

Green Star Design & As Built

New Zealand v1.1.1

Submission Guidelines



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ACKNOWLEDGEMENTS

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We would like to highlight and thank the following individuals for their contribution in the delivery of the *Green Star - Design & As Built NZv1.1*.

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AUTHORISATION AND DISCLAIMER

The Green Star NZ rating system ('Green Star Rating System') and the Green Star NZ Rating Tools ('Rating Tools') have been developed by the New Zealand Green Building Council ('NZGBC'). The Rating Tools are intended for use by project teams, contractors and other interested parties to validate sustainability initiatives of the design, construction and operation phases of eligible projects.

The Green Star NZ Rating System and the Rating Tools have been developed with the assistance and participation of representatives from many organisations. The Rating Tools may be subject to further development in the future. The views and opinions expressed in the Submission Guidelines have been determined by the NZGBC.

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The application of the Submission Guidelines to all Eligible Projects is encouraged to assess and improve their environmental attributes.

The NZGBC offers a formal certification process whereby persons may apply for a particular design or project to be assessed for compliance with the criteria specified in the Submission Guidelines upon payment of the relevant fee and execution of the required documentation by the applicant.

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LIST OF CREDITS

Index	Credit	Points available
MANAGEMENT		
1	Green Star Accredited Professional	1
2	Commissioning and Tuning	4
3	Adaptation and Resilience	3
4	Building Information	1
5	Commitment to Performance	2
6	Metering and Monitoring	1
7	Responsible Construction Practices	2
8	Operational Waste	1
INDOOR ENVIRONMENT QUALITY		
9	Indoor Air Quality	4
10	Acoustic Comfort	3
11	Lighting Comfort	3
12	Visual Comfort	3
13	Indoor Pollutants	2
14	Thermal Comfort	2
ENERGY		
15	Greenhouse Gas Emissions	18
16	Peak Electricity Demand Reduction	2
TRANSPORT		
17	Sustainable Transport	10
WATER		
18	Potable Water	10

MATERIALS		
19	Life Cycle Impacts	11
20	Responsible Building Materials	3
21	Sustainable Products	3
22	Construction and Demolition Waste	1
LAND USE & ECOLOGY		
23	Ecological Value	3
24	Sustainable Sites	2
EMISSIONS		
25	Stormwater	2
26	Light Pollution	1
27	Microbial Control	1
28	Refrigerant Impacts	1
INNOVATION		
29	Innovation	10

CHANGE LOG

Index	Credit	July 2023
MANAGEMENT		
1	Green Star Accredited Professional	●
	<p>R1.01.01 Alternative compliance requirements provided for GSAP Engagement</p> <p>R1.01.02 Defining Preliminary Design as it is a term commonly used in New Zealand in replacement of Schematic Design.</p>	
2	Commissioning and Tuning	▲
	<p>The credit is updated to mandate Commissioning and Tuning. 2 points can still be achieved when the conditional requirement is met.</p> <p>R1.02.01 Update to the guidance for Nominated Building Systems</p> <p>R1.02.02 Additional documentation guidance provided for the innovation of Exceeding Green Star Benchmarks – Supplementary or Tenancy Fitout Systems Review</p> <p>R1.02.03 Additional documentation guidance provided for the Market Transformation – Soft Landings Framework</p>	
3	Adaptation and Resilience	▲
	<ul style="list-style-type: none"> The credit is updated to add a conditional requirement for the climate change pre-screening checklist. Guidance for Climate Changed Risk Assessment and Adaptation Plan is updated to improve clarity by referencing localized resources and approaches. <p>R1.1.03.01 The Conditional Requirement is reworded for clarity.</p>	
4	Building Information	
5	Commitment to Performance	▲
	<p>R1.05.01 Recognition of CarboNZero for Building Operations</p> <p>R1.1.05.01 Recognition of Net Zero Buildings certifications (formerly CarboNZero)</p>	
6	Metering and Monitoring	●
	<p>R1.06.01 An example added for the metering and monitoring requirement.</p> <p>R1.06.02 Additional guidance for defining function spaces.</p>	

	R1.06.03 Update to the guidance by referencing NABERSNZ resources.	
7	Responsible Construction Practices	▲
	R1.07.01 80% of all individuals that work on site for at least 3 days, representing a contractor or sub-contractor, must receive training to comply with the requirements of the Knowledge of Sustainable Practices. R1.07.02 Expanded definition for Responsible Party R1.07.03 Additional guidance for projects having multiple main contractors. R1.07.04 Additional guidance for Programs and Policies	
8	Operational Waste	●
	R1.08.01 Updated documentation requirements for 8B prescriptive pathway: facilities	
INDOOR ENVIRONMENT QUALITY		
9	Indoor Air Quality	●
	R1.09.01 Technical clarifications added for maintenance of ducted split system fan coil units (DX split/VRF/VRV) R1.09.02 Updated test standards for source of pollutants R1.09.03 Added guidance for exhaust ventilation flow rate for a print and/or photocopy room R1.09.04 Updated supporting evidence for 9.1 R1.09.01 Clarifications provided for circumstances where the highest level of filtration possible in the FCU is G2, i.e. in smaller FCUs, and only access downstream of the heating/cooling coils is possible	
10	Acoustic Comfort	▲
	R1.10.01 A clarification added for defining target of Internal Noise Levels when a single figure dBA value is provided in AS/NZS2107 R1.10.02 A clarification added for the time period selected for measuring Internal Noise Level R1.10.03 Compliance with the reverberation criterion should be demonstrated for all common areas R1.10.04 Additional guidance of showing reverberation compliance R1.10.05 Clarifications added for supermarket projects R1.10.06 A clarification added for acoustic separation compliance R1.10.07 Updated requirements for 10.3A as per Green Star Buildings R1.10.08 Updated requirements for 10.3B as per Green Star Buildings R1.10.09 A clarification added to allow exemptions of special functional spaces R1.10.10 Updated definition of Qualified Acoustic Consultant R1.1.10.01 Clarifications added for nominated areas	
11	Lighting Comfort	●

	<p>R1.11.01 Allow retail sections in supermarkets to be excluded from the nominated area for credits 11.2, 11.3, and 11.4.</p> <p>R1.11.02 Alternative metrics for LED lighting to demonstrate compliance for flicker-free lighting</p> <p>R1.11.03 The guidance reference for 'Office Spaces' in the Lighting Comfort - General Illuminance and Glare Reduction credit criterion is updated to Table E1 of AS/NZS 1680.2.2:2008 'Interior and workplace lighting Part 2.2: Specific applications - Office and screen-based tasks'.</p> <p>R1.11.04 Additional guidance provided for Localized Lighting Control</p> <p>R1.1.11.01 Allowing project teams to use calculated maintenance factors according to AS/NZS 1680</p>	
12	Visual Comfort	▲
	<p>R1.12.01 Clarifications added for nominated area</p> <p>R1.12.02 Minor corrections to address that there is no requirement to use a dynamic simulation software where the Visual Comfort credit is met through the Compliance Using Daylight Factor option.</p> <p>R1.12.03 Additional guidance provided for the 8m sightline requirement.</p> <p>R1.12.04 Alternate compliance criteria provided for Visual Comfort – Views</p> <p>R1.12.05 Additional guidance provided for blinds installed by tenants</p> <p>R1.1.12.01 Allowing project teams to use the Annual Sunlight Exposure (ASE) metric to assess glare risks for skylights</p>	
13	Indoor Pollutants	●
	<p>R1.13.01 Minor corrections to clarify product categories for internally applied intumescent paints and concrete sealers. Glazes and sealants applied offsite can be excluded.</p> <p>R1.13.02 DIN EN 717-2 is now renamed to DIN EN ISO 12460-3:2016-0</p> <p>R1.13.03 Additional guidance provided for Exceeding Green Star Benchmarks – Ultra Low VOC Paints. Compliance can be demonstrated by cost for this innovation.</p> <p>R1.1.13.01 Reference to the NZGBC Website instead of GBCA Website for Recognized Product Certification Schemes.</p> <p>R1.1.13.02 A calculation clarification added to 13.2 Engineered Wood Products</p>	
14	Thermal Comfort	●
	<p>R1.14.01 Climate zones updated according to the newly released New Zealand Building Code in 2021</p> <p>R1.1.14.01 Clarifications added for Naturally Ventilated Spaces</p> <p>R1.1.14.02 Clarify that a producer statement can be submitted in lieu of a full energy report</p>	
ENERGY		
15	Greenhouse Gas Emissions	▲
	The credit has been reframed with the following key changes:	

	<ul style="list-style-type: none"> • Total points reduced from 20 to 18 • Separate points for energy efficiency improvement removed and added to overall GHG Emissions reduction. • Increased threshold for conditional requirements for 4, 5 and 6 Star ratings • Fossil fuel limits set up for 4 and 5 Star buildings • Fossil fuel ban for 6 Star buildings • Shared services detail moved to Guidance Document 	
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16	Peak Electricity Demand Reduction	●
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R1.16.01 || Additional guidance added for 16A.

R1.16.02 || Additional guidance to define mixed-use project or building

R1.1.16.01 || Clarify that a producer statement can be submitted in lieu of a full energy report.

TRANSPORT

17	Sustainable Transport	▲
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R1.17.01 || Performance pathway incorporated

R1.17.02 || A peak population occupancy provided by a consultant Fire Report can be used to determine the carparking provision.

R1.17.03 || Changing the end-of-trip facilities requirements for Regular Occupants and its worked example

R1.17.04 || Showers and bathrooms provided to meet statutory accessibility requirements are not included in the calculation of end of trip facilities.

R1.17.05 || Clarifications provided for drop-off lanes/spaces

R1.1.17.01 || To confirm amenities are within 400m of the project, the site plan should show the measured walking distance (instead of the radial distance) from the centre of the project following a designated path to the amenity to meet the credit requirement.

R1.1.17.02 || Clarifying Low Emission Vehicle Infrastructure

WATER

18	Potable Water	▲
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R1.18.01 || Total points for credit 18 reduced from 12 to 10. The two points previously set up for unrealistic reduction targets have been relocated to credit 19 Life Cycle Impacts.

R1.18.02 || 1 point available for Heat Rejection under the prescriptive pathway.

R1.18.03 || Clarifications added for showers' WELS rating.

R1.18.04 || Clarifications provided for specialist fixtures and excluded fixtures.

R1.18.05 || Additional guidance provided for showing compliance of water saving from heat rejection

R1.18.06 || Additional guidance provided for Fire Protection System Test Water

R1.1.18.01 || Allow on-site testing as a way to show compliance

R1.1.18.02 || Allowing supplier/manufacture literature or packaging/photos of packaging showing the WELS rating to be submitted in lieu of WELS certificates

MATERIALS

19 Life Cycle Impacts ▲

This credit has been reframed with the following key changes:

- Total points increased from 7 to 11
- New criteria set up for upfront carbon emissions and long-term carbon storage
- No prescriptive pathway
- A conditional requirement added for upfront carbon emissions

Specific guidance and pathways provided to guide projects' calculations of upfront carbon emissions.

R1.1.19.01 || Clarifications added for the absolute value pathway

R1.1.19.02 || Addressing the purpose of calculating Whole-of-life embodied carbon

R1.1.19.03 || Guidance added for upfront carbon reduction assessment by referencing newly developed resources like the Green Star NZ Embodied Carbon Methodology, Embodied Carbon Emissions Calculator and Guide.

R1.1.19.04 || Updates to peer review requirements

R1.1.19.05 || Add the definition of IPCC AR6

R1.1.19.06 || Updates to the definition of Biogenic Carbon

20 Responsible Building Materials

R1.20.01 || If the 'Responsible Building Materials - Timber' credit criterion is made 'Not Applicable', the project is not eligible to claim the innovation point for timber furniture.

R1.20.02 || Recognition of 'FSC Mix' certification

R1.20.03 || Clarifying the PVC criterion should apply to carpet underlay and mechanical ductwork.

R1.20.04 || Clarifications added for auditing requirements of best practice PVC

Steel manufacturers are no longer required to be a member of the World Steel Association's (WSA) Climate Action Programme (CAP). Steel making facilities are only required to have a currently valid and certified IS 14001 Environmental Management System in place.

21 Sustainable Products ▲

	<p>R1.21.01 Responsible and sustainable systems can be included in the assessment of this credit.</p> <p>R1.21.02 The cost of reused products/materials shall be entered as the replacement cost for a new product/material with the same characteristics</p> <p>R1.21.03 Clarifications provided for cement and concrete products with EPDs</p> <p>R1.1.21.01 Guidance added for showing compliance of façade major components</p>	
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22	Construction and Demolition Waste	▲
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	<p>R1.22.01 Calculation clarifications provided for the fixed benchmark pathway</p> <p>R1.22.02 Refer to the updated <i>New Zealand Green Star Construction and Demolition Waste Reporting Criteria</i>.</p> <p>R1.22.03 Guidance added for Integrated Fitout Projects</p>	
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LAND USE & ECOLOGY

23	Ecological Value	●
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	<p>R1.23.01 Definitions introduced for Native Vegetation and Novel Native Ecosystem</p> <p>R1.23.02 Clarification added for cooling properties of artificial water bodies</p> <p>R1.23.03 Clarification added for Plant density</p>	
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24	Sustainable Sites	▲
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	<p>R1.24.01 Updated requirements and guidance to provide clarity of ecologically significant sites.</p> <p>R1.24.02 Guidance added for eligibility check</p> <p>R1.24.03 Clarifications provided for minor local contamination and credit eligibility.</p> <p>R1.24.04 ISO standard 18504: Soil quality: Sustainable Remediation is a recognized option for Best Practice Remediation Strategy</p> <p>R1.24.05 Health and Safety at Work legislation is referenced for compliance of Hazardous Materials</p> <p>R1.1.24.01 Guidance added for lands that have been planned for high density development.</p>	
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EMISSIONS

25	Stormwater	▲
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	<p>R1.25.01 Change from 'dissolved' Zinc and Copper to 'total' Zinc and Copper under table 25.2 Pollution Reduction Targets.</p>	
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	R1.25.02 Incorporation of a technical clarification issued in April 2020 which allows the Zinc and Copper to be excluded from modelling when proper source control methods are available.	
26	Light Pollution	▲
	R1.26.01 Reference to a newer standard R1.26.02 Light pollution to existing neighbouring buildings within campus may be excluded from the criteria for light pollution to neighbouring bodies. R1.26.03 Projects may use UWLR (Upward Waste Light Ratio) instead of (ULOR) Upward Light Output Ratio when targeting Light Pollution R1.26.04 Guidance added for exterior lighting that can be exempted R1.26.05 Guidance added for time clock methodology	
27	Microbial Control	
28	Refrigerant Impacts	
INNOVATION		
29	Innovation	●
	R1.29.01 Clarifications added for 29.5 Global sustainability Digital infrastructure is removed as it cannot be awarded as an innovation	

Legend

●	Expanded guidance and minor wording corrections throughout credit to improve clarity. Added ‘Design Review’ note to <i>Documentation Requirements</i> section.
▲	Amendments to criteria or compliance requirements, in addition to amendments in ●.

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INTRODUCTION

ABOUT THE NEW ZEALAND GREEN BUILDING COUNCIL

The New Zealand Green Building Council is a team of people who are passionate advocates for better buildings, because we know that better buildings mean healthier, happier Kiwis. We do this by working alongside politicians, industry, businesses, and other organisations to bring change.

We're a not-for-profit organisation, and we believe that all New Zealanders deserve to be safe, healthy and happy in our beautiful country – at home, at school, at work. Everywhere.

WHAT IS GREEN STAR?

Green Star is an internationally recognised rating system that delivers independent verification of sustainable outcomes throughout the life cycle of the built environment.

Green Star's mission is to “*create sustainable places for everyone*”. Green Star aims to achieve this by encouraging practices that:

- Reduce the impact of climate change.
- Enhance the health and quality of life of inhabitants and the sustainability of the built environment.
- Restore and protect the planet's biodiversity and ecosystems.
- Ensure the ongoing optimum operational performance of buildings and fitouts.
- Contribute to market transformation and a sustainable economy.

Green Star is composed of four distinct sustainability rating tools, each relevant to distinct phases of the built environment.

- *Green Star – Communities*: a holistic rating tool for communities and precincts.
- *Green Star – Design & As Built*: a holistic rating tool for the design and construction of new buildings and major refurbishments.
- *Green Star – Interiors*: a holistic rating tool for the design and construction of new interior fitouts.
- *Green Star – Performance*: a holistic rating tool for sustainable building operations.

ABOUT GREEN STAR – DESIGN & AS BUILT

Green Star – Design & As Built is a rating tool developed to rate the design and construction of any building. *Green Star – Design & As Built* aims to:

Assist clients and project teams to achieve and rate their sustainability goals for their project.

Encourage a new approach to designing and constructing buildings by rewarding sustainability best practice and excellence.

Provide consistent and clear advice in an easy to use manner.

Green Star – Design & As Built assesses the sustainability attributes of a building through nine categories:

- Management;
- Indoor Environment Quality;
- Energy;
- Transport;
- Water;
- Materials;
- Land Use and Ecology;
- Emissions; and
- Innovation

Each category groups a number of issues related to a certain sustainability impact; these are known as Credits. A Credit addresses an initiative that improves or has the potential to improve a project's sustainability performance; each of these initiatives is a criterion.

Credits are weighted in relation with each other by varying the number of points available. Each credit defines a clear outcome that a project must meet. Where the outcome is verified to have been met, a project will be rewarded with the relevant available points.

Once all credits are assessed, the total number of points achieved is compared against the available points in the rating tool, and a certified rating is awarded.

'*Green Star - Design & As Built NZ*' certification identifies projects that have demonstrated the achievement of a specific level of sustainability. The rating describes to the industry the sustainability attributes of the project in terms that are widely understood and accepted.

||ABOUT VERSION 1.1 AND VERSION 1.1.1

It has been over three years since the launch of *Green Star - Design & As Built* and *Interiors NZv1.0* ("NZv1.0") rating tool. Despite the Covid-19 Pandemic, we are seeing increased adoption of Green Star certifications and growing support from a wider range of sectors, including Healthcare, Retail, and Industrial.

To accommodate the evolving New Zealand building market, New Zealand Green Star rating tools need to continue evolving and staying relevant. In mid-2021, the New Zealand Green Building Council ("NZGBC") started a review of *NZv1.0* by consulting with industry members and decided to launch *Green Star - Design & As Built* and *Interiors NZv1.1* ("NZv1.1") in 2022.

At the same time, the Green Building Council of Australia (“GBCA”) launched a new version of Green Star, namely Green Star Buildings in 2020. As part of the Green Star development strategy, the New Zealand Green Building Council (“NZGBC”) plans to consult with the industry about Green Star Buildings from mid-2022, with a launch expected in 2024. This dictates that *NZv1.1* will perform as a transition version towards Green Star Building.

NZv1.1 draws on comments and suggestions from the market, with recommendations adopted from Expert Reference Panels (ERP), Green Building Council Australia (GBCA) and the Green Star Advisory Committee (GSAC). Key changes between *NZv1.0* and *NZv1.1* include a greater number of Conditional Requirements each project needs to achieve in order to get a Green Star rating, and a major review on carbon and climate change related credits due to the urgent need for change in order to remain in line with a 1.5-degree trajectory. These changes are essential for Green Star to meet current market demands while leading the industry. For further details of the new Condition Requirements, please refer to the eligibility section below and the relevant credits.

NZGBC review feedback and consider revisions over time to continue supporting projects seeking Green Star certifications. Updates to Green Star (i.e. Technical Clarifications) have been recorded and captured in this updated version of *NZv1.1*, namely *NZv1.1.1*, including:

1. Corrections and clarifications
2. Updates to the Life Cycle Impacts credit as relevant calculators are developed.

Note that there is no major criteria change from *NZv1.1* to *NZv1.1.1*. ||R1.1.Intro.01

GREEN STAR RATINGS

Calculating a Green Star Rating

The *Green Star – Design & As Built* Scorecard is used to calculate the Green Star score. The methodology for calculating a Green Star rating is as follows:

- The Conditional Requirements must be met;
- The estimated number of points for each credit criterion, within each credit, is entered into the ‘Points Claimed’ column in the scorecard; and
- Once all claimed points have been entered, the Scorecard automatically compares the points claimed against the requirements for each Green Star rating level, for the total score.

The Green Star Rating Scale

The Green Star rating is determined by comparing the percentage of available points achieved out of the total available points. The rating scale shown below details the percentage thresholds for the Star ratings awarded.

% of available points	Rating	Outcome
Less than 10	Zero Star	Assessed
10 - 19	One Star	Minimum Practice

20 - 29	Two Star	Average Practice
30 - 44	Three Star	Good Practice
45 - 59	Four Star	New Zealand Best Practice
60 - 74	Five Star	New Zealand Excellence
75+	Six Star	World Leadership

In keeping with its position that Green Star recognises and rewards market leaders, the NZGBC only certifies projects that achieve a *Green Star – Design & As Built* rating of 4, 5 or 6 Star.

Points Allocation

||Each point throughout the *Green Star – Design & As Built* rating tool is comparable to any other point in the rating tool. This means that one point in the ‘Management’ category contributes as much to the total score as one point in any of the other categories. The number of points available in each category indicates the relative importance of the impact addressed within that category towards the overall sustainability outcomes.

The number of points available in each category is as follows:

Category	Available Points
Management	15
Indoor Environment Quality	17
Energy	20
Transport	10
Water	10
Materials	18
Land Use and Ecology	5
Emissions	5
Total	100

||R1.Intro.02

There are 10 additional points available in the ‘Innovation’ Category. These points fall outside of the number of available points used to calculate the rating tool threshold. The Innovation points can be used by project teams to increase the number of points achieved to contribute to their rating. For example, if a project has a score of 55%, and is awarded 6 points in the Innovation Category, the total resulting score will be 61% and thus be awarded a 5 Star rating.

‘Not Applicable’

Where a credit or criterion has been approved ‘Not Applicable’, that credit or criterion’s points will be excluded from the total points available. The Green Star score calculated by the scorecard will account for this in the percentage calculations.

UPDATES TO THE RATING TOOL

||The rating tool will be updated regularly as follows:

- One to two yearly revisions– which will result in a release of a revised tool e.g. v1.1.
- Additional reviews (minor updates) may occur throughout the year should a correction be deemed necessary - which will result in a release of an updated version e.g. v1.1.1
- Three to five yearly rating tool overhaul – which will result in a release of a new tool version.

While the rating tool will be updated from time to time, project teams are only subject to the Submission Guidelines for the rating tool that their project is registered under, or if the project team chooses, a later version. Project teams are not subject to clarifications or amendments made as part of a revision.

Update Type	Timing	Purpose	Process
<p>Minor updates, labelled v1.1, v1.1.1, etc.</p>	<p>One to two yearly updates. (Additional updates may be released if warranted.)</p>	<p>To improve the useability of the rating tool, and to continue to promote sustainable outcomes.</p> <p>Minor updates may include:</p> <ul style="list-style-type: none"> • Readability amendments; • Updates to compliance requirements; • Minor updates to benchmarks; • Introduction of prescriptive criteria; • Amendments to innovation; • Amendments to documentation requirements; • Additional guidance to account for changes in the certification process. 	<p>The updates will be based on a continuous review of feedback received throughout the year from project teams, assessment panel and industry.</p> <p>Feedback sources include Technical Questions, Assessment Panel Comments, communication from project teams, communication from industry and working group feedback.</p> <p>Where significant change to the rating tool is necessary within a minor update, the NZGBC will engage in public consultation and all significant changes will undergo an endorsement</p>

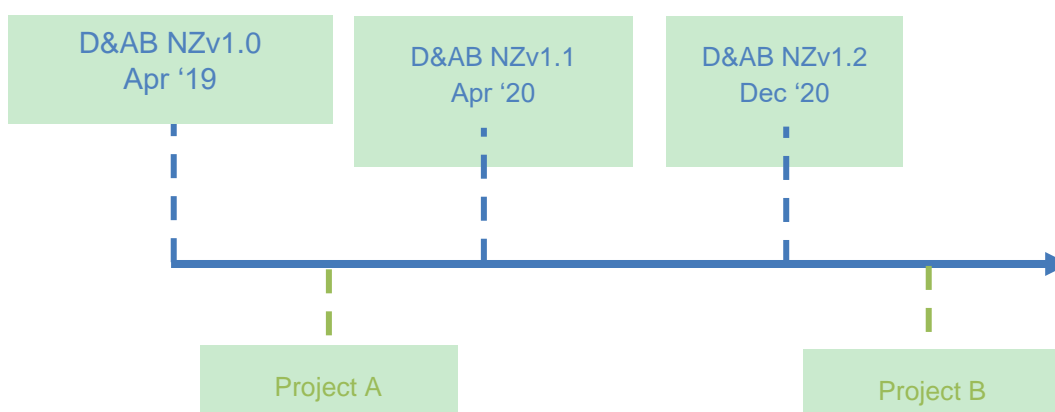
			process through the Green Star Advisory Committee .
Major updates	Scheduled every three to five years.	<p>To ensure that the rating tool remains relevant as a measure of best practice and world leadership.</p> <p>Major updates may include:</p> <ul style="list-style-type: none"> • Major amendments to benchmarks; • Introduction or deletion of criteria, credits, or categories; • Major amendments to credit values. 	<p>The release of a major version will be based on a review of changes in priorities and benchmarks in the built environment.</p> <p>Major releases will involve significant engagement with industry, as well as a review of the achievements through innovation, and a review of certified projects to date.</p>

||R1.1.Intro.02

If an error is found in a Submission Template, or a calculator, the NZGBC reserves the right to make a correction applicable to all registered projects. These are applicable as they correct critical elements which do not accurately reflect the benchmarks or requirements in published credits.

Any release of the Submission Guidelines used by a project team will always have supporting material available for it, such as Submission Templates, Calculators, etc.

Illustration of Green Star Project Registration and Applicable Rating Tool Version



In the example above, project A is registered between the first release of the rating tool (v1.0) and the first update of the rating tool (v1.1). In this case project A:

- Must use the rating tool that was current when they registered (v1.0); and
- May choose to use any of the updates that followed (v1.1, v1.2) if they wish. If the project team chooses to use credits from updates that followed v1.0, they may do so but some conditions will apply.

In the example above, project B is registered after the release of the second update of the rating tool (v1.2). In this case project B:

- Must use the second update of the rating tool (v1.2).

Credit Substitutions and Project Registration Upgrade

Project teams are allowed to substitute certain credits between different rating tools or different versions of the same rating tool. A Technical Question must be submitted to the NZGBC for approval. Project teams may formally update the version (as in move from Version 1.0 to Version 1.1) of the rating tool under which the project is registered by contacting the NZGBC. For additional details on this process, please contact the Green Star team.

THE GREEN STAR – DESIGN & AS BUILT RATING TOOL

The *Green Star – Design & As Built* rating tool is composed of the following documents:

- The *Green Star – Design & As Built* Submission Guidelines and Submission Templates;
- The *Green Star – Design & As Built* Scorecard; and
- The *Green Star – Design & As Built* Calculators and Calculator Guides

Green Star quotes a number of standards, external guides, and legislation, within each credit. Where referenced, these refer to the currently enforced version (for example, by the *New Zealand Building Code*, or local council), unless otherwise stated.

Submission Guidelines

The document that you are reading is known as the *Green Star – Design & As Built* Submission Guidelines. The Submission Guidelines is a collection of all credits applicable to eligible projects. Within this document, all the categories and credits are explained, targets are set, and submission requirements are detailed. The Submission Guidelines contains:

- Information on eligibility;
- Information on the certification process;
- The targets and criteria of each credit; and
- The submission requirements for achieving a *Green Star – Design & As Built* rating.

Categories and Credits

The Submission Guidelines is divided into Green Star categories and credits. Each category includes a number of credits, which in turn describe the targets that a project must meet, and the compliance requirements.

Each credit is structured as follows:

Aim of Credit: Outlines the environmental issue that the credit is targeting, the guiding principles behind the credit, and the desired environmental outcomes of the credit.

Credit Criteria: Explains the issues within the credit that must be addressed in order to meet the 'Aim of Credit'. Where the 'Aim of Credit' is the guiding principle, 'Credit Criteria' outline performance metrics that the project must achieve. This section also outlines the number of available points and how points are either awarded or 'Not Applicable'.

Where there is more than one criterion under this credit, including Conditional Requirement and minimum requirement, each criterion is named with a number, e.g. Credit 23.1 & Credit 23.2. Where there are alternative pathways under one credit or one criterion, each pathway is named with a letter, e.g. Credit 23.1A & Credit 23.1B or 17A & 17B.

Compliance Requirements: Describes the method for demonstrating compliance with the 'Credit Criteria'. Projects should meet the performance and documentation requirements as outlined to be awarded the credit points. Alternatively, if the project would like to meet the intent of the credit by other means, contact the NZGBC via a Technical Question or request for workshop. The 'Compliance Requirements' can provide performance methods or prescriptive methods for demonstrating compliance with a criterion. The performance methods rely on demonstrating compliance with the credit criteria via modelling solutions. The prescriptive solutions are pre-assessed ('Deemed to Satisfy') conditions that have been found to meet the 'Credit Criteria' (for example, a building applying prescriptive sustainability initiatives for the 'Potable Water' credit, rather than modelling the building's predicted water usage).

Where available, credit-specific Innovation points are outlined at the end of each Compliance Requirements section.

Guidance: Contains additional information and clarification on how project teams may demonstrate compliance. The guidance in this section is not mandatory but may offer suggestions on how a project could demonstrate compliance. The Guidance section may also provide a description of how compliance could be demonstrated for alternative space type uses or project delivery type. Definitions and Standards in each credit are also listed in this section.

Documentation Requirements: Details the submission requirements for a credit for both a 'Design Review' and an 'As Built' rating. In all cases, a Submission Template must be presented alongside evidence justifying claims made within. More information is provided in the section titled 'Submitting for Certification'.

Credits Deemed 'Not Applicable'

Credits or specific criteria may not be considered relevant to the sustainability outcomes for some projects. This usually depends on the nature of the building and the inclusion, or otherwise, of a variety of typical features. In this instance, the credit or specific criteria may be considered 'Not Applicable'.

Common instances where a credit may be considered 'Not Applicable' are defined in the Submission Guidelines. However, any credit may be deemed 'Not Applicable' if the project team can demonstrate why this is the case.

In all instances, the project team must seek approval for a credit or criterion to be excluded from the total score available by submitting a Technical Question (formerly known as a Credit Interpretation Request (CIR)). Where a credit or criterion is made 'Not Applicable', that credit or criterion's points will be excluded from the total points available. The Green Star score calculated by the scorecard will account for this in the percentage calculations.

Scorecard

The *Green Star – Design & As Built* Scorecard is an interactive spreadsheet that must be used by anyone seeking a formal rating. The spreadsheet provides a scoring tool that allows project teams to keep track of a project's Green Star score. This spreadsheet is also used by the NZGBC to provide the results of each round of assessment.

The *Green Star – Design & As Built* Scorecard provides a number of error checks to allow projects to determine why a rating can, or cannot, be achieved. These error checks are intended to offer assistance, and follow the information presented in the Submission Guidelines. In all cases, the Submission Guidelines supersedes the information in the Scorecard.

Calculators and Guides

Some credits require additional calculations in order to determine the number of points awarded. For such credits, an additional *Green Star – Design & As Built* Calculator spreadsheet has been developed.

These calculators are provided with a number of supplementary guides that are required reading for projects seeking a Green Star rating. In addition to these calculator guides, other guides are available which provide additional detail on specific credits. These guides complement the Submission Guidelines and, where relevant, provide instructions on completing calculators.

||Please see the table below for a full list of calculators and guides.|| R1.Intro.03

Credit	Calculator	Guide
12. Visual Comfort	No calculator	<i>Daylight and Views Hand Calculation Guide NZv1.1</i>
15. Greenhouse Gas Emissions	<i>Greenhouse Gas Emissions Calculator NZv1.1</i>	<ul style="list-style-type: none"> <i>Energy Consumption and Greenhouse Gas Emissions Calculation Guide NZv1.1</i>
16. Peak Electricity Demand Reduction		<ul style="list-style-type: none"> <i>Shared Services and Low-carbon Energy Supply Assessment Guidelines NZv1.1</i>
17. Sustainable Transport	<ul style="list-style-type: none"> <i>17A Performance Pathway Sustainable Transport Calculator NZv1.1</i> <i>17B Prescriptive Pathway Public Transport Calculator NZv1.1</i> 	<ul style="list-style-type: none"> <i>17A Performance Pathway Sustainable Transport Calculator Guide NZv1.1</i> <i>17B Prescriptive Pathway Public Transport Calculator Guide NZv1.1</i>

18. Potable Water	<i>Potable Water Calculator NZv1.1</i>	<i>Potable Water Calculator Guide NZv1.1</i>
19 Life Cycle Impacts		<i>Life Cycle Impacts Calculator Guide NZv1.1</i>
	<i>Life Cycle Impacts Calculator NZv1.1</i>	<i>Embodied Carbon Calculator NZv1.1</i>
	<i>Embodied Carbon Calculator NZv1.1</i>	<i>Embodied Carbon Methodology R1.1.Intro.03</i>
21. Sustainable Products	<i>Sustainable Products Calculator NZv1.1</i>	No guide.
23. Ecological Value	<i>Ecological Value Calculator NZv1.1</i>	No guide.
28. Refrigerant Impacts	<i>Refrigerant Impacts Calculator NZv1.1</i>	No guide.

Technical Questions

Technical Clarifications (TCs) and Credit Interpretation Requests (CIRs) are now referred to as Technical Questions. Technical Questions are intended to assist project teams in instances where clarification is needed or alternative compliance pathways are to be reviewed and approved by the NZGBC. Project teams should complete the Technical Question Form downloadable from the NZGBC website and email the completed form with any supporting documentation to greenstanz@nzgbc.org.nz.

ELIGIBILITY CRITERIA

There are a number of eligibility criteria that must be met in order to be considered eligible for this tool. These range from performance requirements (such as Conditional Requirements) to the types of spaces in the project.

The eligibility criteria for this rating tool are:

- Conditional Requirements;
- Building Type;
- Spatial Differentiation; and
- Timing of Submission for Certification.

To be eligible for Green Star assessment, projects must meet all provisions of the Green Star eligibility criteria as detailed in this section.

||Conditional Requirement

“Conditional Requirements” determine projects’ eligibility for targeting a Green Star rating. Projects must ensure they can fulfil all the Conditional Requirements before registering to Green Star. When a project team fills out the Green Star registration document, they must agree that the project will meet all the Conditional Requirements.

To achieve a certified rating under the *Green Star – Design & As Built NZv1.1.1*, the project must meet “Conditional Requirements’ set in the following credits.

- *Credit 2 Commissioning and Tuning*
- *Credit 3 Adaptation and Resilience*
- *Credit 15 Greenhouse Gas Emissions*
- *Credit 19 Life Cycle Impacts*
- *Credit 24 Sustainable Sites*

NZGBC may request that full documentation be submitted prior to registration to determine project eligibility (recommended supporting evidence are listed in the corresponding credits).

The New Zealand Green Building Council reserves the right to provide the final ruling on a project’s compliance with this Conditional Requirements. Projects are required to contact the NZGBC if they are unsure if they comply or believe they should not be made subject to the Conditional Requirements.|| R1.Intro.04

||Building Type

Green Star – Design & As Built is intended to rate new buildings and major refurbishments. The majority of building types are eligible to be rated, included mixed use developments.

Throughout the *Green Star – Design & As-Built* Submission Guidelines, usage classifications are referenced which originate in the Australian National Construction Code (NCC). Where guidance for specific usage types is provided within *Green Star – Design & As-Built*, this guidance applies to New Zealand projects. Further explanation can be found at www.abcb.gov.au/Resources/Publications/Education-Training/Building-classifications/.

Note: New Zealand based developments that have a residential component should consult with the NZGBC. Homestar is the preferred rating tool available for use by new build residential developments with primarily sole occupant dwellings (whether standalone, terrace housing or apartments).

For projects in New Zealand that are eligible for *Green Star – Design & As-Built* and *Interiors* ratings, a comparison between the Australian NCC Building Classifications and the New Zealand Building Code Clause A1 Classified uses is summarised below to help on the determination of projects' eligibility.

NCC Building Class	NZ Building Code Clause A1 Classified Uses
<ul style="list-style-type: none"> Class 1a: Detached or attached Residential Dwellings (e.g. terraced housing)* 	<ul style="list-style-type: none"> Housing – Detached dwellings & Multi- unit dwellings*
<ul style="list-style-type: none"> Class 1b: Boarding house, hostel or guest house under 300m² and < 12 residents* 	<ul style="list-style-type: none"> Communal Residential – Community Service*
<ul style="list-style-type: none"> Class 2: Apartment buildings with sole occupancy units (SOU)* 	<ul style="list-style-type: none"> Housing – Multi-unit dwellings*
<ul style="list-style-type: none"> Class 3: Residential buildings other than class 1 & 2 (e.g. larger boarding house, hostel, care-type facilities not classified as class 9)* 	<ul style="list-style-type: none"> Housing – Group Dwelling Communal Residential – Community Service Community Care – Unrestrained*
<ul style="list-style-type: none"> Class 4: A dwelling or residence within a building of a non-residential nature* 	<ul style="list-style-type: none"> Housing – Multi-unit dwellings*
<ul style="list-style-type: none"> Class 5: Office 	<ul style="list-style-type: none"> Commercial
<ul style="list-style-type: none"> Class 6: Retail and hospitality 	<ul style="list-style-type: none"> Commercial
<ul style="list-style-type: none"> Class 7a: Carparks 	<i>Not Applicable for Green Star</i>
<ul style="list-style-type: none"> Class 7b: Warehouses, storage buildings, wholesale distribution centres 	<ul style="list-style-type: none"> Industrial
<ul style="list-style-type: none"> Class 8: Factories, Industrial Buildings, laboratories. 	<ul style="list-style-type: none"> Industrial
<ul style="list-style-type: none"> Class 9a: Hospitals 	<ul style="list-style-type: none"> Community Care - Unrestrained
<ul style="list-style-type: none"> Class 9b: Assembly buildings 	<ul style="list-style-type: none"> Communal non-residential – Assembly service & Assembly Care
<ul style="list-style-type: none"> Class 9c: Aged care buildings* 	<ul style="list-style-type: none"> Community Care – Restrained*

* Homestar is the preferred pathway || R1.Intro.05

Spatial Differentiation

To meet the Spatial Differentiation criterion, the project must be clearly distinct. Only distinct projects are eligible for assessment; project components are not eligible.

Shared building services (such as HVAC plant or water treatment) or amenities (such as waste rooms or bicycle facilities) do not affect the building's eligibility for Green Star assessment.

Sub-tenancies are considered part of the fitout and cannot be excluded from the rating.

Timing of Registration and Certification

All projects registered for *Green Star – Design & As Built* must achieve an As Built certified rating. Registered projects have the option of achieving a Design Review certified rating as an interim step towards As Built certification.

Design Review Certified Rating

Submissions for a Design Review certified rating can be lodged as soon as the required evidence is available, but prior to practical completion. The Design Review is intended as an opportunity for assessment at an early stage, to lend confidence where desired by project teams.

As Built Certified Rating

Submissions for an As Built certified rating can be lodged after practical completion.

Timing Requirements

The following timing requirements are applicable to all registered projects:

As Built certified ratings must be achieved within 24 months of practical completion.

As Built certified ratings do not expire.

Design Review certified ratings must be achieved prior to practical completion.

Design Review certified ratings will expire when either of the following occurs:

- The project achieves an As Built certified rating, or;
- The project reaches 24 months post practical completion.

Design Review certified rating will be cancelled at any time if there is no intent to achieve an As Built certified rating.

SUBMITTING FOR CERTIFICATION

Certifying Your Project

The *Green Star - Design & As Built* rating tool awards only one type of rating - '*Green Star - Design & As Built*' - with three levels of certification (4 Star, 5 Star, and 6 Star).

Information on the certification process is outlined in detail on the NZGBC website. The NZGBC can also provide training to support project teams as they prepare their submission documentation for assessment.

To be awarded a credit within the *Green Star – Design & As Built* rating tool, compliance must be demonstrated through documentation. This documentation is used by the NZGBC's independent Certified Assessors, to establish whether the credit criteria have been met. The independent assessment phase is fundamental to the integrity of the Green Star rating system.

The documentation requirements for the *Green Star – Design & As Built* rating tool do not encourage the submission of large volumes of documentation, but rather a selection of relevant information that clearly demonstrates compliance for each claim made in the Submission Templates. These requirements are detailed in this Submission Guidelines, on a credit-by-credit basis.

How Documentation is Described in the Submission Guidelines

All credits contain a requirement for a Submission Template to be completed. It must be accompanied by additional evidence, relevant to each criterion that is being claimed. The evidence required to demonstrate compliance with each criterion is detailed in the 'Documentation Requirements' section within each credit and within the Submission Templates themselves.

Submission Template

In all credits, the project team must submit a Submission Template summarising the steps taken to ensure compliance with the credit criteria. The Submission Template is the principal method by which the project team communicates with the Certified Assessor(s). It specifies the information and narrative required to confirm that the project complies with the Credit Criteria. The Submission Template will ask project teams to justify their claims with evidence that must be included in their submission.

Each Submission Template is available on the NZGBC website. Projects shall submit the Submission Templates as developed by the NZGBC and are not permitted to use an alternative document without prior consent from the NZGBC.

For both the 'Design Review' and 'As Built' rating, the project team is required to provide evidence of delivery to verify the information and narrative given in the Submission Template. A list of recommended supporting evidence is highlighted in the Documentation Requirements section at the end of each credit.

Evidence for A Claimed Criterion

Additional evidence will be required to support the claims made in the Submission Templates. Each credit notes sample evidence that may be required at the time of assessment. The evidence listed in each credit does not constitute a requirement, and project teams are not required to submit all of it, only what is needed to support your claim. Only submit evidence that project teams would have as part of your design or construction process. All supported documentation listed for each credit in the Submission Guidelines are suggestions only, unless specified otherwise. Alternate documentation to those listed can be used by project teams to demonstrate credit compliance if it adequately supports the claims made within the Submission Templates.

Design Review

As the 'Design Review' rating is aimed at projects early in the design development phase, detailed information and documentation may not be available to support claims made in the Submission Template. As such, when information is not known, as detailed work has not occurred yet, the claims made in the Submission Template should be considered as 'brief requirements' or 'client instructions' backed by evidence showing this is the case. It is noted that a simple statement of commitment will not suffice. Rather, information must be provided showing that the broad strategies and processes to deliver a certain outcome have been agreed to.

Please review and follow the Guidance on [Submitting for Design Review](#) to prepare a design review submission.

||While the Design Review process is a valuable tool to ensure the project is on track for achieving certification, it does not guarantee an As Built rating. The As Built submission assesses what has been completed and delivered on site, not the commitments.

Built streamlining can be offered to projects that have been awarded design review ratings. But a list of eligible credits should be approved through a Technical Question submission to the NZGBC. Guidance for built streamlining is provided in the following section.|| R1.Intro.06

As Built Submission

As the 'As Built' rating is intended to demonstrate that Green Star outcomes have been achieved for the building as constructed, supporting documentation is required to back up the claims made in the Submission Templates. Under the Documentation Requirements section, each credit lists recommended supporting documentation.

The key requirement is that evidence is provided to support each claim made within the Submission Template.

Unless explicitly noted, the evidence submitted should exist in the form of documentation produced as part of the design, procurement, construction, or commissioning process. With the exception of Submission Templates, project teams are discouraged from producing documentation specifically for Green Star, if this can be avoided.

A supporting documentation table is provided at the end of each section in the Submission Templates. Project teams must clearly reference the supporting documentation submitted which backs up all claims made in that section. Project teams are not required to highlight, or

mark up any supporting documentation, however must clearly reference the relevant section of that document.

Example: Referencing Supporting Documentation

An example of how to clearly reference evidence in the supporting documentation table is provided below:

Supporting Documentation (Name / title / description of document)	Reference (Page no. or section)
Letter of appointment for GSAP from building owner (Scope of works under heading 'Roles and Responsibilities' on page 5)	Pages 4-6
GSAP certificate demonstrating continual enrolment (2015 to 2017)	Pages 7-10
Meeting minutes Extracts from meeting minutes held on the project between 2015 and 2017 demonstrating GSAP involvement throughout the design and construction phase.	Pages 10-15
Letter from the building owner post practical completion	Page 16

General Submission Requirements

The NZGBC also has a number of other mandatory submission requirements. Please refer to the 'Submission Requirements Checklist' for this list of requirements. The 'Submission Requirements Checklist' is contained in the same folder as the Submission Templates on the NZGBC website.

||Built Streamlining

If a project has been awarded points under a Design Review rating, the project team may demonstrate Built compliance by confirming that the building has been constructed as per the information submitted and certified under the Design Review rating in the place of full documentation.

Should a project wish to do built-streamlining, a Technical Question needs to be submitted to the NZGBC in order to propose and confirm credits and points that are eligible for built streamlining. A signed statement should be provided along with the Technical Question, confirming the project has been constructed with no significant changes that would affect compliance with the credit criteria.

Note that where the Submission Guidelines recommend evidence to demonstrate that systems have been commissioned and installed as intended, a commissioning report (or similar) would still be required as part of the Built submission or Technical Question.

The purpose of the signed statements is not to remove the requirement for project teams to produce documentation, but rather to stop project teams having to spend additional time and resources on the collation of the as-built documentation into a Green Star submission.

Note: should there be any changes in design or material that would impact the results of the original assessment, full built documentation must be provided. If the project team would like to target additional points which were not achieved at Design stage, full built documentation must be provided for the additional points. The NZGBC Assessors reserve the right to request built documentation where they deem the difference between Design and Built stage to be substantive.|| R1.Intro.07

Best Practice Submissions

[What Do Best Practice Green Star Submissions Look Like](#) is a document established by the Green Building Council of Australia to guide best practice submissions. Please read and follow the 7”C”s principles outlined in the document to prepare Green Star submissions. Hyperlinks should be avoided in the submission template as they sometimes break after the submission is uploaded and incur cybersecurity issues.

We encourage you to provide all the evidence in PDFs (except calculators) and each credit should stand on its own with the associated documents. Previous assessments have shown the disadvantage of cross-referencing documents in submissions.

Highlights and mark-ups are recommended as better ways to present documentation, which will eliminate the need for further clarifications.|| R1.Intro.08

List of Evidence

This section describes and clarifies the evidence that a project team could submit to demonstrate compliance with Green Star credits. Refer to the individual Submission Templates and this list when compiling evidence for a Green Star submission.

Unless explicitly noted, the evidence submitted should exist in the form of documentation produced as part of the design, procurement, construction, or commissioning process. Project teams are advised to use such documents as evidence for justifying claims.

Certificate - An official third-party document that certifies that an individual or organisation possesses the qualifications sought in the relevant credit. ||All the submitted certificates are expected to be current and up-to-date. An expired product certification may be accepted for a built rating project if the certificate expired after the date the final design specification was issued. In this instance, the project team is required to provide a dated specifications/drawing (and evidence this was the final issue) showing that the product was specified whilst the eco-label certification was current.|| R1.Intro.09

Confirmation - An official letter from the relevant party that has authority to confirm an aspect of compliance. The letter must state, recite, or confirm compliance with the Credit Criteria or part thereof. The letter must be project-specific, signed, dated and on company letterhead, as per ISO 9001. Also referred to as: ‘Statement’ or ‘Letter of Confirmation’.

Contract(s) - Full copies or extract(s) from the contract(s) (as required) that clearly stipulate compliance with the Credit Criteria. Relevant sections must be highlighted to allow for quick identification of the relevant clauses.

Terminology that dilutes compliance (e.g. ‘or equivalent’), is not acceptable. Clauses must stipulate that any deviation from the criteria be approved by the professional who can enforce adherence to design intent.

Cover Letter - A letter used to identify the number of points claimed in a credit, or whether it was deemed 'Not Applicable' The Cover Letters are provided by the NZGBC and can be found in the NZGBC website.

Drawings - Drawings in Green Star refer to architectural and engineering plans, elevations and sections that are generally used to locate items in a building.

All drawings must be on official letterhead, contain the project's or the building's name, the version number, and the change log. Where a drawing is typical to a number of buildings or floors, the drawing must clearly state that this is the case, and nominate the typical buildings, or typical building type. The drawings must clearly state what type of drawing they are.

When submitting drawings for the 'As Built' rating, the drawings should be those used for construction, or drawn after construction has finished. If the drawings are from an earlier stage, the submitter must state why these drawings are appropriate when using them as justification.

Meeting Schedule - A document that lists the dates, purpose, and attendees of project team meetings.

Photographic Evidence – A photograph or set of photographs that demonstrate that a design feature has been installed. The evidence must clearly show the design feature, the context and location where it is installed, that it is part of the registered project and give a date that the photograph(s) was taken.

Report - An official report from a relevant professional that provides an analysis and draws a conclusion on an aspect of the design. The report must be project-specific, dated, and on company letterhead.

Specification(s) - Written descriptions of the works that are to be performed for the project. Specifications are used to delineate the required works, the requirements for a product's characteristics, and the verification procedures for the installed item, or the works performed. They also list legal requirements, quote or name applicable standards.

When used to justify a claim, all specifications must be on official letterhead, contain the project's, or the building's name, and the version number. Where a specification is typical to a number of buildings, the specification must clearly state that this is the case, and nominate the typical buildings, or typical building type.

Tender Documentation – Where tender documentation is used to justify a submission, the project is required to provide either specifications, or drawings, or a contract, or other supporting evidence that forms part of the tender package. In such a case, the project must ensure that the evidence provided complies with the descriptions as detailed in this section.

Third-Party Documentation - Full copies or extracts, as stipulated, from public, non project-specific documents. When submitted as evidence, the relevant elements of the document must be clearly identified with colour (e.g. circled or highlighted). Examples may include standards, public transport timetables or local planning regulation.

AREA DEFINITION

List of Areas

Site - The area or land associated with the building. In most cases this will be the legal site boundary, as defined in the Certificate of Title. Where multiple buildings are developed on a single title site, a Technical Question should be submitted detailing the areas attributed to each building.

Common Spaces - Common entrances, lobbies, corridors, stairs, and elevators, where present, such as in a multi-unit residential setting.

Gross Floor Area (GFA) – The total floor area of all parts of a building that are permanently covered and can be protected from the elements. For purposes of Green Star, car parking (including under cover car parking) should not be included in the GFA, unless stated otherwise.

Nominated Area

The nominated area refers to the area of a building(s) which are nominated as relevant to a particular credit criteria. Within the *Green Star – Design & As Built* rating tool, several credits make reference to ‘nominated area,’ particularly in the Indoor Environment Quality category. The nominated area can include primary, secondary, and tertiary spaces, as defined in the Definitions section of each credit. Gross Floor Area (GFA) and Site is also applied to certain credits as Nominated Area.

The intent is for project teams to clearly indicate which areas in the project are included and excluded from the nominated area. The definition of areas will provide project teams with clarity on spaces applicable to credits that reference nominated area.

To assist projects transitioning to use of the Interiors tool, NZGBC has developed an Area Definition Form which may be submitted with the Round 1 submission to clarify the space types within the project, (“nominated areas”) and the relevant criteria to be applied to these spaces types.

Primary Space – All areas where a person is expected to work, or remain for an extended period of time, including, but not limited to:

- Offices, either open plan or private;
- Residential lounge rooms and bedrooms;
- Classrooms, laboratories, computer labs;
- Ward rooms, nurse’s stations, clinic rooms;
- Kitchen and preparation areas where food is being sold;
- Retail / sales floor, exhibition halls, galleries (unless exclusion is justified), multi-purpose rooms (as a general setting); and
- Occupied areas within industrial buildings such as manufacturing spaces, shop floors and work stations. Warehouse and distribution spaces are considered primary space only if the majority of the space is an area where people expected work, or remain for an extend period of time.

- The predominant use of the space determines the space type classification. Where the functional requirements of the space demand specific ventilation conditions (e.g. laboratories, auditoriums, cinemas, or archives) the exclusion must be justified by the project team in a Technical Question.

||Secondary Space - All areas used to support the principal activity of the primary space. These spaces will be regularly occupied, however a single person is unlikely to remain within for more than 2 hours. Examples of secondary space include:

- Meeting rooms, boardrooms;
- Residential kitchens;
- Auditoriums, gyms, seminar rooms (if not intended for regular classes);
- Waiting rooms, and any diagnostic area where no specific lighting requirements exist;
- Cafeterias, restaurants, seating areas, office breakout areas, food courts;
- Stockrooms.

Where the project team is unsure of whether a space is primary or secondary, it is recommended that the project team either submits a Technical Question for confirmation, or, classify the space as a primary space.

Corridors that are exclusively used for transit between spaces (i.e. do not act as a foyer, lounge, waiting space, or reception), and are bound on both sides by a wall these are excluded from the nominated area. Where a corridor is part of a shared space, this corridor, or section of a corridor, cannot be excluded and is considered part of the adjacent space.

Tertiary Space – All areas which are either transient spaces, or accessed intermittently. Examples of tertiary spaces include:

- Back of house areas;
- Corridors;
- Hallways;
- Plant rooms;
- Storage facilities, storerooms, storehouses, depots or similar;
- Warehouse and distribution spaces if they are unoccupied;
- Service riser;
- Toilets and end-of-trip facilities ||R1.1.Intro.04

Project teams can choose to submit a Technical Question to have their identification of spaces types in their project confirmed.|| R1.Intro.10

ADDITIONAL INFORMATION

Green Star Courses and Further Training

As a key part of delivering our vision of sustainable, green buildings for healthier, happier New Zealanders, the team here at the Green Building Council run training and education programmes to support the industry.

Our range of education and training covers all the vital sustainable practices in the built environment, and is designed to provide key knowledge on Green Star tools, encourage collaboration amongst green building practitioners, and provide news of the latest innovations, technologies and trends.

Undertaking our Green Star training leads to two qualifications: Green Star Practitioners or Green Star Accredited Professionals.

Green Star Practitioner training is for professionals who don't intend to make Green Star submissions, but need to be up-to-date with green building practice, and be able to work successfully within a Green Star project. Completing this training shows knowledge leadership in healthy, less polluting green building practices, and provides a good working knowledge of the Green Star categories and credits, and the need-to-know requirements of working on a Green Star project

The Green Star Accredited Professional qualification recognises an in-depth knowledge of Green Star and is perfect for industry professionals who intend to act as the core member of a Green Star project team and collate and manage high quality Green Star project submissions.

For information on our Green Star training courses and how to become a Green Star Accredited Professional, please refer to the Events and Education section at www.nzgbc.org.nz. || R1.Intro.11

Feedback on Green Star – Design & As Built

As more research is undertaken in the sustainable built environment sector, Green Star rating tools are updated to reflect new information, practices, tools, and references. The *Green Star – Design & As Built* rating tool will be regularly updated to reflect these changes.

Please see the 'Updates to the Rating Tool' section for additional information.

Ongoing Feedback

The NZGBC encourages feedback on all Green Star rating tools, including the *Green Star – Design & As Built* rating tool. Please send your feedback to greenstarnz@nzgbc.org.nz for consideration by the NZGBC.

REVISIONS AND AMENDMENTS

Revision No.	Date of Release	Description
NZv1.0	11/04/2019	Initial release.
NZv1.1	04/2022	<p>R1.Intro.01 Introduction to v1.1 added.</p> <p>R1.Intro.02 Update to the points allocation</p> <p>R1.Intro.03 Update to the list of calculators and guides</p> <p>R1.Intro.04 More conditional requirements are added</p> <p>R1.Intro.05 Added a comparison between the Australian NCC Building Classifications and the New Zealand Building Code Clause A1 Classified uses</p> <p>R1.Intro.06 Additional guidance for design review</p> <p>R1.Intro.07 Additional guidance for Built Streamlining</p> <p>R1.Intro.08 Additional guidance for Best Practice Submissions</p> <p>R1.Intro.09 Additional guidance for Certificates used as evidence</p> <p>R1.Intro.10 Minor wording corrections to improve clarity for nominated area</p> <p>R1.Intro.11 Update to Green Star Courses and Further Training</p>
NZv1.1.1	07/2023	<p>R1.1.Intro.01 Updates to About Version 1.1 and Version 1.1.1</p> <p>R1.1.Intro.02 Reword the section for Updates to the Rating Tool to reflect the current review progress.</p> <p>R1.1.Intro.03 Updates to calculators and guidance for credit 19 Life Cycle Impacts</p> <p>R1.1.Intro.04 Clarify that toilets and end-of-trip facilities should be defined as Tertiary Spaces.</p>

GLOSSARY

Air Exchange Rate – The rate at which outside air replaces indoor air in a given space. *

Air Handling Unit – Equipment that includes a fan or blower, heating and/or cooling coils, regulator controls, condensate drain pans, and air filters.*

Asbestos – A naturally occurring soft fibrous mineral commonly used in fireproofing materials and considered to be highly carcinogenic in particulate form.

Australian Standards – Documents, produced by Standards Australia, that set out specifications, procedures, and guidelines that ensure the safety, quality, and performance of a large number of products, or methods. They establish a common language which defines quality and safety criteria. See www.standards.org.au

Biodiversity – The totality of living animals, plants, fungi and micro-organisms in a region; the variety of life in all forms, levels and combinations.*

Biomass – Biological material from trees, grasses, agricultural crops or waste. It can be used as a material for manufacturing, though it is most commonly used to generate electricity or heat. It is considered a renewable resource, with a low CO₂ coefficient.

Blackwater – Water which has been mixed with waste from toilets. Blackwater requires biological or chemical treatment and disinfection before re-use.

Building – the base building development seeking Green Star certification.

Building Code of Australia (BCA) – The BCA is produced and maintained by the Australian Building Codes Board (ABCB) on behalf of the Australian Government and State and Territory Governments. The BCA has been given the status of building regulations by all States and Territories.

Building Envelope – The exterior surface of a building's construction: the walls, windows, roof and floor; also referred to as 'building shell'.*

Building Management Control System (BMCS) – As per Building Management System

Building Management System (BMS) – The BMS automatically controls the building services systems to maintain temperature, humidity, ventilation rates and lighting levels to pre determined load requirements and to provide safe, efficient operation of equipment.

BREEAM (Building Research Establishment Environmental Assessment Method) – The UK-based BREEAM green building rating system assesses the environmental performance of both new and existing buildings. See www.breem.org.

Category Score – The percentage of available points in a category achieved by a project.

Certified Assessor – A person, independent of the NZGBC, nominated by the NZGBC, knowledgeable and with experience in the green building industry, who has such assessment qualifications as the NZGBC from time to time determine.

Chlorofluorocarbons (CFCs) – An organic compound made of chlorine, carbon, and fluorine. Commonly used in refrigerants due to their low toxicity and flammability, CFC's have a destructive effect on the Ozone layer. They are slowly being phased away from production

and replaced by Hydrochlorofluorocarbons (HCFCs) and Hydrofluorocarbons (HFCs). Hydrochlorofluorocarbons have a lower Ozone Depleting Potential than CFCs, and can be replaced with Hydrofluorocarbons (HFCs). This last set of chemicals have no Ozone Depleting Potential, though they have a high Global Warming Potential.

Client – The building/project owner or developer responsible for the development/refurbishment of the building and for the engagement (directly or indirectly) of the design team and the contractor.

Cogeneration – The simultaneous production of electrical or mechanical energy (power) and useful thermal energy from the same fuel/energy source. *

Commissioning – The process of putting building services systems into active service. This includes testing and adjusting HVAC, electrical, plumbing and other systems to assure proper functioning and adherence to design criteria and instructing building representatives in their use.

Contaminant – A substance that is not naturally present in the environment or that is present in unnatural concentrations or amounts, and which can (in sufficient concentration) adversely alter an environment.

Contractor – The builder or main person engaged to construct or refurbish the building.

Design Team – The design team comprises all the professionals normally engaged in the design and contract administration of a building project. These typically include architects, engineers (structural, civil, mechanical, electrical, hydraulics, fire), project manager, cost consultant and building surveyor plus other specialists including ESD consultant, landscape architect, acoustics consultant, façade engineer, lighting consultant, etc.

Ecosystem – An interconnected and symbiotic grouping of animals, plants, fungi and micro organisms that sustains life through biological, geological and chemical activity.*

Eligible Project - Any New Zealand-based new build or major refurbishment project of any eligible typology (see above for NCC Building usage classifications and relevant New Zealand Building Code Clause A1 Classified Uses), with a minimum occupancy of 1FTE, and meeting all other eligibility criteria available on the NZGBC website, may target a *Green Star – Design & As Built* Certified Rating using the Submission Guidelines and this Addendum Document as guidance.

Emissions – The release of gases, liquids and/or solids from any process or industry; liquid emissions are commonly referred to as effluents.*

Environmental Impact – Any change to the environment, whether adverse or beneficial, wholly or partially resulting from human activity, industry or natural disaster.*

Environmentally or Ecologically Sustainable Development (ESD) – Australia’s National Strategy for Ecologically Sustainable Development 1992 defines ESD as ‘using, conserving and enhancing the community’s resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased’.

Global Warming Potential (GWP) – GWP provides a measure of the potential for damage that a chemical has relative to one unit of carbon dioxide, the primary greenhouse gas.

Greenfield Site – Land on which no urban development has previously taken place.

Greenhouse Gases (GHGs) – GHGs are gases in an atmosphere that absorb and emit radiation within the thermal infrared range. This process is the fundamental cause of the greenhouse effect.

Green Star Accredited Professional – A building professional who has attended a Green Star Accredited Professional training course in Australia or New Zealand, has passed the GSAP exam, and is certified by the GBCA or NZGBC as an Accredited Professional.

Greywater – Waste water recovered from sinks, showers, washing machines and other water sources that do not contain food or human waste.

Grid – A term used to describe the network of wires and cables which transport electricity from a power plant.*

Ground Water – Water beneath the earth's surface that fills pores between materials such as sand, soil or gravel. Groundwater is a major source of water for agricultural and industrial purposes and is an important source of drinking water.

Hazardous Waste – Waste that is particularly dangerous or destructive; specifically characterised by one or more of the following properties: ignitable, corrosive, reactive or toxic.*

Integrated Fitout – A fitout where the tenancy design and construction is fully coordinated with the base building design and construction.

ISO 14001:2004 – An international standard published by the International Organisation for Standardisation (ISO) which specifies a set of management standards that help organisations administer and control a company's environmental impact and compliance with regulations.

Landfill – A site where waste is deposited and buried under layers of dirt and topsoil.

LEED (Leadership in Energy and Environmental Design) – The US-based LEED Green Building Rating System® is a voluntary, consensus-based national standard for developing high performance, sustainable buildings. See www.usgbc.org/leed.

Mechanically Assisted Naturally Ventilated (MANV) systems – Systems that rely, partially or fully, on fans to move natural (non-conditioned) air through a space.

Mechanical Ventilation – Ventilation systems that use fans or other electrically operated air movement devices to provide ventilation or condition the temperature of air in a building.

Mixed-Mode Ventilation – An approach to ventilating a building that relies on natural ventilation in certain seasonal conditions and is supplemented by mechanical ventilation when needed to maintain occupant comfort.

Nominated Area – The area of a building(s) relevant to particular credit criteria. The definition of Nominated Area varies across different Green Star tools and is uniquely defined within particular credits. For a relevant definition of Nominated Area, please refer to the Credit Criteria of the credit in which the term is used, and the 'List of Areas' section in the Submission Guidelines.

National Construction Code of Australia (NCC) – The NCC was previously known as the Building Code of Australia (BCA). It is published and maintained by the Australian Building Codes Board (ABCB). It contains technical provisions for the design and construction of buildings and other structures throughout Australia.

National Environment Protection Measure (NEPM) – Broad framework-setting statutory instruments defined in the National Environment Protection Council Act. NEPMs outline agreed national objectives for protecting or managing particular aspects of the environment.

Natural Ventilation – The process of supplying and removing air in building spaces by natural means, by using openings in the façade (e.g. windows), non-powered ventilators, solar chimneys and infiltration processes.

Non-Potable Water – Water collected on-site, such as rainwater or stormwater, or recycled/recovered from a previous use such as blackwater or greywater recovery. It does not include water from rivers, lakes or groundwater (bore water) unless the water has previously been used.

Ozone Depletion – Destruction of the Earth's ozone layer, which can be caused by the photolytic breakdown of certain chlorine and/or bromine containing compounds (e.g. chlorofluorocarbons), which catalytically decompose ozone molecules.

Ozone Depleting Potential (ODP) – ODP provides a measure of the potential damage to the ozone layer that a chemical has relative to that of refrigerant type CFC11. See Ozone Depletion, Ozone Layer

Ozone Layer – The protective layer in the stratosphere layer of the atmosphere, about 24 kilometres above the ground, that absorbs some of the sun's ultraviolet rays, thereby reducing the amount of potentially harmful radiation that reaches the earth's surface.*

Passive Design – Design that reduces the energy consumption of a building by taking advantage of natural heating, cooling and lighting.*

Photovoltaics – The use of semiconductor technology to generate electricity directly from the sunlight.*

Practical Completion: The date of issuance of the Code Compliance Certificate (CCC).

Predicted Mean Vote (PMV) – PMV is an index that predicts the mean value of the votes of a large group of persons on the 7-point thermal sensation scale, from +3 (hot) to -3 (cold), based on the heat balance of the human body. Thermal balance is obtained when the internal heat production in the body is equal to the loss of heat to the environment. In a moderate environment, the human thermoregulatory system will automatically attempt to modify skin temperature and sweat secretion to maintain heat balance. A PMV of -1 to +1 corresponds to a Predicted Percent Dissatisfied (PPD) of no more than 25% (i.e. 25% of people are dissatisfied or uncomfortable). A PMV of -0.5 to +0.5 corresponds to a PPD of 10%. A PMV of zero would still mean 5% of occupants are dissatisfied or uncomfortable.

Predicted Percent Dissatisfied (PPD) – PPD is an index that establishes a quantitative prediction of the percentage of thermally dissatisfied people who feel too cool or too warm. For the purposes of the international standard quoted in the Submission Guidelines (ISO 7730), thermally dissatisfied people are those who will vote hot, warm, cool or cold on the 7-point thermal sensation scale (PMV).

Primary Function – The function accounting for over 50% of the GFA.

Primary Space – All areas where a person is expected to work, or remain for an extended period of time, including, but not limited to:

- Offices, either open plan or private;

- Classrooms, laboratories, computer labs;
- Ward rooms, nurse's stations, clinic rooms;
- Kitchen and preparation areas where food is being sold;
- Retail / sales floor, exhibition halls, galleries (unless exclusion is justified), multi-purpose rooms (as a general setting); and
- Industrial spaces, warehouse areas, shop floors, work stations.

These examples are indicative, and the project is encouraged to submit a Technical Question to ensure that all spaces have been accurately defined.

The predominant use of the space determines the space type classification. Where the functional requirements of the space demand specific ventilation conditions (e.g. laboratories, auditoriums, cinemas, or archives) the exclusion must be justified by the project team in a Technical Question.

Project Scope – All areas in a project that have been registered for Green Star. This includes all buildings and any ancillary areas such as parking, landscaping and shared facilities. This definition applies only where the project is registered for a Multiple Building Single Rating.

Potable Water – Water that is drinkable i.e. safe to be consumed.

Psychrometric Chart – A chart showing the air's dry and wet bulb temperatures, humidity, moisture content and enthalpy. It is used to illustrate the condition (temperature, humidity and enthalpy) of air at each point of the air-conditioning process. This information assists with sizing air-conditioning equipment to maintain comfortable internal air temperatures and relative humidity.

Reclamation – Restoration of materials found in the waste stream to a beneficial use that may be other than the original use.*

Recycled Content – Materials that have been recovered or otherwise diverted from the solid waste stream, either during the manufacturing process (pre-consumer) or after consumer use (post consumer). Pre consumer material does not include materials normally re-used by industry within the original manufacturing process, and is also termed 'post-industrial'.*

Recycling – A process by which materials that would otherwise become waste are collected, separated or processed and returned to the economic mainstream to be re-used in the form of raw materials or finished goods. Horizontal Recycling – A recycling system that turns a majority of the original product back into a similar product as the original. Downcycling – a term coined to disparagingly describe creation of a product of lesser intrinsic value manufactured from a material at the end of its service life that had higher initial end use value. Upcycling – a subjective term used to describe the creation of a product with higher intrinsic value, manufactured from a material at the end of its useful life, which had a lower initial end use value.*

Refurbishment – The upgrading of either (or both) a building's fabric and services with the aim of enhancing its ability to attract tenants, improve rental growth and maximise market value. Refurbishment (Full) – Occurs where a building, or portion of a building, is vacated and withdrawn from stock for the purpose of refurbishment which includes replacement of plant and services. Refurbishment (Partial) – Occurs where a building or portion of a building is

vacated and withdrawn from stock for the purpose of refurbishment which normally is restricted to cosmetic improvements.

Relative Humidity (RH) – Ratio of the amount of water vapour in air at a specific temperature to the maximum capacity of the air to hold moisture at that temperature.

Remediation – Efforts to counteract some or all of the effects of pollution after it has been released into an environment.*

Secondary Space – All areas used to support the principal activity of the primary space. These spaces will be regularly occupied, however a single person is unlikely to remain within for more than 2 hours. Examples of secondary space include:

- Meeting rooms, boardrooms;
- Auditoriums, gyms, seminar rooms (if not intended for regular classes);
- Waiting rooms, and any diagnostic area where no specific lighting requirements exist;
- Cafeterias, restaurants, seating areas, office breakout areas, food courts; and
- Stockrooms.

Where the project team is unsure of whether a space is primary or secondary, it is recommended that the project team either submits a Technical Question for confirmation, or, classify the space as a primary space.

Corridors that are exclusively used for transit between spaces (i.e. do not act as a foyer, lounge, waiting space, or reception), and are bound on both sides by a wall these are excluded from the nominated area. Where a corridor is part of a shared space, this corridor, or section of a corridor, cannot be excluded and is considered part of the adjacent space.

Shared Building Infrastructure – Includes, but is not limited to, waste services, delivery yards, toilet facilities and car parks.

Shell and Core – A shell and core office includes finishes and fitout to landlord areas only with services capped off within the riser at each floor and office areas left as a structural shell.

Sick Building Syndrome (SBS) – (1) A human health condition in which infections linger, caused by exposure to contaminants within a building as a result of poor ventilation. (2) Building whose occupants experience acute health and/or comfort effects that appear to be linked to time spent therein, but where no specific illness or cause can be identified. Complaints may be localised in a particular room or zone, or may spread throughout the building and may abate on leaving the building.*

Standard Hours of Occupancy – The hours that the building is generally occupied. This may vary between space types and is further defined in the *Green Star Energy Consumption and Greenhouse Gas Emissions Calculation Guide*

Technical Question – Technical Questions are submitted prior to assessment by a project that clearly meets the Aim of Credit but does not adhere to the stated Compliance Requirements of the relevant Submission Guidelines. Technical Questions are intended to assist project teams where clarification is needed or alternative compliance pathways are proposed.

Tertiary Space – All areas which are either transient spaces, or accessed intermittently. Examples of tertiary spaces include:

- Back of house areas;
- Corridors;
- Hallways;
- Plant rooms;
- Storage facilities, storerooms, storehouses, depots or similar;
- Warehouse and distribution spaces if they are unoccupied.

Project teams can choose to submit a Technical Question to have their identification of spaces types in their project confirmed.

Test Reference Year (TRY) – A year’s worth of recorded hourly weather data that represents a ‘typical’ year of weather data for that specific location from ACADS BSG/CSIRO.

Thermal Comfort – A means of describing occupant comfort that takes into account air temperature, radiant temperature, humidity, draught, clothing value and activity rates.

Virgin Materials – Previously unprocessed materials. A tree that is cut into lumber to make pallets is an example of a virgin material. Lumber recovered from broken pallets to make new pallets is not a virgin material but a recyclable material (US EPA).

Volatile Organic Compounds (VOCs) – VOCs are organic compounds that produce vapours readily at room temperature and normal atmospheric pressure. The Australian usage of the concept of VOC, adopted by the Australia Paint Approvals Scheme, follows a European definition in that VOCs are defined as organic solvents with a boiling point less than 250°C at 101.3kPa or a vapour pressure of 0.01mm of Hg at 21°C (see 13.1 ‘Paints, Adhesives, Sealants and Carpets’ for more information)

Waste Management Plan – A document that outlines how construction and demolition waste will be collected for recycling and recycled, and how the recycling of that waste will be recorded.

Water Efficiency Labelling Standards (WELS) Scheme – Australia and New Zealand’s water efficiency labelling Scheme that requires certain products to be registered and labelled with their water efficiency in accordance with the standard set under the national Water Efficiency Labelling and Standards Act 2005.

Work Setting – A table or workstation with a chair provided. Tables that are shown to have more than one chair provided are considered to be equivalent to one worksetting for each two chairs provided.

Definitions taken from ‘Glossary: Green Glossary for High Performance Green Buildings’ (2004), produced in partnership by Antron and IFMA (International Facility Management Association).

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ACRONYMS

ABCB – Australian Building Codes Board

AFFL – Above Finished Floor Level

AGO – Australian Greenhouse Office

ASHRAE - American Society of Heating, Refrigerating, and Air Conditioning Engineers

ANZECC – Australian and New Zealand Environment Conservation Council

AS, AS/NZ – See Australian Standards

AIRAH – Australian Institute of Refrigeration Air Conditioning and Heating

BCA – See Building Code of Australia

BREEAM - Building Research Establishment Environmental Assessment Method

BRANZ – Building Research Association of New Zealand

CCANZ – Cement and Concrete Association of NZ

CCC – Code Compliance Certificate (New Zealand)

CIBSE – Chartered Institute of Building Services Engineers

DHW – Domestic Hot Water

EA – Environment Australia

EPA – Environment Protection Authority/Agency

EECA – Energy Efficiency and Conservation Authority (New Zealand)

EMANZ – Energy Management Association of New Zealand

EMP – Environmental Management Plan

EMS – Environmental Management System

FMA – Facility Management Association of Australia

FMANZ – Facilities Management Association of New Zealand

FFL – Finished Floor Level

GBCA – Green Building Council of Australia

GFA – Gross Floor Area

GLA – Gross Lettable Area. Refer to PCNZ ‘Guide for the Measurement of Rentable Areas’

GWP – Global Warming Potential

HCFCs – Hydrochlorofluorocarbons, see Chlorofluorocarbons

HFCs – Hydrofluorocarbons, see Chlorofluorocarbons

HVAC – Heating, Ventilation and Air-conditioning

HVAC&R – Heating Ventilation, Air-conditioning & Refrigeration

IAQ – Indoor Air Quality

IEQ – Indoor Environment Quality

IFMA – International Facility Management Association

IPCC – Intergovernmental Panel on Climate Change

LEED – Leadership in Energy and Environmental Design

MDF – Medium Density Fibreboard

MDS – Manufacturer’s Data Sheet

MBSR – Multiple Building Single Rating

NCC – Australian National Construction Code

NLA – Net Lettable Area	PVC – Polyvinyl Chloride
NSW – New South Wales	QLD – Queensland
NZGBC – New Zealand Green Building Council	RCA – Recycled Concrete Aggregate
NIWA – National Institute of Water and Atmospheric Research Ltd (New Zealand)	RAIA - Royal Australian Institute of Architects
NZBC – New Zealand Building Code	SSC – Sustainable Steel Council
O&M – Operations and Maintenance	TAS – Tasmania
ODP – Ozone Depleting Potential	TVOC – Total Volatile Organic Compounds
OFA – Occupied Functional Area	UFA – Usable Floor Area
OH&S – Occupational Health & Safety	VAV systems – Variable Air Volume air-conditioning systems
OECD - Organisation for Economic Co-operation and Development	VFS – Vegetated Filter Strips
PPB – Parts Per Billion	VIC - Victoria
PPM – Parts Per Million	VLT – Visual Light Transmittance
PCA - Property Council of Australia	WC – Water Closet (i.e. toilet)
PCNZ – Property Council of New Zealand	WHB – Wash Hand Basin

MANAGEMENT

The *Green Star – Design & As Built* 'Management' category encourages and rewards the adoption of practices and processes that enable and support best practice sustainability outcomes throughout the different phases of a project's design, construction and its ongoing operation.

Throughout the 'Management' category, *Green Star – Design & As Built* intends to improve projects' sustainability performance by influencing areas where decision-making is critical. This category rewards the implementation of processes and strategies that support positive sustainability outcomes during construction. The category also promotes practices that ensure a project will be used to its optimum operational potential.

The 'Management' category rewards projects that achieve the following outcomes:

COORDINATED APPROACHES

The facilitation of coordinated approaches among cross-sectoral stakeholder interests.

The establishment of transparent and accountable decision-making processes, through inclusion and the provision of information.

The establishment of practical standards of responsibility, resource allocation and programming that are readily accessible to stakeholders.

COMMITMENT TO IMPLEMENTATION

The development of practically enforceable standards of ownership, accountability and delivery.

The incorporation of performance evaluation, feedback and support mechanisms that provide opportunities for continual improvement.

SUSTAINABLE CULTURES AND BEHAVIOURS

Raising awareness among stakeholders, and the provision of education and learning opportunities that enable more sustainable practices.

The fostering of sustainable behaviour and systems that allow for continual improvement through environmental data monitoring and information sharing.

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GREEN STAR ACCREDITED PROFESSIONAL

Credit 1

Points available: 1

AIM OF CREDIT

To recognise projects that engage a Green Star Accredited Professional to support the Green Star certification process.

CREDIT CRITERIA

1	Accredited Professional	1 point is available where a <i>Green Star Accredited Professional – Design & As Built</i> (GSAP) has been contractually engaged to provide advice, support and information related to Green Star principles, structure, timing and processes, at all stages of the project, leading to certification.
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COMPLIANCE REQUIREMENTS

One (1) point is awarded when a *Green Star Accredited Professional (GSAP)* with *Green Star - Design & As Built* training has been contractually engaged as part of the project team, to deliver advice in accordance with the requirements outlined in this credit.

1.1 The GSAP must have completed the NZGBC-run training for new build/ major refurbishment projects, and the qualification must be current for the duration of the project.

1.2 The GSAP must provide advice and support to ensure that the project team has access to information covering Green Star principles, structure, timing and process including:

- Eligibility;
- Environmental Categories;
- Point allocation and scores;
- Documentation and Compliance Requirements;
- Technical Questions;
- Certification process; and
- Green Star branding and marketing rules.

1.3 The GSAP must deliver at least one workshop to the project team covering the topics above. It is expected that this workshop will be of most benefit at project inception.

1.4 The GSAP must also provide guidance and support at all stages of the project, as follows:

- Participate in meetings and workshops;
- Review all documentation for compliance with Green Star; and
- Be responsible for the preparation and execution of the Green Star submission(s) for certification.

1.5 The GSAP must be nominated as the 'Project Contact' for the purpose of communication with the New Zealand Green Building Council. This may be done through the project's registration process or informing the NZGBC Green Star team.

GUIDANCE

GSAP Engagement from Green Star registration

|| The following alternative Compliance Requirements can be used, when GSAP's engagement starts from Green Star registration, or within one month following (rather than from preliminary design);

1. GSAP certificate must be valid from Green Star registration to construction completion; and
2. There must be at least one GSAP that is part of the team delivering the Green Star certification from registration to completion. The GSAP must be nominated as the 'Project Contact' for the purpose of communication with the New Zealand Green Building Council. The GSAP must provide advice and support to ensure that the project team has access to information covering Green Star principles, structure, timing and process, including:
 - Eligibility;
 - Environmental Categories
 - Points allocation and scores;
 - Documentation and Compliance Requirements;
 - Technical Questions;
 - Certification process; and
 - Green Star branding and marketing rules.
3. The GSAP must deliver at least one workshop addressing the topics above; OR the GSAP plans the Green Star submission and targets with the project team using the Submission Planner, Submission Guidelines and/or other relevant information.
4. The GSAP must participate in meetings/workshops with the design and construction team, but does not need to attend all design and construction meetings. If the GSAP does not attend they are responsible for reviewing the meeting minutes to ensure appropriate Green Star advice, guidance and support is provided, to support the Green Star certification process.

5. The GSAP must review all documentation for compliance and be responsible for the preparation and execution of the Green Star submission(s) for certification.|| R1.01.01

Multiple GSAPs

In some cases, the role of the GSAP can be fulfilled by different individuals throughout the project. This is acceptable as long as each GSAP individually meets the requirements of this credit (apart from the workshop requirement) and this role has been fulfilled continually from preliminary design to practical completion.

In this case, project teams need to demonstrate that there has been a process in place to capture and handover information from one GSAP to another.

Multiple Project Roles

In some cases, the GSAP's employer may also be engaged in other roles on the Green Star project. This does not constitute a conflict of interest where individuals are able to perform each role independently to meet the requirements of each credit. For example, an organisation may fulfil the role of both GSAP and Independent Commissioning Agent (ICA) where separation exists between the individual roles.

In this case, project teams shall demonstrate that there is no conflict of interest by including relevant discussion in the Submission Template.

DEFINITIONS

||Preliminary Design – First phase in the design of a project where an Architect, Interior Designer or Engineer prepares drawings providing a general view of the components and the scale of the project based on the client brief.|| R1.01.02

Practical Completion – Practical completion is deemed to be the date of issuance of the Code Completion Certificate.

DOCUMENTATION REQUIREMENTS

Please refer to the *'How Documentation is Described in the Submission Guidelines'* section within the *Introduction* for further guidance on Documentation Requirements for project submissions.

Design Review submissions are optional.

Project teams must submit documentation supporting credit compliance. A list of recommended supporting evidence is provided in the following section, which can be used to demonstrate compliance. Alternate documentation to that listed below can also be used by project teams to demonstrate compliance.

The key requirement is that evidence is provided to support each claim made within the Submission Template.

SUBMISSION CONTENT

Project teams must submit the following documentation:

- Submission Template
- Evidence to support claims made in the Submission Templates

Recommended Supporting Evidence

Letter of appointment from the client or head contractor confirming the appointment of a GSAP in the project. The letter must include a scope of works as per the Compliance Requirements section of the credit. The contract or letter should confirm that the GSAP is appointed either from preliminary design until practical completion or from Green Star registration, or within one month following until practical completion.

Sample minutes or other written correspondence of the GSAP with the design team, addressing the GSAP involvement.

Letter from the Client confirming that the GSAP satisfactorily fulfilled their engagement responsibilities as per the scope of works and requirements of this credit.

GSAP certificate(s)

REVISIONS AND AMENDMENTS

Revision No.	Date of Release	Description
NZv1.0	11/04/2019	Initial release.
NZv1.1	04/2022	R1.01.01 Alternative compliance requirements provided for GSAP Engagement R1.01.02 Defining Preliminary Design as it is a term commonly used in New Zealand in replacement of Schematic Design.

COMMISSIONING AND TUNING

Credit 2

Points available: 4

AIM OF CREDIT

To encourage and recognise commissioning, handover and tuning initiatives that ensure all building services operate to their full potential and as designed.

CREDIT CRITERIA

To qualify for points in this credit, a **Conditional Requirement** must be met.

2.1	Conditional Requirement	2 points are available where the building has set environmental performance targets, been commissioned, and will be tuned.
2.2	Services and Maintainability Review	1 point is available where a comprehensive services and maintainability review of the project is performed.
2.3	Independent Commissioning Agent	1 additional point is available for utilisation of an Independent Commissioning Agent (ICA) to advise, monitor, and verify the commissioning and tuning of the nominated building systems throughout the design, tender, construction, commissioning, and tuning phases.

COMPLIANCE REQUIREMENTS

The requirements of this credit are project-specific and based on the complexity of the designed and installed building systems.

The project team shall have commissioning process activities completed for all nominated building systems that serve the project. See the Guidance section for the definition of nominated building systems.

2.1 Conditional Requirement

The project must comply with all of the following criteria in order to achieve a Green Star rating:

- Environmental Performance targets; and
- Commissioning and Tuning

2 points can be awarded when the above criteria are met.

2.1.1 Environmental Performance Targets

One common method for demonstrating compliance with this is through developing (early in the design phase) a design intent report or an owner's project requirements (OPR) document. This document must be prepared by the design team (and ICA project team where applicable) at the design phase stage and outline at least the following items:

- Description of the basic functions, operations, and maintenance of the nominated building systems, including:
 - A description of its intended operation and maintenance requirements; AND
 - A list of the main components (including controls), their operation, and the importance of their efficient use.
- The targets for the project energy and water consumption and energy and water budgets for all nominated building systems.
- Description of how energy, water, and aspects of indoor environment quality are metered and monitored. This includes a meter diagram that illustrates how energy and water budgets are confirmed in operation, and how indoor environment attributes which contribute to being comfort and well-being of building occupants are monitored.

The project team must set and document environmental performance targets for each of the individual building systems, as nominated by the project team. All targets must be signed off by the asset owner.

2.1.2 Building Commissioning

One (1) point is awarded when a project team can demonstrate that the pre-commissioning and commissioning activities have been performed based on the approved standards and guidelines (refer to the Guidance section). The following must be documented for compliance:

2.1.2.1 Commissioning Specification

The contractual tender or construction documentation must list the commissioning requirements for each system. It is not sufficient to state that systems must be commissioned to the relevant standard. Instead, the documentation must:

- List the design parameters for each system;
- List the required commissioning activities;
- Define how each system is intended to operate; and
- List the acceptable tolerances during commissioning.

Contractual documentation must clearly indicate divisions of responsibilities, pre-commissioning procedures, commissioning requirements, witnessing requirements, phased completion requirements (if needed), post-occupancy checks, and any training requirements for the operator.

2.1.2.2 Commissioning Plan

A commissioning plan shall be developed and include at least the following:

- Objectives, or basis, of the design;
- Scope of the commissioning plan;
- Commissioning team list, the individual responsibilities, and interface matrix;
- General sequence of commissioning;
- Proposed commissioning procedures;
- Witnessing requirements;
- Commissioning program; and
- Requirements for subcontractor commissioning manuals.

For a project to claim this criterion, the commissioning must have followed the requirements in the contractual documentation and the commissioning plan. The commissioning report must certify that this is the case and be signed by the designer, the head or main contractor, the commissioning manager (or ICA), and the project manager (or owner's representative).

The person responsible for the commissioning of the nominated services must have specific and demonstrable knowledge of the types of systems to be commissioned. As an example, a general sub-contractor is unlikely to be able to fill this role.

2.1.3 Building Systems Tuning

One (1) point is awarded where, following practical completion and prior to occupation, the owner/client has formally committed to a tuning process for all nominated building systems. At a minimum, the commitment must include quarterly adjustments and measurement for the first 12 months after occupation and a review of building system manufacturer warranties. The scope of the tuning works will determine the relevant tuning period.

Building systems that are part of the day-to-day operations of the building must be included within the scope of the credit criteria 'Building Systems Tuning' 'Fitout Systems Tuning' 'Project Systems Tuning.' Building systems, regardless of static or seasonal operational settings, need to be reviewed and tuned accordingly to operate to their full potential and as designed.

The building tuning process will require the analysis of data from the monitoring systems and assessment of feedback from occupants on building conditions. During the tuning period, the owner/client must commit to taking steps to adjust nominated building systems to account for all identified deficiencies.

The commitment from the building owner must confirm that there is a requirement for a building tuning process, and responsibilities are assigned to have all nominated building systems tuned after practical completion. This commitment can be included in the Commissioning Plan or provided as a separate document from the building owner. The commitment must include at least the following:

- Operating and Maintenance Manuals have been developed in accordance with approved standards and guidelines (refer to Guidance);
- A building tuning manual, or a building tuning plan, has been developed in accordance with the approved standards and guidelines;
- A building tuning team has been created, including the facilities manager, the owner's representative and the ICA (if applicable). The head contractor and the services design professionals are available to address specific tuning issues where required; and
- The owner has engaged parties to tune the nominated systems. This engagement includes requirements for:
 - Verification that nominated systems are performing to their design potential at full and part load conditions;
 - Reviews of environmental performance against the environmental targets;
 - Collection of user feedback to match the system performance with the occupant's needs;
 - Adjustment of all the systems to account for all deficiencies discovered; and
 - Management, communication, and assignment of responsibilities for the tuning process within the team.

2.2 Services and Maintainability Review

One (1) point is awarded where a project team can demonstrate that a comprehensive services and maintainability review has been conducted, led by the head contractor or the owner's representative (or the ICA where applicable), during the design stage and prior to construction.

The services and maintainability review is to facilitate input from the design team, the facilities manager and operations staff (if known), and any relevant suppliers and subcontractors (if engaged). The review must address the following aspects for all nominated building systems:

- Commissionability;
- Controllability;
- Maintainability;
- Operability, including 'Fitness for Purpose'; and
- Safety.

The services and maintainability review and its outcomes must be summarised in a 'Service and Maintainability Report.' This report must be agreed and signed off by the involved parties. Action items resulting from this review shall be incorporated in the design intent report or OPR as outlined in 2.1.1. Information on the requirements of this review is outlined in the approved standards and guidelines (refer to the Guidance section).

2.3 Independent Commissioning Agent

One (1) point is awarded where an Independent Commissioning Agent (ICA) has been appointed to advise, monitor, and verify the commissioning and tuning of the nominated building systems throughout the design, tender, construction, commissioning, and tuning phases.

When this point is claimed, the specified commissioning requirements must be overseen by a qualified independent commissioning professional (separate from the design team) who is engaged directly by the client/building owner and reports directly to the owner (or the owner's representative).

DEFINITIONS

||Nominated Building Systems

This credit requires nominated building systems to be defined by the project team. Examples of nominated building systems could include, but are not limited to:

- Mechanical Systems, such as and not limited to:
 - Air-Conditioning Systems
 - Mechanical Ventilation Systems
 - Tenant Systems
 - Building Management Control Systems
 - Smoke Management Systems.
- Electrical systems, such as and not limited to:
 - Lighting power density for lighting fixtures
 - Main Switchboards
 - Occupancy sensors for lighting control
 - Energy Metering Systems (EMS)
- Hydraulic systems, such as and not limited to:
 - Targets for WELS rating for taps, toilets, showers
 - Fire detection systems, smoke alarm systems, and emergency warning systems.
 - Fire protection systems, including pumps and other equipment.
 - Lifts and any other vertical transport devices.
 - Any other system that impacts the energy or water consumption of the building as identified by building owners or building operators.
 - Building envelope, such as facades, roofs, and glazing systems. ||R1.02.01

Independent Commissioning Agent (ICA)

The ICA is defined as a person who is:

- An advocate for, and reports directly to, the project owner;
- Independent of any consultant, contractor, or sub-contractor organisation that has been involved in the design or installation of the nominated systems; and
- A registered professional engineer or qualified technician with demonstrated knowledge on nominated systems commissioning and has previous experience with the commissioning process of at least 2 projects similar in scope.

The qualified independent commissioning professional role can be fulfilled by one or multiple persons, provided that all meet the requirements laid out above. It can also be fulfilled by a person who is part of the client's organisation if the person is qualified to do so. An independent commissioning company may also meet these requirements.

Providing all other requirements for Independent Commissioning Agent are met, an Independent Commissioning Agent (ICA) can be considered independent if they report directly to the building owner or the owner's designated representative, even if they are paid by the contractor.

A facilities manager employed by the client qualified in the commissioning of these systems may also fulfil this criterion's roles. A project may also engage a Green Star Accredited Professional (GSAP) and Independent Commissioning Agent (ICA) from the same organization on the condition that the project team can sufficiently demonstrate that each role is being performed independently of the other.

Owner's Project Requirements

A common method for demonstrating that nominated building systems have been defined is through the owner's project requirements (OPR) document or an equivalent document containing the same information. The OPR (or equivalent document) should be prepared by the design team and outline at least the following items:

- Description of the basic functions, operations, and maintenance of the nominated building systems, including:
 - A description of its intended operation and maintenance requirements; and
 - A list of the main components (including controls) and the importance of their efficient use.
- The targets for the energy and water consumptions and budgets for nominated building systems; and
- Description of how energy, water, and aspects of indoor environment quality are metered and monitored. This typically would include a meter diagram illustrating how energy and water budgets could be confirmed in operation.

INNOVATION

Exceeding Green Star Benchmarks – Supplementary or Tenancy Fitout Systems Review

One (1) additional point may be awarded where project teams and building owners carry out a comprehensive services and maintainability review of supplementary or tenancy fitout systems, in addition to all nominated base building systems as outlined above. This review must be undertaken to ensure the design and function of such systems are properly integrated with base building systems.

When pursuing the "Supplementary or Tenancy Fitout Systems Review credit" under the Improving on Green Star Benchmarks Innovation pathway, the following are documentation requirements apply.

Design Review Submission

- Submission Template
- CV of the project's Commissioning Agent; and
- Confirmation from the building owner that indicates the building owner's commitment to incorporate the Supplementary or Tenancy Fitout Systems Review as a part of the services and maintainability review.
- Scope of Works for the ICA.

As Built Submission

- Supporting documentation to support a comprehensive services and maintainability review of supplementary or tenancy fitout systems, in addition to all nominated base building systems as outlined the design, construction, commissioning and tuning phases; including meeting minutes and commissioning plans;
- CV of the project's Commissioning Agent; and
- A copy of the 'Service and Maintainability Report' evidencing the tenant systems was included in the review. || R1.02.02

Market Transformation – Soft Landings Framework

One (1) additional point may be awarded where the building is designed, built, commissioned, and tuned by adopting a 'Soft Landings' approach. For information on how to implement a 'Soft Landings' approach, please see [BSRIA Soft Landings guides](#).

All compliance requirements of this credit must be achieved prior to pursuing the 'Soft Landings Framework Innovation credit.'

||Recommended supporting evidence to achieve this innovation may include:

Design Review Submission

- Documentation to support how the 'Soft Landings Framework' approach will be implemented throughout the design, construction, commissioning, and tuning phases; including meeting minutes and commissioning plans;

- CV of the project's Commissioning Agent detailing the qualifications and experience relevant to the project; and
- Confirmation from the building owner that indicates their commitment to incorporate the principles of the 'Soft Landings Framework' throughout design, construction, commissioning, and into building operation.

As-Built Submission

Supporting documentation to support how the 'Soft Landings Framework' approach was implemented throughout the design, construction, commissioning, and tuning phases. Where the tuning phase may not have been undertaken at the time of submission, documentation should support how it will be implemented.

- Meeting minutes and workshop notes demonstrating the involvement of the design team in the development and implementation of the 'Soft Landings Framework' throughout design, construction, and commissioning, all stages of checklist completed as per the soft landing framework relevant at the time of submission and checklist for all future stages.
- CV of the project's Commissioning Agent detailing the qualifications and experience relevant to the project; and
- Confirmation from the building owner that demonstrates the building owner's commitment to incorporate the principles of the 'Soft Landings Framework' into building operation.
- Any other evidence to support claims made by the project team. || R1.02.03

Exceeding Green Star Benchmarks – Building Air Permeability

One (1) point will be awarded where an air permeability test is carried out in accordance with the guidance outlined below. Two (2) additional points are awarded where building air permeability rates meet the requirements outlined in table 2.1 below.

Air Permeability Performance Testing

An air permeability test must be carried out by a suitably qualified practitioner, in accordance with an approved standard, over a minimum area of the building. The test results must not exceed a maximum air permeability rate in order for this credit element to be awarded.

This credit element applies to all building types irrespective of the conditioning strategy. Testing is equally relevant to mechanically ventilated (e.g., more efficient HVAC systems) and mixed-mode / naturally-ventilated buildings (e.g., control of airflow).

Suitably Qualified Practitioner

For the purposes of this credit element, a suitably qualified practitioner is defined as a member of the Air Tightness Testing and Measurement Association (ATTMA) or a testing member of the Air Infiltration and Ventilation Association of Australia (AIVAA). Please see the 'Guidance' section for additional information.

The test results are required to be signed-off by the testing practitioner and main contractor. This step in the process ensures that the air permeability rate modelled at the design stage (for which the main contractor is responsible for delivering) is verified by the test.

Testing Standard

The air permeability test must be carried out in accordance with AS/NZS ISO 9972:2015 *Thermal performance of buildings – Determination of air permeability of buildings – Fan pressurization method*. This standard has recently been adopted and is identical with, and has been reproduced from, ISO 9972:2015.

Projects demonstrating compliance with Performance Requirement JP1 of NCC 2019 using JV2 or JV4, are required to use AS/NZS ISO 9972:2015.

Alternative standards may be applied where these are better-suited to the project. The project team is required to justify why AS/NZS ISO 9972:2015 is not suitable via a Technical Question in order for this to be approved. The following list of alternative standards may be considered:

- ASTM E779-10
- ATTMA TSL1 Residential Dwellings – September 2016
- ATTMA TSL2 Non-Dwellings – October 2010
- ASHRAE Guideline 0-2005
- NIBS Guideline 3-2012 (for new construction or structural renovation)

Testing Area Requirements

The air permeability test may be carried out across a sample area, if not the whole building. For sample area testing, the test must be carried out on either 2,000m² or 10% of the building's total envelope area, whichever is greater.

Please see section 2.3 of ATTMA TSL (for dwellings) or section 3.2 of ATTMA TSL2 (for non-dwellings) for definition on how to calculate the building envelope area.

The sample areas tested must include the upper most occupied floor of the building, and be representative of the external envelope construction, including different façade types and building geometries, for the building as a whole. The methodology used to select the sample area and the extrapolation of results for the whole building must be outlined in the submission.

Levels can be tested separately as compartments. For commercial buildings, compartment testing is acceptable where the individual compartments are greater than 1,000m². For multi-unit residential buildings, compartment testing of individual apartments is also acceptable.

Projects may exclude unconditioned warehouse areas where these warehouse spaces are not conditioned by any equipment.

Air Permeability Rates

For the first innovation point to be awarded, the test results must not exceed the 'maximum' air permeability rates outlined in Table 2.1. Up to two points are available where air permeability rates meet the 'normal' and 'best practice' performance levels set in Table 2.1.

The 'maximum' rates outlined in column 2 of Table 2.1 are conservative to ensure projects can satisfy this requirement without excessive difficulty, yet project teams should aim to achieve the air permeability rate as specified by the building's design team. The intent of the air permeability test is to verify whether this is achieved.

In future iterations of Green Star, air permeability testing will become a requirement of the credit. Over time the ‘maximum’ rates will become more stringent to recognise air tight buildings as being best practice. This is in line with the NZGBC’s strategic priorities, including high-performing, energy-efficient buildings.

Testing should be to a pressure difference of 50 Pascals (Pa) or greater; however, where practical concerns limit test pressures to between 25 and 50 Pa, the reasons must be clearly described and justified in the test report. A test is not valid unless a pressure difference of at least 25 Pa is achieved.

Table 2.1 Building Air Permeability Rates

Building Type	Innovation Points Awarded		
	1	2	3
	Maximum	Normal ¹	Best Practice ¹
	Air Permeability m ³ /(h.m ²) at 25 Pa	Air Permeability m ³ /(h.m ²) at 50 Pa	
Conditional Requirement	At least 25Pa 60ummarized60ion m must be achieved, results are reported at 50Pa Testing area must be either 2000m ² or 10% of the total building envelope area	At least 50Pa 60ummarized60ion m must be achieved, results are reported at 50Pa Testing area must be either 5000m ² or 20% of the total building envelope area	
Offices			
Naturally ventilated	20.0	7.0	3.0
Mixed mode	20.0	5.0	2.5
Air conditioned / low energy	20.0	5.0	2.0
Factories / warehouses	20.0	6.0	2.0
Superstores	20.0	5.0	1.0
Schools	20.0	9.0	3.0
Hospitals	20.0	9.0	5.0
Museums and archival stores	20.0	1.5	1.0
Cold stores	20.0	0.35	0.2
Residential ²			

Trickle ventilators and / or intermittent extractors	15.0	7.5	3.0 – 5.0
Passive stack	15.0	7.5	3.0 – 5.0
Continuous mechanical ventilation	15.0	5.0	2.0 – 4.0
Continuous mechanical ventilation – with heat recovery	15.0	3.75	1.0 – 2.0

¹ The ‘normal’ and ‘best practice’ air permeability rates are taken from ATTMA TSL2.

² All ‘residential’ air permeability rates have been adapted from ATTMA TSL1.

Points are awarded on a sliding-scale basis to one decimal place. For example, a warehouse that achieves an air permeability rate of 4 m³/(h.m²) at 50 Pa would achieve 1.5 Innovation points.

GUIDANCE

Air Permeability Testing

To test a building’s air permeability, the building must be pressurised in accordance with a standard using a fan and the resulting air flow rate measured. Typically, the building’s external doors and windows must be closed with internal doors wedged open and with any mechanical and natural ventilation openings sealed. See the relevant standard for detailed guidance.

Testing results are to be stated in terms of air permeability of the building envelope. Air permeability is based on the internal envelope surface area of the walls, roofs, and floors, irrespective of whether any floors are in contact with the ground. Where compartment tests are completed for multi-unit residential buildings, results must be stated in terms of air permeability of the envelope of individual apartments.

Suitably Qualified Practitioner

For the purposes of this credit element, a suitably qualified practitioner is defined as a member of the Air Tightness Testing and Measurement Association (ATTMA) or a testing member of the Air Infiltration and Ventilation Association of Australia (AIVAA). Please note, there are different membership types within AIVAA – in order for this requirement to be met, the practitioner must be a ‘testing member.’

This requirement is intended to ensure a quality testing outcome given the testing practitioner’s membership with an industry recognised body. Should project teams wish to demonstrate an alternative yet equivalent qualification, a Technical Question must be submitted.

For a current listing of members, please visit the following websites:

- Air Tightness Testing and Measurement Association – [ATTMA | Registered Air Tightness Testers – New Zealand](#)
- Air Infiltration and Ventilation Association of Australia – [Our Members – Air Tightness Testers – AIVAA](#)

Timing

Testing is most effective when undertaken early in the construction phase of the project. Air leaks, gaps, and other non-conformance items can be addressed more easily at this stage to achieve optimal air permeability results. Re-testing may take place when measures to improve air permeability have been undertaken. The main contractor is required to accept responsibility for the final test results by signing off on them.

REFERENCED DOCUMENTS

The following Standards and Guidelines are approved for use with this credit's Compliance Requirements.

- AIRAH DA27 Building Commissioning 2011
- AIRAH DA28 Building Management and Control Systems (BMCS) 2011
- ASHRAE Commissioning Guideline 1.1-2007 (for mechanical services)
- AS/NZS ISO 9972:2015 Thermal performance of buildings – Determination of air permeability of buildings – Fan pressurization method
- ASTM E779-10 Standard test method for determining air leakage rate by fan pressurization
- ATTMA TSL1 Residential Dwellings – September 2016
- ATTMA TSL2 Non-Dwellings – October 2010
- CIBSE Commissioning Code M (and the ancillary codes for relevant services)
- BSRIA Soft Landings Framework, [CIBSE](#)

DOCUMENTATION REQUIREMENTS

Please refer to the *'How Documentation is Described in the Submission Guidelines'* section within the *Introduction* for further guidance on Documentation Requirements for project submissions.

Design Review submissions are optional.

Project teams must submit documentation supporting credit compliance. A list of recommended supporting evidence is provided in the following section, which can be used to demonstrate compliance. Alternate documentation to that listed below can also be used by project teams to demonstrate compliance.

The key requirement is that evidence is provided to support each claim made within the Submission Template.

SUBMISSION CONTENT

Project teams must submit the following documentation:

- **Submission Template**
- **Evidence** to support claims made in the Submission Template

Recommended Supporting Evidence

Evidence of Targets for Environmental Performance where the environmental performance targets are documented as outlined in the Compliance Requirements. The relevant sections must be highlighted.

Service and Maintainability Report where the service and maintainability review is 63 summarized as outlined in 2.2. The relevant sections must be highlighted.

Extract(s) from the Commissioning Report demonstrating that comprehensive pre-commissioning activities and commissioning activities have been performed as outlined in 2.3. The relevant sections must be highlighted.

Building Tuning Commitment or Contract demonstrating that there is a requirement for a building tuning process as outlined in 2.1. The relevant sections must be highlighted.

CV of the Independent Commissioning Agent detailing the qualifications and experience relevant to the project.

Whole building airtightness testing report detailing test methodology, air flow rates, and statement of the building air permeability achieved.

Signed confirmation from the testing practitioner and main contractor that the results have been sighted.

The below documentation is suggested to demonstrate sufficient independence between the GSAP and ICA:

An organizational chart showing all people involved,

A role description for each person who contributed to the ICA or GSAP role,

The ABNs of any independent contractors involved in the commissioning process, and a clear election of two separate people that can be named as ICA and GSAP who were an integral part in the provision of the relevant services,

REVISIONS AND AMENDMENTS

Revision No.	Date of Release	Description
NZv1.0	11/04/2019	Initial release.
NZv1.1	04/2022	The credit is updated to mandate Commissioning and Tuning. 2 points can still be achieved when the conditional requirement is met.

R1.02.01 II Update to the guidance for Nominated Building Systems

R1.02.02 II Additional documentation guidance provided for the innovation of Exceeding Green Star Benchmarks – Supplementary or Tenancy Fitout Systems Review

R1.02.03 II Additional documentation guidance provided for the Market Transformation – Soft Landings Framework

ADAPTATION AND RESILIENCE

Credit 3

Points available: 3

AIM OF CREDIT

To encourage and recognise projects that are resilient to the impacts of a changing climate and natural disasters.

CREDIT CRITERIA

To qualify for points in this credit, a **Conditional Requirement** must be met.

3.1	Conditional Requirement	To achieve a certified rating , the project team must complete the climate change pre-screening checklist (refer 3.1). The project team must also communicate the building’s exposure to climate change hazards, and any identified risks to the client/building owner. R1.1.03.01
3.2	Climate Change Risk Assessment and Adaptation Plan	<p>2 points are available where:</p> <ul style="list-style-type: none"> • A project-specific Climate Change Risk Assessment has been developed in accordance with a recognised standard, and; • A Climate Adaptation Plan has been developed, including solutions for the building design and construction that specifically address key risks identified in the Climate Change Risk Assessment.
3.3	Earthquake Resilience	1 point is available where strategies are implemented to mitigate the impact of earthquake and seismic resilience movement over the life of a building.

COMPLIANCE REQUIREMENTS

The risk assessment and Climate Adaptation Plan should be completed by developed design at the latest.

3.1 Conditional Requirement

To achieve a certified rating under the *Green Star – Design & As Built* rating tool the project must complete the climate change pre-screening checklist.

Both historic and future climate and hazard data (refer section ‘*Sourcing Climate Change Projections*’) should be used when completing the checklist. All rows and columns must be completed. The Conditional Requirement is achieved on completion of the checklist and doesn't require identified risks to be treated.

The checklist must be signed off by a member of the project team and shared with key project stakeholders, including the client/building owner.

If credit 3.2 is targeted, the requirement to complete the climate change pre-screening checklist (credit 3.1) is considered to have been met. **R1.03.01 II**

Climate Change Checklist

Criteria	Criteria response [Yes/No]	Comments [If answered yes, provide further explanation]
Have future climate change projections for the project location been reviewed based on relevant national or local climate projections?		
Has the project area been impacted previously by extreme climate events? Please indicate which events.		
Is the project located in or adjacent to a flood plain or flood prone area?		
Is the project located adjacent to the coastline, tidally influenced waterway or within an area with potential for high or tidally-influenced groundwater levels?		
Is the project located in an area with potential bushfire risk?		
Have risks to the building elements, operation or occupants been identified?		

Have adaptation options been identified for any key risks? If yes, please describe design or operational measure.		
Will the project accommodate occupants who may be vulnerable to the impacts of climate extremes? (e.g. children, elderly, low mobility, seeking medical treatment). Please indicate potential groups of vulnerable occupants and which hazards they are likely to be exposed to.		

* Consider potential impacts from climate change including, but not limited to: Direct damage or failure of building elements or components; accelerated deterioration of building elements/components or reduced design life; reduced operating capacity; climate hazard impacts to surrounding areas (e.g. impacting access and egress); impacts to the health and wellbeing of building occupants and other relevant stakeholders; and indirect risks from impacts to other interdependent systems and services (e.g. transport networks, power, water, telecommunications).

3.2 Climate Change Risk Assessment and Adaptation Plan

Two (2) points are awarded where the following Compliance Requirements are met:

3.2.1 Climate Change Risk Assessment

A suitably qualified professional (see Definitions) must undertake the Climate Change Risk Assessment based on a recognised approach (see section 3.2.3). The Climate Change Risk Assessment must contain, as a minimum, the following information:

- Summary of the project's characteristics (site, location, climatic characteristics).
- Summary of locally relevant climate change projections and associated hazards. It is recommended that at a minimum project teams should use the Representative Concentration Pathway (RCP) 8.5 as specified in the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report or any newer version, at two time horizons (e.g. 2050 and 2100) that are relevant to the project's anticipated lifespan (see 3.2.2). These projections should consider a range of climate-related hazards including, but not limited to:
 - Sea level and coastal inundation;
 - Increase rainfall and flooding;
 - Solar radiation;
 - Temperature increase (including heat island effect);
 - Water or moisture ingress;
 - Extreme weather conditions - wind and storms;
 - Subsidence or ground movement;

- Groundwater rise and potential for increased liquefaction vulnerability; and
- Increase potential for fire weather and drought.
- Identification of the potential risks to the building, its operation, site infrastructure, dependant infrastructure, landscaping, and occupants. The risk assessment should consider a range of risk elements including, but not limited to those listed below.

Risk elements	Further information
Building envelope and building structure (e.g. cladding, glazing and roof)	Exposed building elements should be designed to limit direct damage, failure or accelerated deterioration, such as fading, distortion, corrosion, rotting and salt crystallisation. This can thereby reduce the frequency of replacements, repairs and maintenance through the lifecycle of the building.
Site infrastructure (e.g. stormwater, wastewater systems)	Site infrastructure (including wastewater and stormwater systems) should be designed to accommodate future climatic projections and not exacerbate any downstream or offsite impacts (e.g. stormwater pipes with capacity designed for predicted future flows).
Flood resilience (e.g. pluvial, fluvial or coastal flood risk)	<p>Climate change is expected to increase the risk of flooding. Buildings that are within areas considered to be at high risk from flooding must build ground floor heights and access levels above the predicted flood levels.</p> <p>Project teams are required to consider local flood plains, coastal inundation zones which have been modelled based on RCP8.5 for relevant time horizons.</p> <p>Note, surface water management is important in reducing localised flooding and can be achieved by attenuation of run-off with green open space and green roofs.</p>
Building operating systems (e.g. electrics, power and telecommunications, specialised electronic equipment)	Systems need to be designed to reliably operate in a more extreme and volatile climate.
Occupants	Project teams are required to demonstrate that the indoor environment is designed for appropriate thermal comfort (for occupants) using RCP8.5, and demonstrate that recommended operating temperatures can be achieved in the required future times horizons.

Landscaping/external space (e.g. heat island effect)	Project teams are required to assess climate impacts on any vegetated areas, green roofs and vegetated walls etc. Designs should enable air-flow throughout the development, shaded public spaces and footpaths, external finishes that are designed to avoid heat absorption, site layout/orientation to maximise microclimatic cooling and interconnection of green spaces/corridors.
Dependant infrastructure	Project teams should assess indirect risks due to failure/damage to interdependent systems and services (e.g. transport networks, power, water, telecommunications).

- When identifying risks to the above elements, consider the following potential impacts:
 - Direct damage or failure of building elements or components, or infrastructure;
 - Durability or potential for accelerated deterioration of elements/components/ infrastructure or reduced design life;
 - Reduced operating capacity;
 - Climate hazard impacts to surrounding areas (e.g. impacting access and egress);
 - Impacts to the health and wellbeing of building occupants and other relevant stakeholders; and
 - Indirect impacts relating to other interdependent systems and services (e.g. failure/damage of transport networks, power, water, telecommunications).
- Based on the chosen risk assessment method (refer 3.2.3 below), define and document this and the associated input tables / matrices used for the assessment (e.g. exposure and vulnerability, or likelihood and consequence).
- Assess risks in consultation with multidisciplinary representatives from within the project team, and relevant external stakeholders.
- Develop a risk register of risks to the building and related elements (see table above), capturing risk ratings, justifications for ratings, and related treatment options for ‘high’ and ‘extreme’ risks.
- Communicate the results of the assessment to the leads of all design disciplines.

Sourcing Climate Change Projections

Prior to undertaking the assessment, climate change projections must be sourced for agreed RCP scenarios. It is recommended that, at a minimum, RCP 8.5 is used. The following should be considered:

- **National Projections:** The National Institute of Water and Atmospheric Research (NIWA) has developed a report detailing climate change projections for New Zealand, and a summary of the likely impacts. Link [here](#).
- **Local Climate Projections:** A number of Councils in NZ have developed regionally-specific downscaled climate projections. Refer relevant Council websites for these. Use these local projects if available.
- **High Intensity Rainfall Design System (HIRDS) rainfall data.** The HIRDS has been developed by NIWA and contains rainfall data for a range of Annual Recurrence Interval (ARI) events, durations, RCP scenarios and time horizons. Link [here](#).

The project must justify the selection of the climate change projections and RCP scenario used (noting RCP 8.5 as a minimum should be used).

Recognised Risk Assessment Approaches

For the purposes of this credit, the following approaches can be utilised to undertake the risk assessment:

- **Ministry for Environment 2021: *A Guide to Local Climate Change Risk Assessments*.** This guide was developed in alignment with the National Climate Change Risk Assessment (NCCRA) to enable local level risk assessments to be undertaken. The risk assessment methodology is based on an assessment of exposure, sensitivity and adaptive capacity. Link [here](#).
- **Australian Standard 5334:2013 *Climate change adaptation for settlements and infrastructure - A risk based approach*.** The risk assessment used in this guide is based on an assessment of likelihood and consequence. Link [here](#).
- **Australian Greenhouse Office 2006 *Climate Change Risks and Impacts: A Guide for Government and Business*.** The risk assessment used in this guide is based on an assessment of likelihood and consequence. Link [here](#).

Should project teams wish to demonstrate compliance using an equivalent alternate standard or framework, a Technical Question may be submitted to the NZGBC to confirm equivalency.

3.2.2 Development of the Climate Adaptation Plan

A Climate Adaptation Plan outlines the responses to identified priority risks, or in other words, how resilience can be improved. Examples of approaches to improving adaptation / resilience include¹:

- **Resistance:** Preventing damage or disruption by providing the strength or protection to resist the hazard or its primary impact.
- **Reliability:** The asset or systems are designed to operate under a range of set conditions and hence mitigate damage or loss from an event.

¹ BRE Global: *Encouraging resilient assets using BREEAM*

- **Redundancy:** The availability of backup installations or spare capacity to enable operations to be switched or diverted to alternative parts of the system in the event of disruption to ensure continuity of service.
- **Response and recovery:** Enabling a fast and effective response to and recovery from disruptive events.

A suitably qualified professional (see definitions below) must develop a project-specific Climate Adaptation Plan and it must contain as a minimum the following information:

- The Climate Change Risk Assessment described in section 3.2.1;
- A risk register of all potential risks identified to the building, its operation, and occupants; and
- Specific adaptation design responses for all risks identified as ‘high’ or ‘extreme’, and associated responsibilities for action.
- Details of stakeholder consultation that was undertaken during preparation of the Climate Adaptation Plan and how the issues raised have been incorporated.

If no ‘high’ or ‘extreme’ risks are identified, then this would indicate the build/project has been designed to an appropriate standard of climate resilience. The justifications for risk ratings should be captured and this will provide the necessary evidence required for this credit. In this instance, no adaptation design responses will be required.

3.3 Earthquake Resilience

One (1) point is awarded where the following Compliance Requirements are met:

3.3.1 Low Damage Design (LDD) Analysis

A Low Damage Design analysis is undertaken by a suitably qualified professional, using an accepted industry guideline or standard.

The paper *Performance Objectives for Low Damage Seismic Design of Buildings* outlines some considerations that should be made when undertaking an LDD review:

3.3.1.1. Assessing the seismic performance of the LDD systems against the following building performance limits:

- serviceability limit state
- damage control limit state
- ultimate limit state
- collapse limit state;

AND

3.3.1.2. Reviewing the LDD system against the objectives of Low Damage Design:

- damage mitigation effectiveness

- reparability
- self-centring ability
- non-structural damage
- durability
- affordability.

3.3.2 Summary Evaluation

The project team must provide an evaluation of the project's seismic performance against "standard practice", summarising how the project demonstrates best practice and meets the aim of this credit.

GUIDANCE

Staging

The Climate Change Risk Assessment should be undertaken as early during the project's design phase as possible, such as in the concept or preliminary design phase, to allow maximum benefit and opportunity to inform design decisions and implement appropriate and meaningful adaptation responses.

Resilience

Resilience should be seen as a risk management mechanism, where the physical climate change risks are identified and mitigated, and adaptation measures are implemented. This process may decrease compliance risks and potential insurance costs. Assessing and identifying the risks early is critical, and it should involve assessing their potential impact to building and site elements, building systems, interdependent infrastructure, and occupants².

Risk Assessment

Priority should be given to incorporate enterprise risk management or project-specific risk assessment criteria to enable climate change risks to be incorporated into the project's broader risk management processes.

Relevant External Stakeholders

Examples of relevant external stakeholders include known tenants, government officials, emergency services, and utilities, or as determined by the Suitably Qualified Professional.

² BRE Global: *Encouraging resilient assets using BREEAM*

Base Building vs Tenant Scope

By undertaking the Climate Change Risk Assessment during project design, opportunities to incorporate adaptation responses in the base building can be maximised, thereby improving the resilience of the building for tenant use. Additional non-physical adaptation responses, including emergency management plans and information on how to cope during extreme climate events, should be communicated to tenants and used to inform relevant tenant agreements (e.g. agreements with tenants to mandate use of blinds and shading to reduce thermal load, reduce energy consumption and reuse water to reduce reliance on mains supply).

REFERENCED DOCUMENTS

AS 5334-2013 Climate Change Adaptation for Settlements and Infrastructure – A risk based approach

Australian Greenhouse Office (AGO), Climate Change Impacts & Risk Management: A Guide for Business and Government 2006,

<https://www.environment.gov.au/system/files/resources/21c04298-db93-47a6-a6b0-eaaaae9ef8e4/files/risk-management.pdf>

Environment Design Guide (EDG) 66 MSa 2011 – Climate Change Adaptation for Building Designers: An Introduction, [apo-nid72346.pdf](#)

ISO 31000-2009 – Risk Management – Principles and Guidance

Performance Objectives for Low Damage Seismic Design of Buildings, J. Hare, S. Oliver, B. Galloway, NZSEE Conference, 2012 www.nzsee.org.nz

Seismic Performance Assessment of Buildings, Volume 1 – Methodology, ATC 58-1, Applied Technology Council, Redwood City, California www.atccouncil.org

ADDITIONAL INFORMATION

New Zealand's Framework for Adapting to Climate Change, INFO 723, August 2014 www.mfe.govt.nz

Adapting to Climate Change – Lessons from Natural Hazards Planning, B.C. Glavovic, G.P. Smith (eds.), May 2014 www.nzclimatechangecentre.org Impacts of Climate Change on Urban Infrastructure and the Built Environment: Toolbox Handbook, NIWA, MWH, GNS and BRANZ (2012) www.niwa.co.nz

Auckland Council Climate Adaptation Guidelines, Auckland Council, May 2014 www.theplan.theaucklandplan.govt.nz

New Zealand Society for Earthquake Engineering www.nzsee.org.nz

QuakeCoRE: NZ Centre for Earthquake Resilience www.quakecore.nz

QuakeStar www.quakestar.org.nz

DEFINITIONS

Climate Change

A change in the state of the climate that can be identified (e.g. through statistical tests) by changes or trends in the mean and/or the variability of its properties, and that persists for an extended period, typically decades to centuries. Climate change may be due to natural internal climate processes or external forcings such as variations in solar cycles, volcanic eruptions and persistent anthropogenic changes in the composition of the atmosphere or in land use (IPCC, 2014a).

Hazard

The potential occurrence of a natural or human-induced physical event or trend or physical impact that may cause loss of life, injury or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems and environmental resources (IPCC, 2014a).

Representative Concentration Pathway (RCP)

A suite of four future scenarios of additional radiative heat forcing at the Earth's surface by 2100 (in Watts per square metre), which is the net change in the balance between incoming solar radiation and outgoing energy radiated back up in the atmosphere. These include RCPs 2.6, 4.5, 6 and 8.5. Each RCP can be expressed as a greenhouse gas concentration (not emissions) trajectory adopted by the IPCC for its Fifth Assessment Report (AR5) in 2014 (IPCC, 2014a).

Risk

The potential for adverse consequences for human or ecological systems, recognising the diversity of values and objectives associated with such systems.³

Resilience

The capacity of built assets and infrastructure to endure acute shocks and chronic stresses while successfully adapting to long term changes (BREEAM).

Suitably Qualified Professional

A suitably qualified professional is required to develop a project-specific Climate Change Risk Assessment and develop a project-specific Climate Change Adaptation Plan (sections 3.2.1 to 3.2.4). For the purposes of credit 3.2, a suitably qualified professional is defined as someone with a formal tertiary qualification in a relevant field such as Environmental Science, Environmental Engineering, Planning or similar qualification, with at least three years' experience in climate change risk assessments.

A suitably qualified professional is required to undertake Low Damage Design (LDD) analysis (3.3.1 and 3.3.2). For the purposes of this criterion 3.3 a suitably qualified

³ IPCC 2020, *The Concept of Risk in the IPCC Sixth Assessment Report*

professional is considered to be a registered Chartered Professional Engineer (CPEng) with at least 10 years experience in seismic design in New Zealand.

DOCUMENTATION REQUIREMENTS

Please refer to the *'How Documentation is Described in the Submission Guidelines'* section within the *Introduction* for further guidance on Documentation Requirements for project submissions.

Design Review submissions are optional.

Project teams must submit documentation supporting credit compliance. A list of recommended supporting evidence is provided in the following section, which can be used to demonstrate compliance. Alternate documentation to that listed below can also be used by project teams to demonstrate compliance.

The key requirement is that evidence is provided to support each claim made within the Submission Template.

SUBMISSION CONTENT

Project teams must submit the following documentation:

- **Submission Template**
- **Evidence** to support claims made in the Submission Template

Recommended Supporting Evidence

Climate Change Risk Assessment and Adaptation Plan, including; local climate change projections, risk assessment criteria. Risk matrix, RCP and time horizon assumptions, any other assumptions significant in the development of the assessment, summary of key risks and adaptation responses.

Climate Change Risk database / register.

Evidence of the adaptation responses being incorporated into the project design.

CV of the professional that developed the Climate Adaptation Plan and/ or that prepared the Low Damage Design Analysis.

Drawings and specifications demonstrating design responses to the Climate Adaptation Plan.

Commissioning report or other technical document demonstrating design responses to the Climate Adaptation Plan.

Low Damage Design (LDD) analysis and Summary Evaluation

REVISIONS AND AMENDMENTS

Revision No.	Date of Release	Description
NZv1.0	11/04/2019	Initial release.
NZv1.1	04/2022	The credit is updated to add a conditional requirement for the climate change pre-screening checklist. Guidance for Climate Changed Risk Assessment and Adaptation Plan is updated to improve clarity by referencing localized resources and approaches.
NZv1.1.1	07/2023	R1.1.03.01 The Conditional Requirement is reworded for clarity.

BUILDING INFORMATION

Credit 4

Points available: 1

AIM OF CREDIT

To recognise the development and provision of building information that facilitates operator and user understanding of a building's systems, their operation and maintenance requirements, and their environmental targets, to enable optimised performance.

CREDIT CRITERIA

4	Building Information	<p>1 point is available where:</p> <p>Comprehensive operations and maintenance information is developed and made available to the facilities management team; and</p> <p>Relevant and current building user information is developed and made available to all relevant stakeholders.</p>
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COMPLIANCE REQUIREMENTS

The requirements of this credit are project-specific and based on the complexity of the systems designed and installed within the building. The information provided to the building's facilities management team and users should focus on the nominated systems, as defined by the project team. Please see the Guidance section for additional detail.

One (1) point is awarded where the project team can demonstrate that:

4.1 Comprehensive *operations and maintenance* (O&M) information is available to the facilities management team. Compliance may be demonstrated with one document that includes *operations and maintenance* information (in accordance with 4.1) and the *building log book* information (in accordance with 4.2), or a number of separate documents that contain the same information. AND

4.2 Current *building user information* is available to all relevant stakeholders, in accordance with 4.3 and 4.4. For additional detail on the content of *building user information*, please see the Guidance section.

4.1 Operations and Maintenance Information

The project team must confirm that operations and maintenance information is provided for all nominated building systems and that the following criteria are achieved:

Appropriate content for all nominated building systems is readily available;

The appropriate user group has access to the information they require to deliver best practice environmental outcomes; and

Guidance on keeping information up-to-date is provided to the facilities management team in these documents.

4.2 Building Log Book

The project team must develop a *building log book* to present to the building owner before practical completion of the project. For more information on the *building log book*, please see the Guidance section.

The *building log book* must:

- Be developed in line with CIBSE TM31: Building Log Book Toolkit;
- Cover all nominated building systems; and
- Include links or references to all relevant operations and maintenance information.

4.3 Format of Building User Information

Building user information is a source of up-to-date, relevant information for the building user. The information must address the intended use of all nominated systems within the building.

The amount and details of *building user information* must be relevant to the project's audience.

For example, if the premises are owner-occupied, the information provided to users must be geared towards general staff that occupy the space. If the space is leased from a landlord, the information provided must also be geared towards the person responsible for the management of the tenanted space; this may be a tenant representative or an office manager.

Building user information must be able to be updated and edited by the facilities management team, or other appropriate stakeholder group, to ensure it remains current and relevant to users throughout the life of the building.

While there are no specific requirements for the content that must be presented, the Guidance section outlines the typical information that should be presented to different user groups.

4.4 Delivery of Building User Information

All *building user information* must be available to the building owner and facilities management team at the time of practical completion. It is acknowledged that ongoing tuning may require updates to *building user information* and its content may extend beyond practical completion.

The method of delivery of the information provided may differ based on the target audience. However, due to the live nature of *building user information* it must be provided in a digital format and made available through any combination of digital signage or interactive

information kiosks in high traffic public areas (e.g. building foyer, lift lobby or lift displays), induction or training material, website or intranet, or applications for mobile devices.

It must be made clear at the time of submission for certification how this information has been presented to the relevant audience or user group. It is the project team's responsibility to clearly identify the relevant user groups and deliver *building user information* tailored to their needs.

GUIDANCE

Nominated Building Systems

This credit requires nominated building systems to be defined by the project team. Examples of nominated building systems could include, but are not limited to:

- Mechanical systems (such as HVAC and refrigeration systems; mechanically operable systems such as blinds and actuated shading devices).
- Building Management and Control System (BMCS).
- Lighting and associated controls.
- Electrical systems (such as electrical generation, electrical supply, distribution systems, security and access systems, and alarm systems).
- Hydraulic systems (such as gas and water supply distribution systems, sewage collection and distribution systems, stormwater collection and distribution systems; pumps).
- Fire detection systems, smoke alarm systems and emergency warning systems.
- Fire protection systems, including pumps and other equipment.
- Lifts and any other vertical transport devices.
- Any other system that have an impact on the energy or water consumption of the building as identified by building owner or building operator.
- Building envelope, such as facades, roofs and glazing systems.

Owner's Project Requirements

A common method for demonstrating that nominated building systems have been defined is through the owner's project requirements (OPR) document, or an equivalent document containing the same information. The owner's project requirements (or equivalent document) should be prepared by the design team and outline at least the following items:

- Description of the basic functions, operations, and maintenance of the nominated building systems, including:
- A description of its intended operation and maintenance requirements; and
- A list of what the main components are (including controls) and the importance of their efficient use.

- The targets for the energy and water consumptions and budgets for nominated building systems.
- Description of how energy, water, and aspects of indoor environment quality are metered and monitored. This typically would include a meter diagram that illustrates how energy and water budgets could be confirmed in operation.

Operations and Maintenance Information (4.1)

Operations and maintenance (O&M) manuals or equivalent operating information define the requirements and procedures for the effective operation, maintenance and recommissioning of the building. A comprehensive set of operations and maintenance information includes details of the building's construction, commissioning information, maintenance instructions for the operations and maintenance team, and guarantees and warranties.

Based on the information required to effectively manage a building, best practice operations and maintenance manuals should include:

- A summary sheet of relevant building service contacts;
- System-level information for nominated building systems;
- Introduction and scope, including physical and functional descriptions;
- Operating parameters and procedures;
- Preventive maintenance requirements, including procedures and schedules;
- Corrective maintenance requirements, including repair requirements;
- Service contacts, and any warranties and certificates;
- Up-to-date drawings incorporating at least:
 - Mechanical, electrical and hydraulic drawings and schematics covering all associated nominated building systems;
 - Architectural, façade/building envelope drawings; and
 - Architectural layout of the base building.

In addition, information aimed at assisting the facilities management team operate the building for optimal sustainability outcomes should be provided (for instance a Strategic Asset Management Guide). This information should include:

Details on targets or operational benchmarks for energy use, greenhouse gas emissions, potable water, and indoor environment quality including air quality and thermal comfort indices. These should be SMART (specific, measureable, achievable, relevant and time-bound) goals aimed at assisting the facilities management team to optimize performance of the building;

Details on the metering and sub-metering strategy employed by the building, including any instructions for data collection and analysis; and

Description and location of a sustainable procurement framework (if available).

Triggers for updating operations and maintenance information should also be detailed. This guidance should be aimed at assisting the facilities management team to maintain relevant, up-to-date building information. Triggers for the update of operations and maintenance manuals and/or related operating information should include at least when the following events occur:

- Refurbishment of a base building space;
- Recommissioning, retro commissioning, or replacement of nominated building systems;
- Building owner targets or benchmarks change;
- A new operational process is introduced or an existing one is changed; or
- A new tenant fitout is finalised (if applicable).

Building Log Book (4.2)

A building log book is an easily accessible central point of information provided for those who are managing a building. It is a living information source that provides a summary of all key building information. It should be a reference point and provide links to all other key information and documentation such as drawings, O&M manuals, BMCS functional information and warranty documents.

The building log book is a key document for the training of staff involved in operating a building, and should be used as a part of inductions for staff or contractors. It is a dynamic information source that includes, and tracks updates to:

- Descriptions of building systems, including their use and performance;
- Activities for ongoing compliance;
- Re-commissioning procedures, and
- Building tuning protocols.

For further information refer to CIBSE TM31: *Building Log Book Toolkit*.

Building User Information (4.3)

For the purposes of this credit, the building user is understood to be tenants (a tenant representative or office manager of tenanted space) and occupants (day-to-day users of space), depending on the level of information that is relevant to that audience. Project teams are to define the relevant tenant and occupant groups.

The following typical information can be provided to building users. It is the project team's responsibility to define the specific information topics relevant to the building user:

- Description of initiatives designed to enhance energy efficiency and minimise greenhouse gas emissions, and measures that must be taken by users during day-to-day operation to maximise their effectiveness;
- Description of initiatives intended to enhance and minimise water use and the measures that must be taken by users during day-to-day operation to maximise their effectiveness;

- Description of basic function and operation of any nominated building systems that building users may come in direct contact with including any occupant-activated controls;
- List of relevant contacts for maintenance information, operational issues, complaints or other feedback (e.g. relevant facilities management team contact details and/or online request/feedback form);
- Description of alternative transport initiatives promoted within premises (such as bicycle facilities, end-of-trip facilities, carpooling or car-share), location of a transport plan (if available);
- Local public transport information, maps and timetables;
- Description of the operational waste requirements for the building users, including what waste streams can or cannot be collected for recycling at the premises;
- Information on how to maximise the efficiency potential offered by base building services and nominated building systems;
- Information on how to best maximise daylighting, sights and views; and
- Information on green make-good requirements for tenants at end-of-life (if available).

REFERENCED DOCUMENTS

CIBSE TM31: Building Log Book Toolkit, 2006, Chartered Institution of Building Services Engineers

ADDITIONAL INFORMATION

Additional information can be found in the following documents:

- Operations & Maintenance Best Practices: A Guide to Achieving Operational Efficiency, August 2010, US Department of Energy
- Whole Building Design Guide: Comprehensive Facility Operation & Maintenance Manual, National Institute of Building Sciences
- CIBSE Guide M: Maintenance Engineering and Management, 2008, Chartered Institution of Building Services Engineers
- ASHRAE Guideline 4-2008: Preparation of Operating and Maintenance Documentation for Building Systems, 2008, American Society of Heating, Refrigeration and Air-conditioning Engineers
- AIRAH DA19 *HVAC&R Maintenance*, 2009, Australian Institute of Refrigeration Air Conditioning and Heating (Inc)
- The Carbon Trust Good Practice Guide 348: Better information for better buildings, The Carbon Trust

DOCUMENTATION REQUIREMENTS

Please refer to the *'How Documentation is Described in the Submission Guidelines'* section within the *Introduction* for further guidance on Documentation Requirements for project submissions.

Design Review submissions are optional.

Project teams must submit documentation supporting credit compliance. A list of recommended supporting evidence is provided in the following section, which can be used to demonstrate compliance. Alternate documentation to that listed below can also be used by project teams to demonstrate compliance.

The key requirement is that evidence is provided to support each claim made within the Submission Template.

SUBMISSION CONTENT

Project teams must submit the following documentation:

- **Submission Template**
- **Evidence** to support claims made in the Submission Template

Recommended Supporting Evidence

Owner's project requirements document, or an equivalent document, defining the nominated building systems.

Operations and maintenance information in accordance with 4.1.

Building log book in accordance with 4.2.

Building user information and (if required) supporting user documents or other supporting information demonstrating that building user information initiatives have been installed, are accessible to all users, and whose format and content complies with 4.3. This information may be presented through a combination of screenshots, printouts, or links to online information accessible to NZGBC Certified Assessors.

Confirmation from the fitout owner that the building user information has been provided to the relevant parties and, if appropriate, is installed and is operational, in accordance with 4.4.

REVISIONS AND AMENDMENTS

Revision No.	Date of Release	Description
NZv1.0	11/04/2019	Initial release.

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COMMITMENT TO PERFORMANCE

Credit 5

Points available: 2

AIM OF CREDIT

To recognise practices that encourage building owners, building occupants and facilities management teams to set targets and monitor environmental performance in a collaborative way.

CREDIT CRITERIA

5.1 Environmental Building Performance	1 point is available where there is a commitment to set targets and measure results for the environmental performance of the building.
5.2 End of Life Waste Performance	1 point is available where there is a commitment to reduce demolition waste at the end of life of an interior fitout or base building component.

COMPLIANCE REQUIREMENTS

5.1 Environmental Building Performance

One (1) point is awarded where at least 80% of the project's gross floor area (GFA), excluding carparking areas, is covered by a commitment to set, measure and report on its environmental performance. A smaller proportion of compliant space may be rewarded partial points on a sliding-scale to one decimal place, e.g. if 40% of the project's GFA is covered 0.5 points are awarded.

The methods for demonstrating commitment are defined under 5.1.1 'Building Performance Commitment Options'. The application of environmental building performance targets for different building occupancy and ownership models are defined under 5.1.2 'Application of Performance Targets'. The reporting of performance to stakeholders is defined under 4.1.3 'Performance Reporting'.

5.1.1 Building Performance Commitment Options

Compliance shall be demonstrated by providing a commitment to either:

- A. Set, measure and report on building performance metrics, in accordance with 5.1.1A; OR
- B. Commit to achieving a certified operational performance rating for the building, in accordance with 5.1.1B.

5.1.1A Building Performance Metrics

For this option, building environmental performance targets must be set, measured, and reported for at least two of the following environmental performance metrics:

- Greenhouse gas emissions;
- Potable water usage;
- Operational waste; and
- Indoor environment quality.

Greenhouse Gas Emissions or Energy Targets

- A commitment to greenhouse gas performance must state (as a minimum):
- Energy or greenhouse gas performance targets stated in kWh/m² or kg/CO₂/m² (or other appropriate unit); and
- Energy or greenhouse gas performance measurement procedures, including at least quarterly reporting.

Potable Water Targets

- A commitment to potable water performance must state (as a minimum):
- Potable water performance targets stated in kL/m² or kL/person; and
- Potable water performance measurement procedures, including at least quarterly reporting.

Operational Waste Targets

- A commitment to operational waste performance must state (as a minimum):
- Material generation minimisation targets, stated in mass (kg or g) per m² or per person;
- Landfill diversion minimisation targets, stated as a percentage of total materials generated; and
- Performance measurement procedures, including at least quarterly reporting.

Indoor Environment Quality Targets

- A commitment to indoor environment performance must state (as a minimum):
- Occupant comfort survey targets, stated as the number of times per year a questionnaire is completed;
- HVAC systems maintenance targets, stated in accordance with recognised standards; and
- Performance measurement, including at least quarterly reporting, for indoor air quality, thermal comfort or lighting comfort.

5.1.1B Certified Operational Performance Rating

||Criterion 5.1.1B may be achieved through demonstration of a commitment to achieve a Green Star – Performance certification or ||a Net Zero Buildings (formerly CarboNZero) certification. This pathway may only be used by building owners who have registered for these certifications.||^{R1.1.05.01} In this case, the ‘commitment’ element of the criterion relates to the commitment by the building owner to participate in achieving the targeted certification.||^{R1.05.01} Projects need to demonstrate that a commitment is in place to achieve the targeted certification.

For projects targeting Green Star Performance ratings, one credit from at least two of the below performance metrics will be pursued. For example, the combination of ‘Greenhouse Gas Emissions’ and ‘Indoor Air Quality’ is compliant; whereas the combination of ‘Indoor Air Quality’ and ‘Lighting Comfort’ is not.

For projects where 80% of the GFA is intended for office uses, ‘Greenhouse Gas Emissions’ must be pursued as one performance metric following NABERSNZ Energy pathway.

Table 5.1.1B: Green Star - Performance Credits

Performance Metric	Relevant Green Star – Performance Credit (Credit Number)
Greenhouse Gas Emissions	Greenhouse Gas Emissions (15)
Potable Water	Potable Water (19)
Operational Waste	Waste from Operations (22)
Indoor Environment Quality	Indoor Air Quality (8), Lighting Comfort (10), Thermal Comfort (12), or Occupant Satisfaction (14)

5.1.2 Application of Performance Targets

Three separate approaches are available for demonstrating commitment to environmental building performance targets. Projects may demonstrate this using one of the models outlined below that is most applicable to their context:

- Formal Agreement;
- Internal Requirement; and
- Strata Management for multi-unit residential.

If the project is not adequately described by one of the following options, project teams are invited to submit a Technical Question to the NZGBC.

Formal Agreement

This approach is typically used where the building owner and tenants are separate entities. For this model, the building owner and tenant must jointly agree and commit to targets through formal commitments to each other. This may be achieved through a ‘Best Practice Lease’ Agreement or similar formal agreement, or a memorandum of understanding.

These agreements must address the targets through:

- An obligation that the landlord separately monitors the agreed targets of each tenant;
- A defined mechanism for setting and monitoring targets; and
- A collaborative and non-punitive approach to prevention and rectification, where obligations are not met. This should also detail a flexible, fair and open mechanism to resolve any relevant issues.

Where the lease agreements do not include these targets, a separate formal agreement between the tenant and the landlord may be used instead.

Internal Requirement

This approach is typically used where the building owner and tenant are the same entity. For this model, building owners must commit to environmental performance targets through an internal requirement (policy, guideline, or environmental management plan) that targets are set and measured. This formal commitment must address:

- The environmental targets that have been set; and
- Performance measurement procedures.

Strata Management for Multi-unit Residential

For this model, the strata management must commit to environmental performance targets for common areas and services through an internal requirement (policy, guideline, or environmental management plan) that targets are set and measured. This formal commitment must address:

- The environmental targets that have been set; and
- Performance measurement procedures.

5.1.3 Performance Reporting

The results of the performance monitoring shall be reported to relevant stakeholders, at least on a quarterly basis. The project team shall define all relevant stakeholders and the most appropriate reporting methods for each stakeholder group.

5.2 End of Life Waste Performance

One (1) point is awarded where at least 80% of the project's GFA, excluding carparking areas, has a formal commitment in place to reduce demolition waste at the end of life of an interior fitout or base building component. A smaller proportion of compliant space may be rewarded partial points on a sliding-scale to one decimal place.

Compliance must be demonstrated by providing a commitment to either:

- A. Establish contractual agreements, in accordance with 5.2A; or
- B. Achieve a certified operational performance rating for the building, addressing waste from refurbishments, in accordance with 5.2B.

5.2A Contractual Agreements

For this option, contractual agreements must be in place to demonstrate the credit criteria. Projects may demonstrate this using one of the models outlined below that is most applicable to their context:

- Formal Agreement;
- Internal Requirement; and
- Strata Management for multi-unit residential.

If the project is not adequately described by one of these options, project teams are invited to submit a Technical Question to NZGBC.

Formal Agreement

This approach is typically used where the building owner and tenants are separate entities. For this model, building owners and tenants must demonstrate a commitment to best practice 'make good' clauses in the lease. The 'make good' clause must follow industry recognised standards or guidelines (such as *Greening Make Good*, RICS Oceania, and Better Buildings Partnership).

This joint commitment to reducing construction waste at the end-of-life of a fitout or base building component must outline:

A mutually agreed methodology for building owner and tenants to follow at the end-of-life of their fit-out or base building component, including clear metrics; and

Performance measurement procedures for building owner and building tenants, including clear reporting procedures.

Where the lease agreements do not have best practice 'make good' clauses in place, a separate legal agreement or memorandum of understanding that addresses these requirements may be used.

Internal Agreement

This approach is typically used where the building owner and tenant are the same entity. For this model, the building owner must commit to extending the life of the interior fitout or finishes to at least 10 years, barring minor wear and tear or minor repairs.

Strata Management for Multi-unit Residential

For this model, the strata management must commit to extending the life of the finishes to all common areas to at least 10 years, barring minor wear and tear or minor repairs.

5.2B Certified Operational Performance Rating

For this option, the project must commit to achieving the 'Waste from Refurbishments' credit (23) from the *Green Star – Performance* rating tool. This credit must be used to report on the measured results of the end-of-life waste commitments set by the parties involved.

DEFINITIONS

Relevant Stakeholder

An interested party that has either a personal or business interest in the ongoing environmental performance of the building. This may include building occupants, strata management, tenants, investors, shareholders and unit owners.

Sustainable Procurement

Sustainable procurement means only purchasing goods that are really needed and buying items or services whose production, use and disposal both minimise negative impacts and encourage positive outcomes for the environment, economy and society. Sustainable procurement achieves an optimal balance of economic, social and environmental impacts to ensure that an organisation can operate both efficiently and responsibly.

GUIDANCE

Performance Leasing Guide and Model Clauses

The Performance Leasing Guide and Model Clauses is a resource that encourages tenants and landlords to join forces to create better performing, more energy efficient buildings. It has been produced by DLA Piper New Zealand, the Energy Efficiency and Conservation Authority (EECA) and the New Zealand Green Building Council (NZGBC).

For more information about the Performance Leasing Guide and Model Clauses, please refer to: <https://www.nabersnz.govt.nz/news-and-resources/publications/performance-leasing-guide-and-model-clauses/>.

End of Life Waste Management - Building Owner/Occupier Model (5.2A)

Alternatives to demonstrate compliance with this criterion may include the following:

- Furniture, Fittings and Equipment (FFE) Quality standards policy (by either building owner or operator) covers targeting the optimum useful life of the asset or material.
- Requirements for reuse of materials/furniture and setting targets for recycling.
- Provisions for FFE to be donated to charity or sold on for reuse.
- The provision of a building / equipment lifecycle and condition report (by the building owner or manager) that demonstrates a forecast of 10 years (or greater) on capital improvement costs towards new fit-out or refurbishment projects.
- Strategic asset management plan, incorporating whole-of-life management (disposal, reuse, condition standard, green procurement policy, material cost analysis etc.).

Industrial Building Application

The NZGBC encourages industrial projects to view best practice 'green lease' model clauses developed by for example, the Better Buildings Partnership as examples of clauses that may be used within an industrial project. Although these clauses have been developed for the

commercial office sector, they are a great resource for other sectors of the built environment as a starting point.

Methods of Reporting (5.1.3)

The method of reporting environmental targets and performance should be relevant for the stakeholder groups identified. This may be through a public website, secure intranet, formal reports to stakeholders or any other method identified as suitable by the project team.

REFERENCED DOCUMENTS

The following documents are referenced in this credit:

- Australian and New Zealand Government Framework for Sustainable Procurement - Australian Procurement Council's (2007a).
- British Standard (BS) 8903:2010 – Principles and framework for procuring sustainably.
- AIRAH DA19 HVAC&R Maintenance Guideline – Addresses a maintenance process and maintenance strategies for heating, ventilation, air conditioning and refrigeration equipment.
- Greening Make Good Australia, RICS Oceania – Make Good (or Dilapidations as it is also known) refers to the process at the end of a commercial property lease where the tenant is required to hand back the premises they are vacating in a particular condition (established by the terms of the lease).
- Better Buildings Partnership Green Lease Toolkit, City of Sydney.
- *Green Star – Performance* rating tool: 'Waste from Refurbishments' credit (23).
- NABERSNZ Energy and Water for Offices: Rules for collecting and using data - [NABERSNZ Energy and Water for Offices Rules V1.1 Final](#)
- The Performance Leasing Guide and Model Clauses: [Performance Leasing Guide and Model Clauses - NABERSNZ](#)

DOCUMENTATION REQUIREMENTS

Please refer to the *'How Documentation is Described in the Submission Guidelines'* section within the *Introduction* for further guidance on Documentation Requirements for project submissions.

Design Review submissions are optional.

Project teams must submit documentation supporting credit compliance. A list of recommended supporting evidence is provided in the following section, which can be used to demonstrate compliance. Alternate documentation to that listed below can also be used by project teams to demonstrate compliance.

The key requirement is that evidence is provided to support each claim made within the Submission Template.

SUBMISSION CONTENT

Project teams must submit the following documentation:

- **Submission Template**
- **Evidence** to support claims made in the Submission Template

Recommended Supporting Evidence

Area Schedule listing the areas of each of the relevant formal commitments entered into.

Formal Agreements that describe the stakeholders, targets and duration of agreements or copies of other formal commitment devices.

Green Star – Performance credit documentation where applicable.

Green Star – Performance registration email for the building

Net Zero Buildings (formerly CarboNZero) **documentation** where applicable

Net Zero Buildings (formerly CarboNZero) **registration email** where applicable

NABERSNZ rating certificate where applicable.

REVISIONS AND AMENDMENTS

Revision No.	Date of Release	Description
NZv1.0	11/04/2019	Initial release.
NZv1.1	04/2022	R1.05.01 II Recognition of CarboNZero for Building Operations
NZv1.1.1	07/2023	R1.1.05.01 II Recognition of Net Zero Buildings certifications (formerly CarboNZero)

METERING AND MONITORING

Credit 6

Points available: 1

AIM OF CREDIT

To recognise the implementation of effective energy and water metering and monitoring systems.

CREDIT CRITERIA

To qualify for points in this credit a **minimum requirement** must be met

<p>6.1 Metering</p>	<p>To qualify for this credit, it is a minimum requirement that accessible metering be provided to monitor building energy and water consumption, including all energy and water common uses, major uses and sources. The metering is to be accurate and to inform energy consumption practices and reduce wasted energy.</p>
<p>6.2 Monitoring Systems</p>	<p>1 point is available where a monitoring strategy is addressed through a monitoring system, capable of capturing and processing the data produced by the installed energy and water meters, and accurately and clearly presenting data consumption trends.</p>

COMPLIANCE REQUIREMENTS

6.1 Metering

It is a minimum requirement of this credit that project teams must provide accessible metering to all energy and water common uses and major uses, and to energy and water sources provided by the project.

||All distinct uses, common uses and major uses that service the building must be metered. These uses must also be connected to a monitoring system.

As an example: at a minimum, the base building should provide floor by floor meters for the following tenant energy uses;

- General power
- HVAC Systems
- Lighting Systems|| R1.06.01

6.1.1 Metering Distinct Uses or Floors

Metering shall be provided to allow for monitoring of the relevant areas or functions of the project. In most cases floor-by-floor metering will suffice if the entire floor has a single use. If a floor has multiple uses, the different uses shall be individually metered. Therefore, should a floor be composed of office space and a computer server room, both spaces shall be separately sub-metered. If a floor has multiple tenants or owners, each tenancy or property shall also be separately sub-metered.

||A functional space must be the smallest of the following:

- a. Each individual contiguous floor of the building (i.e., for buildings with multiple units or towers, this refers to each floor of each unit or tower); or
- b. Each individual and distinct tenancy, regardless of its size; or
- c. Within any tenancy, any section that must be treated as distinct because of a significant difference in period of occupation or operating hours. This must include:
 - i. Spaces in which significant construction activity has taken place for fit-out works during the rating period; and
 - ii. Spaces associated with different AHAC zones or office support facilities that have a significant difference in operating hours to the surrounding office space.
- d. Any computer server room or series of contiguous computer server rooms that constitute more than 5% of that respective floor plate's rentable area; or
- e. Any meeting room or series of contiguous meeting rooms that constitute more than 10% of that respective floor plate's rentable area and have supplementary air conditioning or hours of operation that are different to the surrounding offices.

Where the electrical load for a single item exceeds 5% of the total electricity (power) demand for the project, or 100kW, it must be individually metered. Supplementary equipment can also be installed on the same measured circuit as the major use item. However, the total combined energy use of any systems connected to the major use item must not contribute more than 10kVA to the overall energy use. ||_{R1.06.02}

Where a common water use consumes 10% of the project's water use, these must be independently metered. For additional detail, refer to the Guidance section.

6.1.2 Water and Energy Meters

Utility meters must meet metering guidelines under the weights and measures legislation, as outlined under the current standards of the Electricity Authority. Project teams must verify if existing meters meet these requirements as well as any other utility meters being installed.

||Office projects targeting a *Green Star – Design & As Built* rating must install tariff metering or sub-metering to allow for separate monitoring of Base Building energy use (as defined by the NABERSNZ Rules- [Rules and documents for Accredited Assessors - NABERSNZ](#)), and must provide sub-metering to cover each tenancy energy use in accordance with the NABERSNZ Rules. Separate metering must be provided for lighting and power (unless either load is less than 5kVA) on each floor. Meters must be located in an area that allows regular monitoring and maintenance by facilities managers and other facilities management personnel.||_{R1.06.03}

6.1.3 Energy Metering Integrity

It is a requirement that all meters and metering systems:

- Be commissioned and validated in accordance with the most current 'Guide to non-utility metering system validation' described in NABERSNZ rules. Validation can be completed for electrical non-utility metering systems, gas non-utility metering systems, and Remote Meter Reading Systems (RMRS). Alternative protocols are acceptable provided they are of similar scope and nature.
- Be capable of producing alerts if any inaccuracies in the meter network are found. Inaccuracies are defined as in excess of meter tolerances (e.g. 'Class 1' meters shall not have inaccuracies of more than 1% due to metering accuracy class). The Monitoring system is to be continual (15mins to 1hr interval readings) and meter accuracy reconciled to appropriate standards, including, but not limited to, NABERSNZ rules.

6.1.4 Small Buildings Exception

Where the building's Gross Floor Area (excluding carparking areas) is smaller than 1000 m², unless specialist equipment is present in the building, a single meter for energy and a single meter for water will comply with this minimum requirement. If accessible to the building manager, the utility meter is acceptable.

6.2 Monitoring Systems

One (1) point is awarded where a monitoring system is provided capable of capturing and processing the data produced by the installed energy and water meters. The monitoring system must accurately and clearly present the metered data and include reports on consumption trends, in accordance with the following requirements.

6.2.1 Monitoring Strategy

The monitoring strategy must be developed in accordance with a recognised Standard, such as CIBSE TM39 *Building Energy Metering*. Although this Standard has been created to be used for developing energy metering and monitoring strategies, for the purpose of this credit, the same principles described in the Standard shall be used for developing water metering and monitoring strategies.

The monitoring strategy must include a metering schedule. This schedule shall address the estimated loads for energy and water and must list:

- The incoming input (electricity, gas, water, etc.);
- The end use (lighting, HVAC, fans);
- The estimated energy consumption for the end use;
- Which meter(s) provide the required information; and
- The individual estimated end consumption.

The monitoring schedule shall also address the location and the type of meter. The end uses shall be estimated and included in the strategy, though if not known at the initial stage, they can be established from the first full month of readings.

6.2.2 Automatic Monitoring System

The project team must provide automatic monitoring systems that record both consumption and demand of energy or water, and are capable of producing reports on hourly, daily, monthly, and annual energy use for all meters.

The installed meters must be capable of producing an output that can be transmitted to a central location (either onsite or offsite). This central location must provide data retrieval and reporting mechanisms.

As a minimum, the automatic monitoring system must be capable of:

- Collecting data from all meters;
- Alerting to missing data due to failures;
- Recording energy use and water consumption, and providing a reporting capability at user adjustable intervals;
- Raising an alarm when the energy or water use increase beyond certain parameters and automatically and instantly issue an alert the facilities manager. The process to assess, correct and validate alerts or faults must be detailed and contained in an accessible location;
- Providing a breakdown of the information by building system (mechanical, electrical, etc.), or by space (or by tenanted floor);
- Including the consumption water or energy, the load versus time (load profile), and the power factor (in the case of energy); and
- Producing, as a minimum, a quarterly report that is automatically emailed to the facilities manager responsible for the building.

For small buildings, this criterion can be met by providing a simple automated metering system that provides an alert to the building manager or owner. Alternatively, offsite monitoring is also acceptable through a central reporting system.

DEFINITIONS

Automatic Monitoring System

Automatic monitoring systems are defined as systems that record both consumption and demand of either energy or water. These systems are capable of processing this information to produce reports at user adjustable intervals. This means that the Automatic Monitoring System can report at intervals selected by the building managers according to their process to assess, correct and validate alerts or faults. The data recorded from the metering system must be at either 15 minutes, 30 minutes or 1 hour intervals to maintain integrity of the metering system.

Common Uses for Energy

Common uses of energy are defined as items, or systems, that have a load greater than 5% of the total energy use of the building, or, have a rated load of greater than 100kW.

Possible examples of systems that are considered to be common uses for energy include, but are not limited to:

- Chillers;
- Air handling units, fans, humidification;
- Server and computer equipment;
- Water reuse systems;
- Kitchen plant and equipment;
- Specialist lighting for stages, etc.; and
- Specialist equipment.

Common Uses for Water

Common water uses are defined as items or spaces that individually consume 10% of the project's water use. Examples include, but are not limited to:

- Evaporative heat rejection systems;
- Irrigation systems;
- Wash down systems;
- Humidifiers;
- Kitchens; and
- Sanitary blocks (if refurbished as part of the tenancy works).

Energy

Energy refers to electricity and gas, as well as any other fuel uses.

Energy Sources Provided by the Project

Electricity, gas, propane, steam, hot water, chilled water, renewable generation and other sources of energy, are examples of energy sources provided by the project. Where these energy sources are provided to occupants or tenants, these must be metered for each floor or distinct use.

Water Sources Provided by the Project

Rainwater supply and recycled water supply are examples of water sources that must be monitored, particularly if provided to occupants or tenants by the project. However, separate metering of rainwater supply is not required if rainwater is used solely for manual irrigation.

Non-utility Meters

Non-utility meters are meters that are not owned or managed by the relevant utility. These meters can either be read manually or automatically, directly or remotely.

Small Buildings

Small buildings are defined as those with a Gross Floor Area (1000m²excluding car parking) smaller than 1000m². Buildings with similar attributes to a small building that are outside the area definition can submit a Technical Question to obtain additional clarification.

Smart Metering

A smart meter is an electronic device that records consumption of electric energy and water in intervals of an hour or less and communicates that information at least daily back to the property owner for monitoring and billing purposes. Smart meters also enable two-way communication between the meter and the central building systems. Smart metering may utilise a fixed visual display or cloud based reporting or an alternative.

GUIDANCE

Metering Distinct Uses

A number of different metering examples are provided for guidance purposes only:

In office facilities, consideration should be given to the usage patterns of the building. Floor-by-floor sub-metering is appropriate if the entirety of the floor is an office area. If a floor has a significant component that differs from the principal use, for example a number of seminar rooms, then this space should be sub-metered as well.

In retail facilities, consideration should be giving to separately meter staff only areas, such as warehousing or office area, from the sales floor, and separately sub-metered from the warehouse.

In an education building, the metering strategy should address the multiple uses in the facility. The kitchen, computer classrooms, auditoriums, gyms, swimming pool, laboratories, study rooms, classrooms and lecture halls all have different usage patterns. As such, the metering strategy should separately sub-meter those.

In a building with a large floor plate, energy meters should be provided separately for lighting consumption, and other power consumption.

REFERENCED DOCUMENTS

The following documents are referred to in this credit:

- CIBSE TM39 Building Energy Metering
- 'Guide to non-utility metering system validation', NABERSNZ Energy and Water for Offices: Rules for collecting and using data

- NABERSNZ Energy and Water for Offices: Rules for collecting and using data: [NABERSNZ Energy and Water for Offices Rules V1.1 Final](#)

ADDITIONAL INFORMATION

Additional information can be found in the following documents:

- Crossley, D. (2007), 'Advanced metering for energy supply in Australia', Energy Futures Australia for Total Environment Centre
- Sydney Water Corporation (SWC) (2007), Best Practice Guidelines for Water Conservation in Commercial Office Buildings and Shopping Centres.
- Country Energy, 2009, Energy Insights - Encourage reduced consumption, Install Sub metering.

DOCUMENTATION REQUIREMENTS

Please refer to the '*How Documentation is Described in the Submission Guidelines*' section within the *Introduction* for further guidance on Documentation Requirements for project submissions.

Design Review submissions are optional.

Project teams must submit documentation supporting credit compliance. A list of recommended supporting evidence is provided in the following section, which can be used to demonstrate compliance. Alternate documentation to that listed below can also be used by project teams to demonstrate compliance.

The key requirement is that evidence is provided to support each claim made within the Submission Template.

SUBMISSION CONTENT

Project teams must submit the following documentation:

- **Submission Template**
- **Evidence** to support claims made in the Submission Template

Recommended Supporting Evidence

Drawings showing the location of all energy and water meters in the project and the associated energy and water uses; showing how the system is easily accessible to the residents; and confirming the requirements for utility and non-utility meters.

Letter of confirmation from the contractor/metering provider/manager demonstrating that the metering systems are continually and automatically monitored by a system that is able to produce alerts if any inaccuracies are found, and that correction and revalidation to any faulty meters are to be carried out.

Extracts from Commissioning Report where relevant, showing the automatic monitoring system is operating and has the ability to provide the information required in the Compliance Requirements and demonstrating that all energy sub-meters be validated in accordance with a recognised standard (e.g. NABERSNZ rules).

Copy of Monitoring Strategy document specific to the building and including detail described in the Compliance Requirements section of the credit, including description of check sums for integrity calculations.

Automatic monitoring system data sheet describing the systems features and capabilities. In particular, it must describe the system's ability to analyse metering information at regular intervals, i.e. on a daily, weekly, and monthly basis.

REVISIONS AND AMENDMENTS

Revision No.	Date of Release	Description
NZv1.0	11/04/2019	Initial release.
NZv1.1	04/2022	<p>R1.06.01 II An example added for the metering and monitoring requirement.</p> <p>R1.06.02 II Additional guidance for defining function spaces.</p> <p>R1.06.03 II Update to the guidance by referencing NABERSNZ resources.</p>

RESPONSIBLE CONSTRUCTION PRACTICES

Credit 7

Points available: 2

AIM OF CREDIT

To reward responsible construction practices that manage environmental impacts, enhance staff health and wellbeing, and improve sustainability knowledge on site.

CREDIT CRITERIA

To qualify for points in this credit a **minimum requirement** must be met.

7.1	Environmental Management Plan	To qualify for this credit, it is a minimum requirement that environmental impacts are managed during construction by implementing a best practice environmental management plan.
7.2	Environmental Management System	1 point is available where the responsible party for the site has a formalised approach to planning, implementing and auditing is in place during construction, to ensure conformance with the EMP.
7.3	High Quality Staff Support	<p>1 point is available where high quality staff support practices are in place that:</p> <p>Promote positive mental and physical health outcomes of site activities and culture of site workers, through programs and solutions on site; and</p> <p>Enhance site workers' knowledge on sustainable practices through on-site, off-site, or online education programs.</p>

COMPLIANCE REQUIREMENTS

7.1 Environmental Management Plan

It is a minimum requirement of this credit that a project-specific best practice EMP is developed and implemented, to assist the Principal/Head Contractor and its service providers to manage environmental performance, conditions and impacts arising from demolition, excavation and construction. The EMP must cover environmental impacts arising from construction works, and it must be site-specific.

Best Practice EMPs

The EMP must be compliant with best practice guidelines and must be implemented from the beginning of construction works, including any excavation and demolition. The requirements for EMPs, as outlined within the *NSW Environmental Management Systems Guidelines*, are considered best practice. The edition of the guidelines current at the time of construction must be used.

7.2 Environmental Management System

One (1) point is awarded where project teams demonstrate that a formalised systematic and methodical approach to planning, implementing, and auditing is in place during construction, to ensure compliance with the EMP.

The plan must be implemented by a responsible party with a formal environmental management system in place. For the purposes of this credit, this is achieved through a formalised environmental management system implemented by the key party responsible for managing the site.

There are two compliance pathways for this criterion. Project teams must demonstrate compliance with the pathway specified for the project's contract value, below:

For projects with a contract value less than \$10 million, the environmental management system (EMS) must comply with either *NSW Environmental Management Systems Guidelines* or a recognised standard.

For all other projects, the formalised Environmental Management System must have been independently certified to a recognised standard, such as AS/NZS ISO 14001, Enviro-Mark Diamond, BS 7750 or the European Community's EMAS. The certification party must be members of the International Accreditation Forum.

In all cases, an auditor report confirming evidence of effective use of the formalised EMS must be provided to demonstrate compliance. An auditor report for the organisation, rather than the site, will suffice. Where nonconformities with the EMS have been recorded, corrective and preventive actions must also be demonstrated to have been applied, in order for credit compliance to be achieved.

7.3 High Quality Staff Support

One (1) point is available where high quality staff support practices are in place that:

Promote positive mental and physical health outcomes of site activities and culture of site workers, through programs and solutions on site in accordance with 7.3.1; and

Enhance site workers' knowledge on sustainable practices through on-site, off-site, or online education programs in accordance with 7.3.2.

7.3.1 Health Impacts of Site Activities

To comply with this requirement, programs and policies in place must go beyond legal requirements for occupational health and safety (OHS) and extend into wellbeing promotion.

The responsible party must implement policies and programs to promote health and wellbeing on-site. The programs must target both physical and mental health outcomes.

At least three distinct issues, with one of those specifically addressing mental health impacts, must be addressed. Issues that may be considered include:

- healthier eating and active living
- reduced harmful alcohol and drug and tobacco-free living
- increase social cohesion, community, and cultural participation
- understanding depression
- preventing violence and injury
- suicide prevention
- decrease psychological distress

The responsible party should carry a needs analysis of site workers and contractors to determine appropriate actions. The policies and programs must be relevant to all construction workers on site for the whole duration of construction. A mix of programs is acceptable throughout the duration of construction. A list of suggested programs or policies which could be implemented on the project can be found in the guidance section.

7.3.2 Knowledge of Sustainable Practices

The responsible party must provide training to site workers on project specific sustainable practices and initiatives. The training must include information on any sustainable building certification(s) sought; explain the value of certification; and the role site workers play in delivering a sustainable certified building.

||80% of all individuals that work on site for at least 3 days, representing a contractor or sub-contractor,|| R1.07.01 must receive training to comply with the requirements of the Knowledge of Sustainable Practices. Training can be provided through one, or a combination of:

- On-site training, such as by including the items above as part of site induction practices.
- Off-site training, such as by providing sustainability training to site workers via a TAFE or similar program within the last 3 years.
- Online training, such as by a third party service that can provide training on sustainability topics and track personnel who have taken the relevant materials within the last three years.

DEFINITIONS

International Accreditation Forum

The International Accreditation Forum (IAF) is the world association of Conformity Assessment Accreditation Bodies and other bodies interested in conformity assessment in

the fields of management systems, products, services, personnel and other similar programmes of conformity assessment. Its primary function is to develop a single worldwide program of conformity assessment that reduces risk for business and its customers, by assuring them that accredited certificates may be relied upon. Accreditation assures users of the competence, and impartiality of the body accredited.

Responsible Party

The responsible party is defined as head contractor, principal contractor, or similar. ||It refers to people employed by the contractor or subcontractor, who are involved in decision making and will be key to the delivery of the Green Star certification in their relevant trades. There is no requirement for a Responsible Party to be office based, site based or a combination, as long as they have relevant participation in the project. There are no specific roles defined or excluded from this definition. A contractor's Sustainability Consultant may be considered Responsible Party for the purposes of this credit. || R1.07.02

Construction Workers

Any head contractor, subcontractor, consultant or professional services who are inducted onto the site during the construction phase.

GUIDANCE

Multiple Main Contractors

||When a project has multiple main contractors looking after demolition, earthworks, and construction work separately, in order to achieve the point, all of these main contractors are expected to meet requirements set under this credit. The small contract pathway (<\$10 million) can be adopted based on individual contractor value instead of the project value. Note that minor non-compliance can be accepted for small contract accounting for less than 7.5% of the total project value. Works completed prior to the land purchase can be excluded from this credit's assessment scope. || R1.07.03

Multiple Project Certifications

Where multiple buildings are seeking a single certified rating, a plan and certification for the entire project site area is an acceptable way to demonstrate compliance with this requirement.

Formalised Management System

A formalised Environmental Management System (EMS) is a process that can be used to identify, manage, audit and reduce environmental impacts, and generate reports on environmental performance progress. It should provide a systematic and methodical approach to planning, implementing and reviewing an organisation's response to those impacts.

The management system may also be integrated with other management systems (such as occupational health and safety, risk registers etc.) to give a 'whole of business' approach – although this is not a requirement for the purposes of this credit.

All formalised EMS should follow the basic stages of high-level commitment, identification of impacts, review, target setting, action plan, monitoring and reporting. The process is to be frequent and ongoing.

Programs and Policies

||A single program or initiative can be used to comply with High Quality Staff Support, providing the program or initiative covers at least three distinct issues, with one of the three specifically addressing mental health impacts. Project teams must clearly highlight the distinct issues and provide evidence in the submission demonstrating these being addressed on site.|| R1.07.04

The following is a brief list of initiatives which could be implemented on site for, made available to, or discussed with all construction workers for the whole duration of construction:

- Beyond Blue
- Mates in Construction
- Lifeline
- Headspace
- White Ribbon
- Nutrition Organization

Contractor Education

Examples of the type of training to be provided include:

- Training on the core concepts of global warming, climate change and the health impacts of minimum
- building practices.
- Site-specific training that highlights the sustainable solutions of your project.
- Information on any certification that is being achieved by the project.
- Explanation on why the concept of certification is important, as well as the role they play in achieving it.

REFERENCED DOCUMENTS

The following documents are referenced in this credit:

- AS/NZS ISO 14001 Environmental Management
- BS 7750 Specification for environmental management systems
- Eco-Management and Audit Scheme (EMAS) European Commission
- NSW Environmental Management Systems Guidelines https://12253-console.memberconnex.com/Attachment?Action=Download&Attachment_id=3993

- Enviro-Mark Certification: [Environmental Management Certification & Programmes NZ | Toitū Envirocare \(toitu.co.nz\)](https://www.toitu.co.nz/environ)

DOCUMENTATION REQUIREMENTS

Please refer to the *'How Documentation is Described in the Submission Guidelines'* section within the *Introduction* for further guidance on Documentation Requirements for project submissions.

Design Review submissions are optional.

Project teams must submit documentation supporting credit compliance. A list of recommended supporting evidence is provided in the following section, which can be used to demonstrate compliance. Alternate documentation to that listed below can also be used by project teams to demonstrate compliance.

The key requirement is that evidence is provided to support each claim made within the Submission Template.

SUBMISSION CONTENT

Project teams must submit the following documentation:

- Submission Template
- Evidence to support claims made in the Submission Template

Recommended Supporting Documentation

7.1 ENVIRONMENTAL MANAGEMENT PLAN

Environmental Management Plan (EMP), clearly demonstrating compliance with the requirements of the *NSW Environmental Management System Guidelines*.

Confirmation of Subcontractor Adherence to the EMP Requirements that any subcontractors relevant to the project adhered to the EMP provisions at the time of construction works. This may be through a confirmation from the Principal/Head Contractor, or through a policy document stating the process undertaken to ensure compliance.

7.2 ENVIRONMENTAL MANAGEMENT SYSTEM

Contractor Formalised Management System (EMS) External Auditor's Report confirming formalised management system was in place and operational at the time of construction works.

Contractor ISO 14001 or Enviro-Mark Diamond Certificate showing the date of issue prior to the commencement of construction works.

7.3 HIGH QUALITY STAFF SUPPORT

Extracts of Evidence detailing the programs and policies implemented to promote health and wellbeing on site.

Evidence detailing the process to manage training, and track workers trained. Examples of evidence include extracts from the training policy, a report from a third-party provider, or similar.

Extracts of Training such as screenshots, presentation, or similar, showing the information provided as part of training.

REVISIONS AND AMENDMENTS

Revision No.	Date of Release	Description
NZv1.0	11/04/2019	Initial release.
NZv1.1	04/2022	<p>R1.07.01 II 80% of all individuals that work on site for at least 3 days, representing a contractor or sub-contractor, must receive training to comply with the requirements of the Knowledge of Sustainable Practices.</p> <p>R1.07.02 II Expanded definition for Responsible Party</p> <p>R1.07.03 II Additional guidance for projects having multiple main contractors.</p> <p>R1.07.04 II Additional guidance for Programs and Policies</p>

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OPERATIONAL WASTE

Credit 8

Points available: 1

AIM OF CREDIT

To recognise projects that implement waste management plans that facilitate the re-use, upcycling, or conversion of waste into energy, and stewardship of items to reduce the quantity of outgoing waste.

CREDIT CRITERIA

There are two options available in this credit: a 'Performance Pathway' that relies on specialised waste management solutions, or a 'Prescriptive Pathway' that outlines specific best practice requirements.

8A	Performance Pathway: Specialist Plan	1 point is available where a waste professional prepares and implements an Operational Waste Management Plan (OWMP) for the project in accordance with best practice approaches and this is reflected in the building's design.
8B	Prescriptive Pathway: Facilities	1 point is available where facilities are in place to collect and separate distinct waste streams, and where these facilities meet best practice access requirements for collection by the relevant waste contractor.

COMPLIANCE REQUIREMENTS

8A Performance Pathway: Specialist Plan

One (1) point is awarded where a *qualified waste auditor* prepares an Operational Waste Management Plan (OWMP) for the building in accordance with best practice approaches. The requirements or recommendations made in the Operational Waste Management Plan must then be reflected in the design of the building's facilities.

For information on what qualifications are required to be deemed a *qualified waste auditor*, please see the Guidance section.

OWMPs can influence the amount of waste recycled and generated by occupants, tenants and visitors. For the purposes of this credit, the OWMP must be developed for implementation at the site and building level, and be applicable to the Green Star project boundary. OWMPs are usually implemented by building owners or operators.

The OWMP must be developed by a *qualified waste auditor*. As a minimum, the OWMP must:

Identify the site boundary, the waste streams relevant to the project, and the individual roles responsible for delivering and reviewing the OWMP;

Set diversion from landfill targets and/or targets for reducing total materials generation (general waste materials and recyclable/reusable materials), as well as monitoring and measurement procedures for waste and recycling streams by weight;

Outline methods for encouraging the separation of waste streams, such as bins, storage areas, or recycling facilities in public areas as required;

- Identify storage areas for all waste streams and outline best practice safety and access requirements for their collection;
- Identify safe methods for vehicle access and transfer of waste; and
- Incorporate a review process to assess the success of the OWMP and make improvements, based on operational experience.

8B Prescriptive Pathway: Facilities

One (1) point is awarded where project teams meet all of the following prescriptive requirements. In combination, these requirements are considered a prescriptive approach for achieving best practice outcomes in operational waste management. The three requirements are:

- 8B.1 Separation of Waste Streams;
- 8B.2 Dedicated Waste Storage Area; and
- 8B.3 Access to Waste Storage Area.

8B.1 Separation of Waste Streams

Collection bins or storage containers shall be provided for building occupant use to allow for separation of all applicable waste streams. The following waste streams must be provided with separate bins or containers:

- General waste going to landfill;
- Recycling streams to be collected by the building's waste collection service, including paper and cardboard, glass, and plastic. These streams may be collected in separate bins or in the same bin where commingled recycling is available.

Commingled recycling is permissible to the extent that is accepted by the waste collection service. For example, if glass and plastic are collected as commingled recycling, then paper and cardboard are still required to have a separate recycling bin or container; and

At least one other waste stream. This waste stream should further reduce waste being sent to landfill. This may include collecting any of the following waste types: organics, e-waste, batteries etc.

These bins or containers must be clearly marked for each stream, to allow for separation of the applicable waste streams. Bins or containers must be evenly distributed throughout the building.

8B.2 Dedicated Waste Storage Area

A dedicated area for the storage and collection of the applicable waste streams shall be provided. The storage area must be sized to accommodate all bins or containers, for all applicable waste streams, for at least one collection cycle. The calculations used to demonstrate that the area provided is adequately sized to handle the recyclable waste streams specified must be based on:

- Waste generated by project; and
- Collection frequency for each waste stream.

The calculations for waste generation rates must be based on figures outlined within third-party best practice guidelines.

It is acceptable to provide more than one dedicated storage area when providing the appropriate waste storage space for the project. However, all storage areas dedicated to recycling must meet all the applicable requirements.

8B.3 Access to Waste Storage Area

Access to waste collection areas must adhere to best practices, as outlined within third-party best practice guidelines, in order for this requirement to be met.

DEFINITIONS

General Waste Materials

Includes all waste streams not clearly identified as being recyclable or reusable.

Recyclable / Reusable Materials

Materials that can be made into new products, or reused, to prevent them from being sent to landfill. This reduces the consumption of raw materials, as well as the environmental impacts associated with sending waste to landfill.

GUIDANCE

Qualified Waste Auditor (8A)

A qualified waste auditor is defined as one of the following:

An auditor holding Environmental Management Systems Auditor certification issued by Exemplar Global (formerly RABQSA Inc.). To find a certified auditor, refer to the 'Search for Certified Individuals' section of the Exemplar Global website (<http://www.exemplarglobal.org/what-we-offer/search-for-certified-individuals-or-organizations/>); or

An auditor employed by a waste management organisation, possessing a minimum of five years' experience, working in waste auditing in the built environment, with specific experience in conducting commercial audits in line with guidelines issued by State/Territory waste authorities; or

A waste auditor or waste specialist, working for a consultant, building owner or contractor, possessing a minimum of three years' experience developing OWMPs; or

Off-site Recycling (8B)

Where recyclable waste is taken off-site to be sorted and hence equipment for the different recyclable waste streams will not be provided, demonstrate that suitable off site separation of recyclables is to be implemented either by demonstrating standard recyclable pick up services are available or through a contract for the waste to be removed and sorted. In both cases demonstrate that the waste is to be sorted into the streams required by the Compliance Requirements of this credit.

Third-party Best Practice Guidelines (8B)

The City of Sydney's *Policy for Waste Minimisation in New Developments 2005* (Sections A and C on access and Appendix B on waste generation rates) is a recognised third-party best practice guideline that may be used to calculate waste generation rates (8B.2) and justify access arrangements (8B.3).

Other third-party best practice guidelines, issued by other city councils or other waste authorities, may also be used.

REFERENCED DOCUMENTS

City of Sydney's 'Guidelines for Waste Management in New Developments' August 2018 (or latest available):

http://www.cityofsydney.nsw.gov.au/_data/assets/pdf_file/0018/120384/WasteCodeForNewDevelopments.pdf

ADDITIONAL INFORMATION

Additional information can be found in the following documents:

Australian Waste Management Report 2010

NSW Environment Protection Authority's 'Better Practice Guide for Waste Management in Multi-unit Dwellings' June 2008 (or latest available):

<https://www.cityofsydney.nsw.gov.au/development-guidelines-policies/guidelines-waste-management-new-developments>

NSW Environment Protection Authority's 'Better Practice Guidelines for Waste Management and Recycling in Commercial and Industrial Facilities' December 2012: [Guidelines for waste management in new developments - City of Sydney \(nsw.gov.au\)](#)

NZ Weight and Measures Act 1987

DOCUMENTATION REQUIREMENTS

Please refer to the *'How Documentation is Described in the Submission Guidelines'* section within the *Introduction* for further guidance on Documentation Requirements for project submissions.

Design Review submissions are optional.

Project teams must submit documentation supporting credit compliance. A list of recommended supporting evidence is provided in the following section, which can be used to demonstrate compliance. Alternate documentation to that listed below can also be used by project teams to demonstrate compliance.

The key requirement is that evidence is provided to support each claim made within the Submission Template.

SUBMISSION CONTENT

Project teams must submit the following documentation:

- **Submission Template**
- **Evidence** to support claims made in the Submission Template

Recommended Supporting Evidence

8A PERFORMANCE PATHWAY: SPECIALIST PLAN

Operational Waste Management Plan including all relevant compliance requirements as outlined in the Submission Template.

Evidence of Waste Auditor qualifications - CV or project list outlining previous experience and qualifications.

Site Plan and/or Architectural Plans highlighting all relevant areas as referenced by the WMP.

8B PRESCRIPTIVE PATHWAY: FACILITIES

Site Plan and/or Architectural Plans — highlighting all relevant areas as referenced by the WMP, and demonstrating:

- B.1 Separation of Waste Streams;
- B.2 Dedicated Waste Storage Area; and
- B.3 Access to Waste Storage Area.

B.1- **Equipment list/schedule** demonstrating that waste streams provided are met through adequate bins

B.2- **Calculations** regarding waste generation and bin sizing and reference to how these figures meet third party best practice guidelines

B.3- **Description** of how waste collection areas adhere to best practices, as outlined within third-party best practice guidelines. ||_{R1.08.01}

REVISIONS AND AMENDMENTS

Revision No.	Date of Release	Description
NZv1.0	11/04/2019	Initial release.
NZv1.1	04/2022	R1.08.01 II Updated documentation requirements for 8B prescriptive pathway: facilities

INDOOR ENVIRONMENT QUALITY

The *Green Star – Design & As Built* 'Indoor Environment Quality' category aims to encourage and reward initiatives that enhance the comfort and well-being of occupants. The credits within this category address issues such as air quality, thermal comfort and acoustic comfort.

Through the 'Indoor Environment Quality' category, *Green Star – Design & As Built* aims to achieve sustainability performance improvements in a manner that also improves occupants' experience of the space. While it is possible to reduce a project's energy intensity by simply providing occupants with poor lighting quality for example, the 'Indoor Environment Quality' category recognises that buildings are designed for people and that reductions in energy use should never be made at the expense of the occupants' health and wellbeing.

By rewarding both energy efficiency and encouraging occupant well-being, the Green Star rating system promotes and rewards a holistic approach to sustainability that results in multiple benefits.

The 'Indoor Environment Quality' category rewards projects that achieve the following outcomes:

INCREASED COMFORT AND WELL-BEING

- Improvements to air quality through appropriate ventilation.
- The provision of high levels of thermal, visual and acoustic comfort.
- Reductions to occupant stress.

REDUCED EXPOSURE TO POLLUTANTS

- The creation of low-toxicity environments through reductions to pollutants.
- The removal of harmful materials from existing buildings.

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INDOOR AIR QUALITY

Credit 9

Points available: 4

AIM OF CREDIT

To recognise projects that provide high indoor air quality to occupants.

CREDIT CRITERIA

9.1 Ventilation System Attributes	<p>1 point is available where:</p> <p>The entry of outdoor pollutants is mitigated;</p> <p>The system is designed for ease of maintenance and cleaning; and</p> <p>The system has been cleaned prior to occupation and use.</p>
9.2 Provision of Outdoor Air	<p>2 points are available where the nominated area is provided with sufficient outdoor air to ensure levels of indoor pollutants are maintained at acceptable levels.</p> <p>Options are available for mechanically and naturally ventilated buildings and for outdoor air provision or contaminant monitoring.</p>
9.3 Exhaust or Elimination of Pollutants	<p>1 point is available where nominated pollutants, such as those arising from printing equipment, cooking processes and equipment, and vehicle exhaust, are limited by either removing the source of pollutants from the nominated area, or exhausting the pollutants directly to the outside while limiting their entry into other areas of the project.</p>

This credit, or specific criterion, may not be considered relevant to the sustainability outcomes for some projects. In this instance, the credit, or specific criterion, may be considered 'Not Applicable'. Please see the Introduction section of the Submission Guidelines for additional information.

NOMINATED AREA

For this credit, the nominated area includes all **primary** and **secondary** spaces. A space can be excluded if the use of the space (for example, a laboratory) justifies specific ventilation conditions, or will not be regularly occupied (for example, a warehouse floor). Please see the 'List of Areas' section of the Submission Guidelines for space type definitions.

COMPLIANCE REQUIREMENTS

9.1 Ventilation System Attributes

One (1) point is awarded where project teams demonstrate that the ventilation system meets all of the following conditions:

- The entry of outdoor air pollutants is mitigated, in accordance with 9.1.1;
- The system is designed for ease of maintenance and cleaning, in accordance with 9.1.2; and
- The system has been cleaned prior to occupation and use, in accordance with 9.1.3.

9.1.1 Entry of Outdoor Pollutants

The entry of outdoor air pollutants to the space must be minimised. The building ventilation systems must be designed to comply with ASHRAE Standard 62.1:2013 or a more recent edition in regards to minimum separation distances between pollution sources and outdoor air intakes. Windows, doors, openings, vents, grilles, and skylights are all considered outdoor air intakes for purposes of this credit and must be modelled taking into account their free area.

Compliance is to be demonstrated in accordance with the distances specified in Table 5.5.1 of the Standard, however projects must also ensure compliance with any other requirement or guidance nominated within the Standard. Analytical solutions are also acceptable by following the example provided within Appendix F of ASHRAE Standard 62.1.

9.1.2 Design for Ease of Maintenance and Cleaning

Any mechanical ventilation system within the building, whether existing or new, must be designed to provide adequate access for maintenance, to both sides of all moisture and debris-catching components, within the air distribution system. Moisture-producing and debris-catching components include items such as cooling coils, heating coils, humidifiers and filters in the air handling system.

||For ducted split system fan coil units (DX split/VRF/VRV), project teams do not have to provide access to both sides of coils for cleaning and maintenance purposes of such systems, provided the following conditions are met:

A. Design teams may provide access to the upstream side of fan coil units where the coils are protected by a filter rated at MERV 8 or higher and:

- Provide heating only; or,
- Provide cooling only with the coil assembly no more than 4 rows deep; or,
- Provide dual heating/cooling with the coil assembly no more than 4 rows deep

B. For fan coil units or air handling units located within a ceiling void, in addition to the above criteria, the project team must fully demonstrate safe access for cleaning and maintenance. This may include:

- Access panels in unit / ductwork is in close proximity to the coil to be cleaned.
- Access panels in the ceiling below the unit is in close proximity to the unit / ductwork access panel.
- The upstream surface of the coil must be accessible within 1m of the ceiling panel. ||

R1.09.01

||Where the highest level of filtration possible in the FCU is G2, i.e. in smaller FCUs, and only access downstream of the heating/cooling coils is possible then:

- Adequate access must be provided to the FCU for filter cleaning/maintenance/replacement.
- Adequate access must be provided to the downstream side of the heating/cooling coils in the FCU for cleaning/maintenance.
- Adequate access is considered as that presented in item B on the bottom of page 116 of the Submission Guidelines, ensuring that access to the filter is also adequate.
- Outdoor air must be supplied to the FCU via an air handling unit (AHU).
- AHU must have minimum levels of filtrations of: Panel filter = G4 + Deep Bag = F7 (ePM1 50%). An additional panel filter is recommended to extend the clean performance of the bag filter.
- Adequate access to both sides of the AHU coils for cleaning/maintenance must be achieved.
- The building owner commits to a maintenance schedule that includes regular filter and coil inspections/cleans as necessary. The regularity of maintenance should be based on the manufacturer's recommendations. || R1.1.09.01

9.1.3 Cleaning Prior to Use and Occupation

All new and existing ductwork that serves the building must have been cleaned in accordance with the recognised Standards, see the Guidance section. This includes all ductwork in the base building that serves the building from the air handling unit to the supply vents. If no ductwork exists, these requirements are deemed to be met.

Where construction management processes (see the 'Responsible Construction Practices' credit) are in place to ensure that all new ductwork, or ductwork that has been recently cleaned, remains free of moisture and debris until occupation, this ductwork can be considered to be clean. All other ductwork (existing and new) including plenums, filters and fan chambers must be cleaned in accordance with a recognised Standard.

9.2 Provision of Outdoor Air

Up to two (2) points are awarded where at least 95% of the nominated area is provided with sufficient outdoor air to ensure that levels of indoor air pollutants are maintained below acceptable levels.

9.2.1 Mechanically Ventilated or Mixed-mode Spaces

For mechanically ventilated or mixed-mode spaces:

One (1) point is awarded where outdoor air is provided at a rate 50% greater than the minimum required by a recognised standard (listed below), or carbon dioxide (CO₂) concentrations are maintained below 800ppm; or

Two (2) points are awarded where outdoor air is provided at a rate 100% greater than the minimum required by a recognised standard (listed below), or CO₂ concentrations are maintained below 700ppm.

9.2.2 Naturally Ventilated Spaces

For naturally ventilated spaces, two (2) points are awarded where the requirements of a recognised standard (listed below) are met. The nominated area must be provided with the quantity of outdoor air appropriate for the activities and conditions in the space.

The systems provided must not rely on its operation or adjustment by the facility management to achieve the required performance, the credit will only be awarded for permanent building attributes.

9.2.3 Recognised Standards

In calculating achievement of criteria 9.2.1 project teams must reference one of the following recognised standards:

- AS 1668.2:2012 The use of ventilation and air-conditioning in buildings – Part 2: Mechanical ventilation in buildings

- NZS 4303:1990 Ventilation for Acceptable Indoor Air Quality

For criterion 9.2.2 one of the following recognised standards must be referenced:

- AS 1668.4:2012 The use of ventilation and air-conditioning in buildings – Part 4: Natural ventilation of buildings

- NZS 4303:1990 Ventilation for Acceptable Indoor Air Quality

9.2.4 Demonstrating Compliance

Project teams must use one of the following three options for demonstrating compliance with the requirements for each space, depending on the 'primary mode of ventilation'.

The primary mode of ventilation is defined as the ventilation system that is expected to operate for at least 70% of occupied hours. Standard hours of occupancy are defined as 50 hours a week or the building's design occupancy.

If no single mode of ventilation can be considered the primary mode of ventilation, a combination of methods is acceptable for demonstrating compliance.

Compliance Method	
9.2A Comparison to Industry Standards	<p>For this option, outdoor air must be provided to each space in the nominated area at a rate greater than the minimum required by AS 1668.2:2012, by the stipulated percentage increase (50% or 100%).</p> <p>To demonstrate compliance, the HVAC system must be clearly sized to accommodate the increased outdoor air rates. The project must use the design occupancy, where known, rather than the default occupancy when calculating the required rates.</p> <p>The design occupancy is to be determined by the project team – any assumptions made must be justified within the Submission Template. Where the occupant density is unknown, projects must utilise the occupancy rates prescribed within the recognised standards listed in 9.2.3.</p>
9.2B Performance-based Approach	<p>For this option, the system must be capable of providing enough outdoor air to maintain carbon dioxide (CO₂) levels at, or less than, the stipulated thresholds within each space in the nominated area, at all times during the design occupancy period.</p> <p>The system must continuously measure the concentration of CO₂ within the breathing zone of each space during occupancy hours. The system must then adjust the amount of outdoor air to each space (up to the maximum design outdoor air quantity) to ensure that CO₂ levels are maintained below the stipulated ppm threshold.</p> <p>Zoning the system</p> <p>CO₂ sensors shall be located so that they provide accurate representative readings of the CO₂ concentrations in occupied spaces. A sensor shall be installed in each enclosed space. At a minimum, CO₂ sensors should be located with (and as regularly as) temperature sensors and monitor an area no greater than 500m².</p> <p>Modifying the air quality threshold</p> <p>The nominated CO₂ thresholds are applicable to most spaces. If appropriate, the project may nominate alternative thresholds from ASHRAE 62.1:2013. The justification must be accompanied with documentation from a recognised Standard or peer reviewed research.</p>
9.2C Natural Ventilation	<p>For this option, the space in the nominated area must be provided with good access to outdoor air, appropriate for the activities and conditions in the space.</p> <p>The naturally ventilated space must meet the requirements of AS 1668.4:2012. If any mechanical ventilation is present, other than ceiling fans, and can be considered a 'primary mode of ventilation' (e.g. exhaust fan), then the space cannot be considered naturally ventilated.</p> <p>Projects must justify how the nominated area will perform as a naturally ventilated space under all likely weather conditions.</p>

9.3 Exhaust or Elimination of Pollutants

One (1) point is awarded where project teams demonstrate that pollutants from printing and photocopying equipment, cooking processes and equipment, and vehicle exhaust, are limited from the nominated area by either:

- A. Removing the source of pollutants, in accordance with 9.3A; or
 - B. Exhausting the pollutants directly to the outside, in accordance with 9.3B.
- A combination of methods can be used to demonstrate compliance.

9.3A Removing the Source of Pollutants

For this option, sources of pollutants, such as printing or photocopy equipment, kitchen stoves or vehicles, must be compliant with minimum emissions standards or not be present within the nominated area.

||Where printing and/or photocopying equipment is present within the building, these must be certified in accordance with one of the following test standards:

- ECMA-328;
- RAL UZ 171 (expired 2017)
- RAL UZ 205
- DE-UZ 205
- GGPS.003

Blue Angel certificates issued in accordance with one of the following test standards can be used to demonstrate compliance with the credit criterion:

- ECMA-328
- DE-UZ 219
- UL 2819|| R1.09.02

9.3B Exhausting the Pollutants Directly to the Outside

For this option, specified sources of pollutants shall be exhausted directly to the outside of the project in accordance with a recognised Standard; and/or physically separated from occupants. The following requirements for printing and photocopy equipment, kitchen cooking processes and equipment, and vehicle exhaust apply.

Printing and photocopying equipment

All print and photocopy equipment must be located in an enclosed print/photocopy area that is exhausted directly to the outside, or to a dedicated exhaust riser. The exhaust system must not recycle air to other building enclosures, or to the return air duct of the ventilation system. In shell and core buildings (or similar), the provision of the exhaust facility without enclosure will suffice, provided that guidance to the tenant is developed to ensure appropriate installation. Each print/photocopy room must achieve a minimum exhaust ventilation flow rate in accordance with AS 1668.2-2012 (Table B1). The fans must be installed as part of the base building; provision of the fans for future installation (e.g. by a

tenant) does not meet the credit criteria. The exhaust ventilation flow rate for a print and/or photocopy room must be at least 5l/s/m² and at least 10% greater than the supply rate of air. This ensures the space is negatively pressurised and pollutants do not escape to neighbouring areas. || R1.09.03

Cooking processes and equipment

All kitchens must be ventilated in accordance with AS 1668.2:2012. A separate exhaust system must be provided for the kitchen exhaust. The kitchen must be physically separated from the adjacent spaces or have an opening no larger than an area of 2.5m².

A 'kitchen' is defined as a space that includes cooking equipment such as stove tops or ovens, please see the Definitions section. Residential kitchens are not required to be physically separated, but must utilise either:

- A. A non-recirculating exhaust system, exhausting directly to outside; or
- B. A recirculating system, with filtration media that has been proven to effectively remove kitchen pollutants.

Kitchenettes or tea points with basic tea/coffee making or simple reheat equipment are not included. Cooking equipment employed for the preparation of food which has a power input less than 0.5kW/m² may be excluded.

Vehicle exhaust

All pollutants from vehicles in an enclosed space must be exhausted to a dedicated exhaust riser or directly to the outside, in accordance with Section 4 of AS 1668.2-2012. This exhaust system must not recycle air to other enclosures.

This requirement is applicable where a combustion engine based vehicle (of all types) is parked or otherwise operated in an enclosed area which is within the project area. Examples include an enclosed or underground carpark, a fire station, an aircraft hangar, a mechanics shop or a warehouse using forklifts.

In addition to the exhaust system, the space where the vehicle is located must be physically separated from the rest of the project, a door will suffice.

DEFINITIONS

Cooking Processes and Equipment

Commercial or institutional cooking equipment, and stoves in residential apartments. For more definitions, see Section 3.3.1(b) of AS 1668.2:2012. As mentioned in the Standard, microwave cookers and other small cooking appliances for reheating food do not need to comply with this credit.

Mechanically Ventilated Spaces

Spaces that rely on mechanical equipment, such as chillers and fans, to provide conditioned or unconditioned air for ventilation. Ceiling fans, for purposes of Green Star, are not considered to be mechanical ventilation.

Naturally Ventilated Spaces

Spaces that provide ventilation through passive means or openings in the facade that do not rely on any mechanical equipment, other than ceiling fans, to provide increased levels of thermal comfort and ventilation.

GUIDANCE

CO₂ Benchmarks – Performance Based Approach (9.2B)

The GBCA notes that the CO₂ ppm benchmark is used as a proxy for a percentage increase in outdoor air levels and they are not necessarily equivalent. Two options are provided for flexibility.

Large Format Printing Equipment

Large format printing equipment may not be available which meet any of the above standards, due to legislative regulations outlined by the European Commission and the absence of a local Australian regulatory standard. Where this is the case, the 9.3B 'Exhausting the Pollutants Directly to the Outside' compliance method should be applied for this equipment.

From the European Commission's decision on Regulation No 66/2010, dated 17 December 2013: "large format printing equipment means printing equipment designed for printing on A2 media and larger, including those designed to accommodate continuous-form media above 406 mm wide".

ADDITIONAL INFORMATION

Additional information can be found in the following documents:

- American Society of Heating, Refrigerating and Air-conditioning Engineers (ASHRAE) (2013), ASHRAE Standard 62.1: Ventilation for Acceptable Indoor Air Quality, Atlanta, www.ashrae.org
- Corney, A. (2007), Refresh – Demystifying Health and Productivity Benefits of HVAC, Lincolne Scott Pty Ltd and Advanced Environmental, www.lincolnescott.com/Refresh1/
- Der Bluer Engel, Office Equipment with Printing Function (Printers, Copiers, Multifunction Devices), RAL-UZ 171, <http://www.blauer-engel.de>
- GreenGuard (2010), GreenGuard Indoor Air Quality Standard for Office Equipment, www.greenguard.org

- Washington State Department of Health (2003), School Indoor Air Quality: Best Management Practices Manual, Washington, [School Indoor Air Quality Best Management Practices Manual \(wa.gov\)](#)
- Laurence Berkeley National Laboratory – Indoor Environment Department [Home | Indoor Environment Group \(lbl.gov\)](#)

STANDARDS

Standards for the 'Ventilation System Attributes' criterion include:

- AIRAH HVAC 2010 Hygiene Best Practice Guideline.
- ASHRAE Standard 62.1:2013, Section 5
- ACR 2006 Assessment, Cleaning and Restoration of HVAC Systems
- SMACNA IAQ Guidelines for Occupied Buildings under Construction
- Standards for the 'Provision of Outdoor Air' criterion include:
 - AS1668.2:2012 The use of ventilation and air-conditioning in buildings - Mechanical Ventilation in buildings.
 - AS1668.4:2012 The use of ventilation and air-conditioning in buildings - Natural Ventilation of buildings.
- ASHRAE 62.1:2013 Ventilation for Acceptable Indoor Air Quality
- NZS 4303:1990 Ventilation for Acceptable Indoor Air Quality
- Standards for the 'Exhaust or Elimination of Pollutants' criterion include:
 - AS1668.2:2012 The use of ventilation and air-conditioning in buildings - Mechanical Ventilation in buildings.
 - AS1668.4:2012 The use of ventilation and air-conditioning in buildings - Natural Ventilation of buildings.
- RAL UZ 171:2012 Basic Criteria For Award Of The Environmental Label - Office Equipment With Printing Functions (Printers, Copiers, Multifunction Devices).
- ECMA-328 Determination of Chemical Emission Rates from Electronic Equipment.
- GGPS.003 Greenguard Indoor air Quality (IAQ) Standard for Office Equipment (Hardcopy Devices).

DOCUMENTATION REQUIREMENTS

Please refer to the *'How Documentation is Described in the Submission Guidelines'* section within the *Introduction* for further guidance on Documentation Requirements for project submissions.

Design Review submissions are optional.

Project teams must submit documentation supporting credit compliance. A list of recommended supporting evidence is provided in the following section, which can be used to demonstrate compliance. Alternate documentation to that listed below can also be used by project teams to demonstrate compliance.

The key requirement is that evidence is provided to support each claim made within the Submission Template.

SUBMISSION CONTENT

Project teams must submit the following documentation:

- Submission Template
- Evidence to support claims made in the Submission Template

Recommended Supporting Evidence

9.1 VENTILATION SYSTEM ATTRIBUTES

Mechanical drawings for each ventilated space.

Extract from the ventilation system specification for each system, showing that the project's commissioning requirements are stated in accordance with the relevant codes/guideline. The relevant sections must be highlighted.

Extracts from the Environmental Management Plan that specify ventilation cleaning.

||Evidence that all moisture-producing and debris-catching components such as cooling coils, heating coils, humidifiers and filters in the air handling unit are able to be sufficiently cleaned and maintained through single sided access.

Section drawing demonstrating any ceiling units can be safely reached through the ceiling access panel.

Plan drawing showing 100% of the upstream surface of the coil is accessible within 1m of the ceiling panel, allowing for obstructions. || R1.09.04

||Where the highest level of filtration possible in the FCU is G2, i.e. in smaller FCUs, and only access downstream of the heating/cooling coils is possible, project teams may need to provide **evidence** of the following in their submission:

- Why filtration no higher than G2 is possible at the FCU.
- Accessibility at the FCU is adequate for both filter maintenance/replacement and coil inspection/cleaning
- A maintenance plan clearly showing the requirements for filter and coil maintenance have been met.
- A commitment from the building owner for implementing the maintenance plan as proposed || R1.1.09.01

9.2 PROVISION OF OUTDOOR AIR

Extract from the Commissioning Report demonstrating that the HVAC and CO₂ monitoring systems are operating as intended. For naturally ventilated areas, this is only relevant where automation systems and the like are included.

9.3 EXHAUST OR ELIMINATION OF POLLUTANTS

Extract from the printing and photocopy specification outlining the product certification criteria for all printing or photocopy equipment located throughout the project.

Certificates for printing equipment to ACMA 328, RAL-UZ 171 or GGPS.003 for all printing equipment which is included in the project.

REVISIONS AND AMENDMENTS

Revision No.	Date of Release	Description
NZv1.0	11/04/2019	Initial release.
NZv1.1	04/2022	<p>R1.09.01 II Technical clarifications added for maintenance of ducted split system fan coil units (DX split/VRF/VRV)</p> <p>R1.09.02 II Updated test standards for source of pollutants</p> <p>R1.09.03 II Added guidance for exhaust ventilation flow rate for a print and/or photocopy room</p> <p>R1.09.04 II Updated supporting evidence for 9.1</p>
NZv1.1.1	07/2023	<p>R1.09.01 II Clarifications provided for circumstances where the highest level of filtration possible in the FCU is G2, i.e. in smaller FCUs, and only access downstream of the heating/cooling coils is possible</p>

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ACOUSTIC COMFORT

Credit 10

Points available: 3

AIM OF CREDIT

To reward projects that provide appropriate and comfortable acoustic conditions for occupants.

CREDIT CRITERIA

10.1	Internal Noise Levels	1 point is available where internal ambient noise levels in the nominated area are suitable and relevant to the activity type in the room. This includes all sound generated by the building systems and any external noise ingress.
10.2	Reverberation	1 point is available where the nominated area has been built to reduce the persistence of sound to a level suitable to the activities in the space.
10.3	Acoustic Separation	1 point is available where the nominated enclosed spaces have been built to minimise crosstalk between rooms and open areas.

This credit, or specific criterion, may not be considered relevant to the sustainability outcomes for some projects. In this instance, the credit, or specific criterion, may be considered 'Not Applicable'. Please see the Introduction section of the Submission Guidelines for additional information.

COMPLIANCE REQUIREMENTS

|| For this credit, the nominated area includes all primary and secondary spaces and living and sleeping areas in residential apartments. A space can be excluded if the standard recommends that specialist advice be sought, such as in a theatre. || R1.1.10.01

10.1 Internal Noise Levels

One (1) point is awarded where project teams demonstrate that internal ambient noise levels in the *nominated area* are no more than 5dB(A) above the lower figure in the range recommended in Table 1 of AS/NZS2107:2016. ||Where a single figure dBA value is provided in AS/NZS2107, the noise target shall be no larger than that single dBA value.||

R1.10.01

The noise measurement and documentation must be provided by a qualified acoustic consultant and in accordance with AS/NZS 2107:2016. Noise measurement must account for all internal and external noise including noise arising from building services equipment, noise emission from outdoor sources such as traffic, and (where known) noise from industrial process. Occupancy noise is excluded.

Compliance shall be demonstrated through measurement, and the measurements shall be conducted in at least 10% of the spaces in the *nominated area*. The selection of representative spaces must be justified within the Submission Template and must consider how the spaces are considered to be the most conservative with respect to both internal, and external noise sources.

The range of measurement locations shall be representative of all spaces available within the *nominated area*. All relevant building systems must be in operation at the time of measurement. Projects less than 500m² Gross Floor Area (GFA) must account for measurements conducted in at least 95% of spaces within the nominated area.

||The time period selected for measuring Internal Noise Level should be representative of the source as in line with the NZS2107:2016. For clarification – naturally ventilated spaces might have a longer time period than a continuously operating mechanically ventilated space.||

R1.10.02

Provisions for Naturally Ventilated Buildings

In naturally ventilated buildings, all measurements must be carried out with natural ventilation openings in the open position. The internal ambient noise levels must be no more than 10dB(A) above the lower figure in the range recommended in Table 1 of AS/NZS 2107:2016.

Provisions for Mixed Mode Buildings

For purposes of this credit, mixed mode buildings can be treated as mechanically ventilated.

10.2 Reverberation

One (1) point is awarded where the reverberation time in the *nominated area* is below the maximum stated in the 'Recommended Reverberation Time' provided in Table 1 of AS/NZS 2107:2016. ||Compliance with the reverberation criterion should be demonstrated for all common areas.|| R1.10.03

Reverberation refers to the persistent prolonged reflections of sound in a space. A technical definition is provided in AS/NZS 2107:2016. For residential spaces, this criterion is 'Not Applicable'.

Where note 1 of Table 1 AS/NZ 2107:2016 applies and requires that reverberation times be minimised as far as practical, acoustic absorption should be installed in the noise sensitive space. Acoustic absorption should be applied in locations appropriate to the function of the space, and located to maximise the acoustic performance of materials selected.

||The performance of the installed acoustic absorption, irrespective of quantity or location installed, must result in a reverberation time equivalent to or lower than the reverberation time predicted for treating at least 50% of the combined floor and ceiling area with a material having a noise reduction coefficient (NRC) of at least 0.5. Alternatively, compliance can be demonstrated by treating 50% of the combined floor and ceiling area with a material having a NRC of at least 0.5. Acoustic absorption should be applied in locations appropriate to the function of the space, and located to maximise the acoustic performance of materials selected.|| R1.10.04

Dedicated teaching space must have reverberation times in the lower half of the range specified in Table 1 of AS/NZS 2107:2016.

Compliance shall be demonstrated through measurement, and the measurements shall be conducted in at least 10% of the spaces in the nominated area. The selection of representative spaces must be justified within the Submission Template and must consider how the spaces are considered to be the most conservative.

The range of measurement locations shall be representative of all spaces available within the *nominated area*. All relevant buildings systems must be in operation at the time of measurement. Projects less than 500m² Gross Floor Area (GFA) must account for measurements conducted in at least 95% of spaces within the nominated area.

||A supermarket would not be defined as a noise sensitive space. Displayed stock in supermarkets cannot be taken into account in reverberation time calculations.

It is accepted that credit 10.2 can be Not Applicable for the supermarket shop area of the store, but not for the other more standard spaces such as offices and staff rooms. || R1.10.05

10.3 Acoustic Separation

One (1) point is awarded where the project addresses noise transmission in enclosed spaces within the nominated area. Enclosed space is defined as meeting rooms, private offices, classrooms, residential apartments (bounding apartment construction), and any other similar space where it is expected that noise should not carry over from one space to the next. ||When there are two adjacent Tertiary spaces, this criterion doesn't apply to the wall between these spaces as tertiary spaces are not noise sensitive and do not have privacy concerns. When a tertiary space is adjacent to either a Primary space or a Secondary space, the sound insulation requirement applies. || R1.10.06 For this specific criterion, where the delivery method of the project is core and shell, then the criteria may be considered 'Not Applicable'.

There are three methods for demonstrating compliance with this criterion.

10.3A

||The partition between the spaces should be constructed to achieve a weighted sound reduction index (dB Rw) of:

- At least Rw 45; for all partitions separating enclosed spaces which are:
 - Fixed without a door; and/or
 - Glazed partitions without a door
- At least 40, for all partitions fronting a room (from an open plan area);
- At least 35 (in composite with door and partition) for all partition types that contain a door; and
- At least 50 through floors between occupied spaces.|| R1.10.07

*The Acoustic Consultant can use their discretion to determine whether an Rw of 35 or 45 is more applicable when using glazed partitions. The selected Weighted Sound Reduction index must be justified in terms of adjoining space use, required levels of noise sensitivity between spaces and any other aspects which would help to achieve acoustic separation.

10.3B	<p> The sound insulation between internal spaces complies with:</p> $D_w + LA_{eqT} > X.$ <p>X = 75 except for:</p> <p style="padding-left: 40px;">X = 60 for any partition with a door</p> <p style="padding-left: 40px;">X = 80 for walls / partitions separating areas with elevated privacy requirements (e.g. meeting rooms, classrooms, wards, etc.) R1.10.08</p> <p>Where:</p> <p>D_w = Weighted sound level difference measured between two spaces; and LA_{eqT} = Indoor ambient noise level in the space adjacent to the enclosed space.</p> <p>The sounds tests from which D_w is derived must be measured in accordance with ISO 140-4:1998. Measurements must be based on finished rooms, accounting for any carpets and acoustically absorbent ceilings specified. The measurements can be conducted in either furnished or unfurnished spaces.</p> <p>A Technical Question may be submitted to confirm areas with elevated privacy requirements.</p>
10.3C	<p>For residential components:</p> <p>The inter-tenancy apartment construction to habitable areas results in airborne noise isolation standard of $R_w + C_{tr} > 55$; and</p> <p>All inter-tenancy walls should include Discontinuous Construction as defined by the Building Code of Australia</p> <p>Walls between apartments and public corridors results in airborne noise isolation standard of $R_w > 55$; and</p> <p>The floor construction above habitable rooms and wet areas of adjacent dwellings (i.e. floor cover) results in an impact isolation standard of $L_{n,w} + C_I < 55$.</p> <p>Apartment entry doors include acoustic seals and achieve laboratory acoustic rating of $R_w 30$.</p> <p>Where:</p> <p>$L_{n,w} + C_I$ is used to describe impact sound performance of floors $L_{n,w}$ = Weighted Normalised Impact Sound Pressure Level and C_I = Spectrum Adaptation Term. The lower the $L_{n,w} + C_I$, the better the performance of the floor.</p> <p>$R_w + C_{tr}$ is used to describe the sound insulation performance R_w = The Weighted Sound Reduction Index and C_{tr} = A correction factor (and is a negative number). So if a building element has R_w of 60 and a C_{tr} of -10, its $R_w + C_{tr}$ will equal 50. The addition of C_{tr} and R_w helps to account for lower frequency sounds, such as those created by modern home theatre systems</p>

and music equipment. The higher the $Rw + Ctr$ number, the better the performance of the system.

Compliance shall be demonstrated through measurement, and the measurements shall be conducted in at least 10% of the spaces in the *nominated area*. The selection of representative spaces must be justified within the Submission Template and must consider how the spaces are considered to be the most conservative with respect to both internal, and external noise sources.

The range of measurement locations shall be representative of all spaces available within the *nominated area*. All relevant building systems must be in operation at the time of measurement. Projects less than 500m² Gross Floor Area (GFA) must account for measurements conducted in at least 95% of spaces within the nominated area.

||Where there are key functional requirements for the spaces which are more important than the acoustic separation between spaces, the credit may be achieved even when the sound insulation target is exceeded. Please submit a Technical Question to justify in this case in order to preclude these spaces from the assessment.|| R1.10.09

DEFINITIONS

Enclosed Space

Meeting rooms, private offices, classrooms, residential units and any other similar space, where it is expected that noise should not carry over from one space to the next.

||Qualified Acoustic Consultant

A qualified acoustic consultant should be a member of the Acoustical Society of New Zealand or equivalent international recognised body, or a qualified staff member within an Association of Australasian Acoustical Consultants (AAAC) member firm.|| R1.10.10

REFERENCED DOCUMENTS

The following documents are referenced in this credit:

- AS/NZS 2107:2016 Acoustics — Recommended design sound levels and reverberation times for building interiors.
- ISO 140-4:1998 Acoustics — Measurement of sound insulation in buildings and of building elements — Part 4: Field measurements of airborne sound insulation between rooms.

ADDITIONAL INFORMATION

ISO/FDIS 16283-1 Acoustics – Field measurement of sound insulation in buildings and of building elements – Part 1: Airborne sound insulation.

DOCUMENTATION REQUIREMENTS

Please refer to the *'How Documentation is Described in the Submission Guidelines'* section within the *Introduction* for further guidance on Documentation Requirements for project submissions.

Design Review submissions are optional.

Project teams must submit documentation supporting credit compliance. A list of recommended supporting evidence is provided in the following section, which can be used to demonstrate compliance. Alternate documentation to that listed below can also be used by project teams to demonstrate compliance.

The key requirement is that evidence is provided to support each claim made within the Submission Template.

SUBMISSION CONTENT

Project teams must submit the following documentation:

- **Submission Template**
- **Evidence** to support claims made in the Submission Template

Recommended Supporting Evidence

Detailed Drawings detailing the acoustic design features relevant to this credit.

Report by a qualified acoustics consultant confirming credit compliance.

Extracts from the commissioning report detailing relevant measured noise levels and target noise levels.

REVISIONS AND AMENDMENTS

Revision No.	Date of Release	Description
NZv1.0	11/04/2019	Initial release.
NZv1.1	04/2022	<p>R1.10.01 II A clarification added for defining target of Internal Noise Levels when a single figure dBA value is provided in AS/NZS2107</p> <p>R1.10.02 II A clarification added for the time period selected for measuring Internal Noise Level</p> <p>R1.10.03 II Compliance with the reverberation criterion should be demonstrated for all common areas</p> <p>R1.10.04 II Additional guidance of showing reverberation compliance</p>

R1.10.05 II Clarifications added for supermarket projects

R1.10.06 II A clarification added for acoustic separation compliance

R1.10.07 II Updated requirements for 10.3A as per Green Star Buildings

R1.10.08 II Updated requirements for 10.3B as per Green Star Buildings

R1.10.09 II A clarification added to allow exemptions of special functional spaces

R1.10.10 II Updated definition of Qualified Acoustic Consultant

NZv1.1.1

07/2023

R1.1.10.01 || Clarifications added for nominated areas

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LIGHTING COMFORT

Credit 11

Points available: 3

AIM OF CREDIT

To encourage and recognise well-lit spaces that provide a high degree of comfort to users.

CREDIT CRITERIA

To qualify for points in this credit a **minimum requirement** must be met.

11.1 Minimum Lighting Comfort	It is a minimum requirement of this credit that lights in the nominated area are flicker-free and accurately address the perception of colour in the space.
11.2 General Illuminance and Glare Reduction	1 point is available where, in the nominated area: Lighting levels and quality comply with best practice guidelines; and Glare is eliminated.
11.3 Surface Illuminance	1 point is available where a combination of lighting and surfaces improve uniformity of lighting to give visual interest in the nominated area.
11.4 Localised Lighting Control	1 point is available where; in the nominated area, occupants have the ability to control the lighting in their immediate environment.

This credit, or specific criterion, may not be considered relevant to the sustainability outcomes for some projects. In this instance, the credit, or specific criterion, may be considered 'Not Applicable'. Please see the Introduction section of the Submission Guidelines for additional information.

NOMINATED AREA

For this credit, the nominated area is all **primary** and **secondary** spaces.

Compliance is required to be demonstrated across 95% of the nominated area or 95% of number of fittings, in order for this credit to be achieved.

Please see the '*List of Areas*' section of the Submission Guidelines for space type definitions.

Where the functional requirements of the space require that lighting requirements differ from the requirements of this credit (such as a laboratory), or if the space will not be regularly

occupied (for example a warehouse floor), these areas may be excluded. The reasons for exclusion must be justified by the project team.

||Retail sections in supermarkets can be excluded from the nominated area for credits 11.2, 11.3, and 11.4. The more standard spaces, such as offices and staff rooms would still need to comply with these credits to achieve the points.|| R1.11.01

COMPLIANCE REQUIREMENTS

11.1 Minimum Lighting Comfort

It is a minimum requirement of this credit that lights in the nominated area are flicker-free and accurately address the perception of colour in the space.

Flicker-free Lighting

Flicker-free lighting refers to luminaires that have either:

- A minimum Class A1 & A2 ballast for all fluorescent lighting;
- Electronic ballasts for all High Intensity Discharge (HID) lighting;
- Electronic drivers that feature 12-bit or greater resolution for all Light-emitting Diode (LED) lighting; or
- High frequency ballasts for all other lighting types, including incandescent (incl Halogen), dichroic (e.g. low-voltage downlights), and High-Intensity Discharge (e.g. metal halide, low/high pressure sodium).

|| Project teams may use the following metrics for both analogue and digital forms of dimmable and non-dimmable LED lighting to demonstrate that LED fittings within the project are flicker-free.

Acceptable flicker metrics:

- Short Term Light Modulation (PstLM) ≤ 1.0
- Stroboscopic Visibility Measure (SVM) ≤ 0.4

These metrics have been deemed appropriate at this time for residential and commercial office projects, with the understanding that ongoing research into acceptability levels may result in a more stringent limit being recommended in the future.|| R1.11.02

Colour Quality

To address the perception of colour, light sources must have a minimum Colour Rendering Index (CRI) of 80, unless the project team can demonstrate that, in a particular area, the activity is not impeded by a lower CRI. The project team shall support their justification by ensuring their selection complies with the guidance provided in Table 7.3 in AS 1680.1:2006.

11.2 General Illuminance and Glare Reduction

One (1) point is awarded where project teams can demonstrate that for 95% of the nominated area, lighting levels comply with best practice guidelines and glare is eliminated in accordance with the following requirements.

11.2.1 General Illuminance

Best practice lighting levels for each task within each space type is defined as lighting with a maintained illuminance that meets the levels recommended in the relevant Standard. Guidance for different space types and activity types are listed in Table 11.2.1.

Table 11.2.1: Standards for Best Practice General Illuminance

Type of Task/Activity	Guidance
Industrial tasks and processes	Table E1 of AS/NZS 1680.2.4
Circulation and other general areas	Table D1 of AS/NZS 1680.2.1
Healthcare spaces	Table F1 of AS/NZS 1680.2.5
Office spaces	Table E1 of AS/NZS 1680.2.2:2008 _{R1.11.03}
Workspaces and other activities	Table 3.1 of AS/NZS 1680.1
Retirement living spaces	Table 2 of ANSI/IES RP-28-07
Residential spaces	See below

Compliance with this credit can be demonstrated through modelling or measuring of the whole nominated area or a representative floor or section. Assessment (either modelling or measuring) must be carried out in accordance with Appendix B of AS/NZS 1680.1:2006.

The maintained Illuminance values must achieve a uniformity of no less than that specified in Table 3.2 of AS 1680.1:2006, with an assumed standard maintenance factor of 0.8.

Where recommended maintained illuminance values for a particular space are not specified, the values to be used must relate to the closest type of task as defined in AS/NZS 1680.1:2006 Table 3.1.

||Alternatively, projects can use a maintenance factor as calculated using AS/NZS 1680. Project teams using this approach should provide a summary/justification of these calculations and inputs for assessment. Supporting documents for the inputs may include:

- Luminaire specific factors such as Lamp Lumen Maintenance Factor, Lamp Survival Factor, IP rating, luminaire type;
- Reference to the relevant data from AS/NZS1680;
- Description of the use of the space and its atmospheric impact (clean, dirty, etc); and
- The planned luminaire cleaning maintenance programme or the inclusion of cleaning requirements within the tenants fit-out guide.

Where inputs for the calculation of the maintenance factor are uncertain then projects must continue to use the 0.8 maintenance factor. || R1.1.11.01

Residential Spaces

For residential spaces, the point is awarded where in living spaces, kitchen, bathrooms and bedrooms:

The lighting design includes or permits general fixed lighting that provides good maintained illuminance values for the entire room; and

The installed fittings all have a rated colour variation not exceeding 3 MacAdam Ellipses (decorative fittings being exempt).

11.2.2 Glare Reduction

Glare from lamps must be limited within the nominated area. Three options are provided for demonstrating compliance with this requirement; a performance method, and two prescriptive methods. A combination of methods can be used to demonstrate compliance.

Option 11.2.2A Prescriptive Method 1	For this option, bare light sources must be fitted with baffles, louvers, translucent diffusers, ceiling design, or other means that obscures the direct light source from all viewing angles of occupants, including occupants looking directly upwards.
Option 11.2.2B Prescriptive Method 2	For this option, the lighting system must comply with the Luminaire selection system as detailed in Clause 8.3.4 of AS/NZS 1680.1-2006.
Option 11.2.2C Performance Method	For this option, the Unified Glare Rating (UGR) calculated for the lighting on a representative floor must not exceed the maximum values listed in Table 8.2 of AS/NZS 1680.1-2006. The UGR rating must be calculated in accordance with the procedure outlined in Clause 8.3.3 of AS/NZS 1680.1-2006.

11.3 Surface Illuminance

One (1) point is awarded where project teams can demonstrate that a combination of lighting and surfaces improve uniformity of lighting to give visual interest in the nominated area.

There are two options provided for demonstrating compliance with this requirement, a prescriptive method and a performance method, with a third prescriptive method also available for residential spaces. A combination of methods is acceptable for demonstrating compliance.

||Retail projects may mark credit criterion 11.3 Surface Illuminance as 'Not Applicable' (NA) due to the specific requirements for lighting design within retail fitouts. || R1.11.01

Option 11.3A - Prescriptive Method	<p>For this option, 95% of the spaces in the nominated area must have:</p> <p>An surface reflectance for ceilings of at least 0.75; and</p> <p>A direct/indirect lighting system present such that the ceiling area has an average surface illuminance of at least 30% of the lighting levels on the working plane.</p> <p>The surface reflectance value of 0.75 corresponds to a matte flat white ceiling. The surface reflectance value for the final finish must be obtained from the manufacturer's data sheet.</p>
Option 11.3B - Performance Method	<p>For this option, the 95% of the spaces in the nominated area must be modelled to show that:</p> <p>The average ceiling luminance (excluding light fixtures) does not exceed 0.5 kcd/m² and the maximum luminance at any point on the ceiling does not exceed 1.5 kcd/m²;</p> <p>The ceiling area has an average surface illuminance of at least 30% of the lighting levels on the working plane; and</p> <p>In rooms less than 100m², or in rooms where more than 20% of workstations are located within 3m of walls, the wall area above the working plane has an average surface illuminance of at least 50% of the lighting levels on the working plane.</p> <p>The illuminance values for ceilings, walls, and floors must be calculated in accordance with Appendix B of AS/NZS 1680.1:2006.</p> <p>The material and reflectance values used must correspond to the installed items. Where these are not available, reflectance may be estimated from AS/NZS 1680.1 Table E1. Where the reflectance values are not included in the Standard, or through manufacturer's data, the closest conservative value must be used.</p>
Option 11.3C - Residential Spaces (Prescriptive Method)	<p>At least one wall in each living space, kitchen and bedrooms are provided with at least one specific wall-washing or a wall mounted fitting.</p>

Note: Residential spaces may still demonstrate compliance following Option 11.3A or 11.3B.

11.4 Localised Lighting Control

One (1) point is awarded where project teams can demonstrate that for 95% of the nominated area, occupants have the ability to control the lighting in their immediate environment. This includes turning the lights on and off and adjusting their light levels.

One light can be controlled by one or more individuals, however, the project team must justify why and how, this is conducive to localised control.

It is essential for project teams to identify what the ‘immediate environment’ is. For example, in an open-plan office the immediate environment is the light shone on the workstation; in a residential unit it is the light hitting the work surface in the kitchen where food is prepared.

In residential spaces, this requirement can be achieved through the provision of sufficient power outlets for future task lights / lamps around the predicted furniture layouts used in the space. In addition, appropriate task lighting must be provided for kitchens, bathrooms, and service areas.

In the case of an integrated fitout incorporating an activity-based working environment, the occupant adjustment of light levels criterion may be achieved where it is demonstrated that a wide variety of working environments provide a variety of lighting conditions, including some with the ability to adjust lighting levels, which are suitable for the activity undertaken in the space. A system is still required throughout the nominated area to turn lights on/off.

||A project team may target the credit criteria Localised Lighting Control for a base building by installing a DALI system, which can then be utilized by the tenant to deliver localized lighting control. Project teams must provide a Tenancy Fitout Guide (or similar) to the tenant, which contains relevant information about the DALI system. In an open plan/ activity-based working environment, for example, an office setting or educational facilities i.e. libraries, project teams may demonstrate compliance by providing different lighting zones across 95% of the nominated area. It is noted that the lighting zones should be designed to suit different tasks, for example:

- Some areas may have soft lighting, such as areas with daylight during the nominated hours.
- Some areas may have a high degree of lighting control, including turning the lights on and off and adjusting their light levels and;
- Other areas where light is shone directly on the workstation.

Where compliance is being demonstrated through varied lighting zones, project teams must demonstrate how all the regular occupants in the project have access to all the spaces provided. The localized lighting strategy should be complemented with a communication strategy, outlining how individual lighting control may be achieved by occupants by occupying different lighting zones. The project team may choose to use the tenant fit out guide to communicating this message. Where projects are delivered with cold shell spaces or where the scope of the rating is base building, project teams can demonstrate compliance by installing a DALI system within the base building which can be utilised by the tenant to deliver localised lighting control.

The requirements of 11.4 may be achieved in the office spaces by providing a mixture of general non-dimmable ceiling lighting and local dimmable task lighting provided the task lighting is installed either as part of the base build or as part of an integrated fit-out. The local dimmable lighting must also be able to be turned on or off. Where 11.2 is also being targeted then the requirements of 11.2 must be achieved alongside the recommendations for general and local lighting set out in AS1680.2.2-2008 Appendix E with the general lighting on and the local task lighting at its maximum illuminance. This applies to office spaces only.

||R1.11.04

DEFINITIONS

Digital Dimmable Lighting Control System - A digital dimmable lighting control system is a system where each luminaire can be addressed and re-addressed, controlled, and dimmed individually and in groups, OR, where one or more luminaires can be controlled and dimmed via a digital signal.

Light Source - A man-made light source created to produce optical radiation; and includes lamps, tubes, semi-conductors and any electrically powered source of light. Light sources are often mounted in a luminaire.

Luminaire – A light fitting, comprising light source, equipment housing and diffusers to scatter light and control glare.

Maintained Illuminance - Refers to the illuminance from light sources and luminaires at the end of their usable life and cleaning cycle (with dust and other factors taken into account).

Regularly Occupied – A space expected to have people within it for more than 2 hours per working day (average).

Surface Illuminance - Surface illuminance is defined in AS/NZS 1680.1:2006.

Two Component Lighting System - Two component lighting system is defined as a system where a lower lux level is provided to the general space, with additional task lighting provided to suit individual tasks.

Unified Glare Rating - The UGR system, commonly called the glare index, is a glare evaluation system that uses the formula based method in CIE 117 to evaluate the suitability of a lighting system to a space. Information on the UGR system is provided in AS/NZS 1680.1:2006.

Working Plane - The working plane is defined in AS/NZS 1680.1:2006 Table 3.2.

Work Setting – A work settings is a retail counter, a reception counter, a workstation, a kitchen bench or similar furniture designed for a specific task.

GUIDANCE

Occupant to Install Lighting

Where occupants of a nominated area (eg tenants) are to install their own lighting, this space is still considered part of the Nominated Area, but is deemed to be 'non-compliant' unless the occupant is obliged to meet the credit criteria, and the tenant has agreed to do so.

Until a lease has been executed, and tenant committed to achieve the Lighting Comfort obligations, the only Credit Criteria that can be achieved for these spaces are 11.1 Minimum Lighting Comfort and 11.2 General Illuminance and Glare Reduction.

Areas with A Combination of Owner Installed and Tenant Installed Lighting

Where the nominated area of a project includes areas that are both compliant and non-compliant, partial points may be awarded on an area-weighted basis.

Example

Scenario: A building with a nominated area of 10,000 m² installs compliant lighting to 5,000 m². Of the remaining 5,000 m², all the tenants are required to install compliant lighting. However, at the time of submission, only 1 tenant had leased 2,000 m² and committed to achieve the credit criteria.

	Building Provision	Tenant Commitment	Unleased	Total Compliant Area	Nominated Area	Points Awarded
11.1 Minimum Lighting Comfort	5,000 m ²	2,000 m ²	3,000 m ²	10,000 m ²	10,000 m ²	Achieved
11.2 General Illuminance and Glare Reduction	5,000 m ²	2,000 m ²	3,000 m ²	10,000 m ²	10,000 m ²	1
11.3 Surface Illuminance	5,000 m ²	2,000 m ²	0 m ²	7,000 m ²	10,000 m ²	0.7
11.4 Localised Lighting Control	5,000 m ²	2,000 m ²	0 m ²	7,000 m ²	10,000 m ²	0.7

Note: Providing 95% of a zone complies, the entire zone can be considered to comply. For example, in a 1,000 m² zone, if 960 m² complies, then in the above example, the compliant area can be entered as 1,000 m².

If however, only 700 m² (70%) complies, then the compliant area is to be entered as 0 m². This approach is taken because it is recognised Standard Practice will achieve the requirements in some of the area, and Green Star recognises and rewards projects that exceed Standard practice.

For Residential Spaces

The 10th edition of The Lighting Handbook (Chapter 33) by the Illuminating Engineering Society (IES), presents recommended residential illuminance guidelines, task lighting requirements, and surface illuminance recommendations. While not mandatory, it is recommended as a reference points for all project teams.

For Commercial Spaces

For examples of best practice leasing clauses, refer to the *Better Buildings Partnership Green Lease Toolkit*.

REFERENCED DOCUMENTS

The following documents are referenced in this credit:

- AS/NZS 1680.1:2006 Interior and workplace lighting - general principles and recommendations.
- AS/NZS 1680.2.1:2008 Interior and workplace lighting – Specific applications - Circulation spaces and other general areas
- AS/NZS 1680.2.2:2008 Interior and workplace lighting – Specific applications - Office and screen-based tasks.
- AS/NZS 1680.2.4:1997 Interior lighting – Industrial tasks and processes
- AS/NZS 1680.2.5:1997 Interior lighting – Hospital and medical tasks
- AS/NZS 60921:2002 Ballasts for tubular florescent lamps – Performance requirements
- AS/NZS 60929:2005 A.C. supplied electronic ballasts for tubular florescent lamps – Performance requirements
- ANSI/IES RP-28-07 Lighting and the visual environment for senior living
- The Lighting Handbook (Chapter 33) by the Illuminating Engineering Society (IES)
- Better Buildings Partnership Green Lease Toolkit
<http://www.betterbuildingspartnership.co.uk/working-groups/green-leases/green-lease-toolkit/>

DOCUMENTATION REQUIREMENTS

Please refer to the *'How Documentation is Described in the Submission Guidelines'* section within the *Introduction* for further guidance on Documentation Requirements for project submissions.

Design Review submissions are optional.

Project teams must submit documentation supporting credit compliance. A list of recommended supporting evidence is provided in the following section, which can be used to demonstrate compliance. Alternate documentation to that listed below can also be used by project teams to demonstrate compliance.

The key requirement is that evidence is provided to support each claim made within the Submission Template.

SUBMISSION CONTENT

Project teams must submit the following documentation:

- **Submission Template**, including justification for any exclusion of nominated area or not-applicability of criterion.
- **Evidence** to support claims made in the Submission Template

Recommended Supporting Evidence

Lighting Drawings

Architectural Drawings

Lighting Specifications/Schedules

Product Data Sheets

Isolux Plot Drawings

Where an occupant (tenant) is obliged to install lighting that meets the credit criteria, the following evidence must be submitted:

Extract of a **Tenant Fitout Design Guide** (or Lease), detailing the requirement;

Signed lease agreement referring to the conditions set by the Tenant Fitout Design Guide

REVISIONS AND AMENDMENTS

Revision No.	Date of Release	Description
NZv1.0	11/04/2019	Initial release.
NZv1.1	04/2022	<p>R1.11.01 II Allow retail sections in supermarkets to be excluded from the nominated area for credits 11.2, 11.3, and 11.4.</p> <p>R1.11.02 II Alternative metrics for LED lighting to demonstrate compliance for flicker-free lighting</p> <p>R1.11.03 II The guidance reference for 'Office Spaces' in the Lighting Comfort - General Illuminance and Glare Reduction credit criterion is updated to Table E1 of AS/NZS 1680.2.2:2008 'Interior and workplace lighting Part 2.2: Specific applications - Office and screen-based tasks'.</p> <p>R1.11.04 II Additional guidance provided for Localized Lighting Control</p>
NZv1.1.1	07/2023	R1.1.11.01 II Allowing project teams to use calculated maintenance factors according to AS/NZS 1680

VISUAL COMFORT

Credit 12

Points available: 3

AIM OF CREDIT

To recognise the delivery of well-lit spaces that provide high levels of visual comfort to building occupants.

CREDIT CRITERIA

To qualify for points in this credit a **minimum requirement** must be met.

12.1 Glare Reduction	It is a minimum requirement of this credit that the glare from sunlight through all viewing façades and skylights is reduced through a combination of blinds, screens, fixed devices, or other means for 95% of the nominated area R1.12.01.
12.2 Daylight	Up to 2 points are available where a percentage of the nominated area receives high levels of daylight: For 40% of the nominated area – 1 point; For 60% of the nominated area – 2 points.
12.3 Views	1 point is available where 60% of the nominated area has a clear line of sight to a high quality internal or external view.

This credit, or specific criterion, may not be considered relevant to the sustainability outcomes for some projects. In this instance, the credit, or specific criterion, may be considered 'Not Applicable'. Please see the Introduction section of the Submission Guidelines for additional information.

NOMINATED AREA

||For criterion 12.1 Glare Reduction, the nominated area is primary and secondary spaces; for criteria 12.2 Daylight and 12.3 Views, the nominated area is all **primary** spaces.|| R1.12.01

Please see the '*List of Areas*' section of the Submission Guidelines for space type definitions.

Where the functional requirements of the space require that the visual comfort requirements differ from the requirements of this credit (such as bedroom/sleeping area), or if the space will not be regularly occupied (for example a residential bathroom), these areas may be excluded. With the exception of bedrooms/sleeping areas and bathrooms in residential dwellings, the reasons for exclusions must be justified by project teams.

Residential Spaces

Where it is expected that blinds will be installed by the occupiers of residential units, these spaces are excluded from this minimum requirement.

COMPLIANCE REQUIREMENTS

12.1 Glare Reduction

It is a minimum requirement for this credit that glare from sunlight through all viewing façades and skylights in the nominated area is reduced through a combination of blinds, screens, fixed devices, or other means. Three options are provided and a combination of the methods outlined can be used to demonstrate compliance with this minimum requirement.

12.1A Fixed Shading Devices	<p>For viewing facades (except skylights), the nominated plane is at ground level and is a narrow band along the entire length of viewing façade, 1.5m in from the viewing façade.</p> <p>For skylights, the nominated plane is the skylight.</p> <p>The nominated plane must be shown to be shaded from direct sunlight for 80% of the nominated hours for each day of the autumn and spring equinoxes and the summer and winter solstices</p>
12.1B Blinds or Screens	<p>All blinds or screens in the nominated area must meet the following criteria:</p> <p>The blinds must provide glare reduction to at least 95% of the area of viewing façade and skylights;</p> <p>Blinds must be controlled by all affected occupants within each individual space; and</p> <p>Blinds must have a visual light transmittance (VLT) of $\leq 10\%$.</p> <p>Manual or automated internal, in-glazing, or external blinds can be used.</p> <p>Where automated blinds are used, they must be controlled either by a management system or by a manually-activated switch. If blinds and screens are automatically controlled, they must also be equipped with a manual override function accessible by occupants in each of the adjacent spaces served.</p>
12.1C Daylight Glare Model	<p>For this option, modelling can be used to demonstrate that any combination of tinted glazing, fixed shading devices and other solutions will meet the minimum requirement, provided that the model shows that the combined solution results in a reduction of glare equivalent to that achieved by option 12.1A.</p>

||The Annual Sunlight Exposure (ASE) metric may be used by project teams to assess glare risks for skylights under this credit. Spaces that receive 1000 Lux for greater than 250 hours during the year ASE (1000,250) are considered at risk of glare. Any regularly occupied

spaces with ASE (1000,250) greater than 10%, must identify how the space is designed to address glare. All regularly occupied spaces with ASE (1000,250) less than 10% are considered compliant under Green Star credit 12.1 and do not require any additional glare mitigation.

Project teams are expected to provide glare plots documentation within the submission with some commentary on how the space is designed in response to the results. ||_{R1.1.12.01}

12.2 Daylight

Up to two (2) points are awarded where project teams can demonstrate that a specified proportion of the nominated area receives high levels of daylight.

There are three options are provided for demonstrating compliance with this requirement. A combination of methods can be used across the building to demonstrate compliance.

<p>12.2A Prescriptive Methodology</p> <p>Compliance using Manual Calculations</p>	<p>For this option, the daylight access is determined using manual calculations for simple designs that determine the zone of compliance for each orientation.</p> <p>Calculations must comply with the <i>Green Star Daylight and Views Hand Calculation Guide</i>, for the requirements of this pathway.</p>
<p>12.2B Compliance Using Daylight Factor</p>	<p>For this option, daylight access is determined through modelling the Daylight Factor across the Nominated Area.</p> <p>High Levels of daylight are deemed to have daylight factors above 2.0% for all spaces, except living rooms and dining rooms in residential primary spaces, where the threshold is a 1.5% daylight factor.</p> <p> There is no requirement to use a dynamic simulation software where the Visual Comfort credit is met through the Compliance Using Daylight Factor option. _{R1.12.02}</p>
<p>12.2C Compliance Using Daylight Autonomy</p>	<p>For this option, daylight access is determined through modelling Daylight Illuminance (DI) across the Nominated Area.</p> <p>High Levels of daylight are deemed to have at least 160 lux due to daylight during 80% of the nominated hours.</p>

Demonstrating Compliance

Compliance with option 12.2A is demonstrated by calculation, and compliance with options 12.2B and 12.2C is demonstrated by modelling. Compliance for this credit cannot be demonstrated by measurement of actual daylight levels in the building.

Permanent partitions must be included within the modelling of this credit.

Project teams must define reflectance values to represent the project's design. If values are unknown, refer to a relevant Standard for guidance.

Daylight Factor

When calculating Daylight Factor, either a CIE overcast sky or CIE uniform sky may be used. The daylight Factor is to be determined either at the finished floor level, or 720mm above FFL.

Daylight Autonomy

Calculations must be completed for at least every hour during the Nominated Hours.

Requirements for Modelling|| (Daylight Autonomy Option Only)|| R1.12.02

Project modelling must include shading from any shutters or overhangs. A nearby building or feature (such as a cliff face) must be accounted for in overshadowing where the building height is at least a third of the height of the proposed building design, and, where the angle between the nearest point at the top of that building and the nearest point at the base of the proposed building is greater than the 21 June (winter) midday altitude of the sun.

There are a number of dynamic simulation software programs that can be used to show compliance with the credit criteria. Daysim, ESP-r, Lightswitch Wizard, and SPOT (>Ver 4.0) can be used. Where other programs are used, the project team must demonstrate that the software is based on the Radiance simulation engine, and that it uses the statistical sky, the daylight coefficients and Perez All Weather Sky model, or the annual CIE sky simulation algorithms.

Shading devices (including blinds) must be modelled as operating the same as the 'Greenhouse Gas Emissions' credit (15). This means they can be modelled as being in a fixed position, or being controlled (automatically or by occupants), providing the same approach is taken between the two credits.

12.3 Views

One (1) point is awarded where at least 60% of the nominated area has a clear line of sight to a high quality internal or external view. All floor areas within 8m from a compliant view can be considered to meet this credit criterion.

||The external 8m sight line is required to be entirely within the legal site boundary of project and/or open public spaces and cannot extend into adjacent sites. For precinct developments, the compliance of this credit will be assessed case by case. For projects like supermarkets, to receive this credit, views will have to be made available to employees working in areas where staff would be expected to work for extended periods such as checkouts or deli counters. ||R1.12.03

The line-of-sight shall be measured by extending a perpendicular line from the view, be it a window, opening or internal view. A line at 45° can be used at the corners of the view. The thickness of the external walls must be taken into account in the calculations. Internal or external columns can be ignored.

Refer to the *Green Star Daylight and Views Hand Calculation Guide* for further guidance.

||Projects may target one (1) point for Visual Comfort - Views by using the following alternate compliance criteria:

60% of the nominated area must demonstrate that a View Rating of 3 or greater is achieved. The View Rating may be found using the below methodology summarised from *Windows and Offices: A Study of Office Worker Performance and the Indoor Environment*.

Sitting in a chair in each cubicle or space facing the computer monitor, the amount and quality of view visible within a 90 degree cone of the monitor is rated from 0=none to 5=largest, based on the below:

- A view rating of 5 almost completely fills the visual field of the observer seated at the cubicle.
- A view rating of 4 fills about one-half of the visual field.
- A view rating of 3 represents about one-half the size of a view 4, but still with a coherent view.
- A view rating of 2 represents a narrow and typically fractured view.
- A view rating of 1 represents a glimpse of sky or sliver of the outside environment.
- Additionally, the following guidance will apply:
 - View glazing in the contributing area must provide a clear image of the exterior, not obstructed by frits, fibers, patterned glazing, or added tints that distort colour balance.
 - Include in the calculations any permanent interior obstructions. Movable furniture and partitions may be excluded.
 - Views into interior atria or similar Internal View may also be considered. ||R1.12.04

DEFINITIONS

External Views – A high quality external view must extend to the outside towards natural elements such as large bodies of vegetation, a body of water, frequent movement of (people, vehicles, or animals) or sky.

Internal Views - A high quality internal view is defined as a view towards an area that is landscaped or contains a water feature, or an atrium. A landscaped area must contain high plant density and may be vertical.

Nominated Hours - Nominated hours shall be defined by the project team. The project team shall provide a summary of space types, uses and nominated hours. These hours must align with Hours used in Credit 15 Greenhouse Gas Emission Energy model.

Overcast Sky - Overcast Sky is defined as a sky with a completely closed cloud cover (100 %). This is the sky condition applied in daylight factor calculations (ISO 15469:2004 or CIE S 011:2003).

Uniform Sky - Uniform Sky represents a sky with a constant value of luminance. Thus, no matter where in the sky you look, the model has the same value (ISO 15469:2004 or CIE S 011:2003).

Viewing Façades - Viewing façades are defined as any part of the building's façade through which occupants can view the external environment, regardless of if the view achieves the requirements of 12.3 Views. Glazing and perforated façades are considered viewing façades in walls. Transparent skylights are considered viewing façades in roofs. Translucent sheeting in the roof or walls is not considered to be a viewing facade.

GUIDANCE

Blinds Installed by Tenants

||The project team can demonstrate compliance with credit '12.0 Glare Reduction', through a provision for tenants to install blinds on the following conditions:

- Evidence is provided that there are no obstructions to installing blinds, and that the spaces are constructed to support compliant tenant delivered systems;
- It is demonstrated that the future installation of blinds to windows is not impeded by the base building services, façade design, and/or structure.
- A Tenancy Fitout Guide (or similar) is provided which outlines a typical blind detail to demonstrate how blinds can be integrated at the perimeter. ||R1.12.05

REFERENCED DOCUMENTS

The following documents are referenced in this credit:

- ISO 15469:2004 (CIE S 011/E: 2003) Spatial distribution of daylight
- Green Star Daylight and Views Hand Calculation Guide
- Green Star – Design & As Built, Greenhouse Gas Emissions credit

ADDITIONAL INFORMATION

Chartered Institution of Building Services Engineers, U.K. (CIBSE) (1999), Publications – Daylighting and Window Design, www.cibse.org

Farley, KMJ. Veitch, JA.(2001), A Room with a View: A Review of the Effects of Windows on Work and Well-Being, National Research Council Canada, Ottawa.

Heschong Mahone Group (HMG) (2003), Windows and Offices: a Study of Worker Performance and the Indoor Environment (Technical Report), California Energy Commission.

International Energy Agency (IEA) (2000), Daylighting in Buildings: A Source Book on Daylighting Systems and Components, www.iea.org

Massachusetts Institute of Technology (MIT) (2006), 'Daylight Savings: Building with Natural Light', ScienceDaily, 15 November 2006, www.sciencedaily.com/releases/2006/11/061114194440.htm

Osterhaus, W. K. E. (2005), 'Discomfort glare assessment and prevention for daylight application in office environments', Solar Energy, Vol.79, Iss.2, pp.140-158.

Standards Australia (2006), AS/NZS 1680.1-2006: Interior and workplace lighting – General principles and recommendations, www.standards.org.au

DOCUMENTATION REQUIREMENTS

Please refer to the *'How Documentation is Described in the Submission Guidelines'* section within the *Introduction* for further guidance on Documentation Requirements for project submissions.

Design Review submissions are optional.

Project teams must submit documentation supporting credit compliance. A list of recommended supporting evidence is provided in the following section, which can be used to demonstrate compliance. Alternate documentation to that listed below can also be used by project teams to demonstrate compliance.

The key requirement is that evidence is provided to support each claim made within the Submission Template.

SUBMISSION CONTENT

Project teams must submit the following documentation:

- **Submission Template** including justification for any exclusion of nominated area or not-applicability of criterion.
- **Evidence** to support claims made in the Submission Template

Recommended Supporting Evidence

Daylight modelling report showing the daylight factor or daylight illuminance for the claimed spaces and including the following information:

- A summary table showing each space or floor, their nominated area, and the compliant area in both square meters and as a percentage basis.
- The daylight model showing the amount of floor area that is compliant, and the daylight values.

Daylight glare model (for 12.1C), showing

- A description of the methodology used to create the daylight glare model and the software used;
- A description of how the selected points for modelling represent the areas that would be affected by glare;
- All terms clearly defined;
- All names, types, glazing properties, and location of glazing; and
- Justification of how the results in the model are equivalent to that of option 12.1A

Drawings showing:

- The location of all blinds / shutters.

- Any glare control devices.
- Access to views.

Manual calculations showing:

- The amount of floor area that is compliant for daylight.
- The amount of compliant area for views.
- The height and length of windows and any area of any skylights.
- The lines-of-sight showing that no obstructions exist.
- Any internal features or showing that no obstructions exist externally.

||Tenancy Fitout Guide (or similar)

Drawings and any other evidence to demonstrate base building provisions for **blinds**

Simulation report demonstrating View Rating achieved for nominated area.|| R1.12.05

REVISIONS AND AMENDMENTS

Revision No.	Date of Release	Description
NZv1.0	11/04/2019	Initial release.
NZv1.1	04/2022	<p>R1.12.01 Clarifications added for nominated area</p> <p>R1.12.02 Minor corrections to address that there is no requirement to use a dynamic simulation software where the Visual Comfort credit is met through the Compliance Using Daylight Factor option.</p> <p>R1.12.03 Additional guidance provided for the 8m sightline requirement.</p> <p>R1.12.04 Alternate compliance criteria provided for Visual Comfort – Views</p> <p>R1.12.05 Additional guidance provided for blinds installed by tenants</p>
NZv1.1.1	07/2023	R1.1.12.01 Allowing project teams to use the Annual Sunlight Exposure (ASE) metric to assess glare risks for skylights

INDOOR POLLUTANTS

Credit 13

Points available: 2

AIM OF CREDIT

To recognise projects that safeguard occupant health through the reduction in internal air pollutant levels.

CREDIT CRITERIA

Two points are available in this credit; each point is independent from the other.

13.1 Paints, Adhesives, Sealants and Carpets	1 point is available where at least 95% of all internally applied paints, adhesives, sealants and carpets meet stipulated 'Total VOC Limits', or, where no paints, adhesives, sealants or carpets are used in the building.
13.2 Engineered Wood Products	1 point is available where at least 95% of all engineered wood products meet stipulated formaldehyde limits or no new engineered wood products are used in the building.

This credit, or specific criterion, may not be considered relevant to the sustainability outcomes for some projects. In this instance, the credit, or specific criterion, may be considered 'Not Applicable'. Please see the Introduction section of the Submission Guidelines for additional information.

COMPLIANCE REQUIREMENTS

All paints, adhesives, sealants, carpets, and engineered wood products used in the building must meet the requirements within each criterion. Emissions for each application must be acquired through recognised testing methods and reported through a recognised datasheet. In the case of paints and adhesives and sealants, theoretical TVOC calculations are also acceptable.

This credit applies to new applications used in the building as part of the building contract. Where the fitout is part of the construction contract, all applications in the fitout are included.

Unfinished surfaces, as well as reused carpets, existing carpets, and all other flooring products are excluded from this credit.

13.1 Paints, Adhesives, Sealants and Carpets

One (1) point is awarded where project teams demonstrate that either:

- No paints, adhesives, sealants or carpets are used in the nominated spaces;

OR

- At least 95% of all internally applied paints, adhesives, sealants (by volume) or carpets (by area) meet the total VOC limits specified in 13.1.1 and 13.1.2 as applicable.

13.1.1 Paints, Adhesives and Sealants

This requirement is applicable to all internal applications of all types of paints, adhesives or sealants applied on-site, including both exposed and concealed applications.

If exterior grade products are used in an internal application then these must also meet the requirements.

The following items are excluded from this credit:

- Glazing film, tapes, and plumbing pipe cements;
- Products used in car parks;
- Paints, adhesives and sealants used off-site, for example applied to furniture items in a manufacturing site and later installed in the fitout; and
- Adhesives and mastics used for temporary formwork and other temporary installations.

Total VOC (TVOC) values must reflect the final ready to use product, inclusive of tints (in the case of paints) and made in grams of VOC per litre (g/L) of ready to use product.

There are two methods for demonstrating that a paint, adhesive or sealant complies with this criterion:

- Product certification in accordance with 13.1.1A; or
- Laboratory testing in accordance with 13.1.1B.

A combination of methods can be used to demonstrate compliance.

13.1.1A Product Certification

||The product is certified under a recognised Product Certification Scheme. The current list of recognised schemes is shown on the NZGBC website: [New Zealand Green Building Council \(nzgbc.org.nz\)](http://nzgbc.org.nz)|| R1.1.13.01

The certificate must be current at the time of project registration or submission and list the relevant product name and model.

13.1.1B Laboratory Testing

TVOC limits for paints, adhesives or sealants are detailed in Table 13.1.1B. Most adhesives and sealants are addressed in the '*General purpose adhesives and sealants*' category of the table, unless they clearly belong in the other specialised product categories.

Table 13.1.1B: Maximum TVOC Limits for Paints, Adhesives and Sealants

Product Category	Max TVOC content in grams per litre (g/L) of ready to use product.
General purpose adhesives and sealants	50
Interior wall and ceiling paint, all sheen levels	16
Trim, varnishes and wood stains	75
Primers, sealers and prep coats	65
One and two pack performance coatings for floors	140
Acoustic sealants, architectural sealant, waterproofing membranes and sealant, fire retardant sealants and adhesives ((including internally applied intumescent paints)) ^{R1.13.01}	250
Structural glazing adhesive, wood flooring and laminate adhesives and sealants	100

Concrete sealers applied on site can be classified under the category of 'Primer, Sealer and Prep Coats'. Glazes and sealants applied offsite will be excluded from the associated category and credit as outlined in the Submission Guidelines.^{R1.13.01} Please see the Guidance section for details of VOC testing methods for paints, adhesives and sealants.

13.1.2 Carpets

There are two methods for demonstrating that a carpet complies with this criterion. A combination of methods can be used to demonstrate compliance.

13.1.2A - Product Certification	<p>The product is certified under a recognised Product Certification Scheme (listed on the GBCA website http://new.gbca.org.au/product-certification-schemes/) or other recognised standards.</p> <p>The certificate must be current at the time of project registration or submission and list the relevant product name and model.</p>
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13.1.2B - Laboratory Testing	The product complies with the Total VOC (TVOC) limits for a selected compliance option, specified in the Table below.		
	Carpet Test Standards and TVOC Emissions Limits		
	Compliance option	Test protocol	Limit
	ASTM D5116	ASTM D5116 - Total VOC limit*	0.5mg/m ² per hour
		ASTM D5116 - 4-PC (4-Phenylcyclohexene)*	0.05mg/m ² per hour
ISO 16000 / EN 13419	ISO 16000 / EN 13419 - TVOC at three days	0.5 mg/m ² per hour	
ISO 10580 / ISO/TC 219 (Document N238)	ISO 10580 / ISO/TC 219 (Document N238) - TVOC at 24 hours	0.5mg/m ² per hour	
*Both limits should be met when testing against ASTM D5116			

13.2 Engineered Wood Products

One (1) point is awarded where project teams demonstrate that either no new engineered wood products are used in the building, or at least 95% (by area) of all engineered wood products meet the formaldehyde emission limits specified in Table 13.2B. ||Project teams are not expected to calculate all the surface areas of each engineered wood product. Only the largest face of each product is to be calculated for credit compliance. || R1.1.13.02

There are two methods for demonstrating than an engineered wood product complies:

A. Product certification in accordance with 13.2A

OR

B. Laboratory testing in accordance with 13.2B.

A combination of methods can be used to demonstrate compliance.

Engineered wood products include particleboard, plywood, Medium Density Fibreboard (MDF), Laminated Veneer Lumber (LVL), High-Pressure Laminate (HPL), Compact Laminate and decorative overlaid wood panels. Timber veneers are excluded. Where only part of a product is composed of an engineered wood product, the limits apply only to that portion of the product, not the entire item.

The following applications of engineered wood products are excluded from this credit:

- Formwork;
- Car park applications; and
- Non-engineered wood products such as milled timber.

13.2A Product Certification

||The product is certified under a recognised Product Certification Scheme. The current list of recognised schemes is shown on on the NZGBC website: [New Zealand Green Building Council \(nzgbc.org.nz\)](http://New Zealand Green Building Council (nzgbc.org.nz))|| R1.1.13.01 The certificate must be current at the time of project registration or submission and list the relevant product name and model.

13.2B Laboratory Testing

All engineered wood products used in the building must meet the relevant limits specified in Table 13.2B as per the specified test protocol, or have product specific evidence that it contains no formaldehyde.

Table 13.2B: Formaldehyde Emission Limit Values for Engineered Wood Products

Test Protocol	Emission Limit/ Unit of Measurement
AS/NZS 2269:2004, testing procedure AS/NZS 2098.11:2005 method 10 for Plywood	≤1mg/ L
AS/NZS 1859.1:2004 - Particle Board, with use of testing procedure AS/NZS 4266.16:2004 method 16	≤1.5 mg/L
AS/NZS 1859.2:2004 - MDF, with use of testing procedure AS/NZS 4266.16:2004 method 16	≤1mg/ L
AS/NZS 4357.4 - Laminated Veneer Lumber (LVL)	≤1mg/ L
Japanese Agricultural Standard MAFF Notification No.701 Appendix Clause 3 (11) - LVL	≤1mg/ L
JIS A 5908:2003- Particle Board and Plywood, with use of testing procedure JIS A 1460	≤1mg/ L
JIS A 5905:2003 - MDF, with use of testing procedure JIS A 1460	≤1mg/ L
JIS A1901 (not applicable to Plywood, applicable to high pressure laminates and compact laminates)	≤0.1 mg/m ² hr*
ASTM D5116 (applicable to high pressure laminates and compact laminates)	≤0.1 mg/m ² hr
ISO 16000 part 9, 10 and 11 (also known as EN 13419), applicable to high pressure laminates and compact laminates	≤0.1 mg/m ² hr (at 3 days)
ASTM D6007	≤0.12mg/m ³ **
ASTM E1333	≤0.12mg/m ³ ***
EN 717-1 (also known as DIN EN 717-1)	≤0.12mg/m ³
DIN EN ISO 12460-3:2016-03 R1.13.02	≤3.5mg/m ² hr

*mg/m²hr may also be represented as mg/m²/hr.

**The test report must confirm that the conditions of Table 3 comply for the particular wood product type, the final results must be presented in EN 717-1 equivalent (as presented in the table) using the correlation ratio of 0.98.

***The final results must be presented in EN 717-1 equivalent (as presented in the table), using the correlation ratio of 0.98.

DEFINITIONS

Safety Data Sheet (SDS)

A document that provides information on the properties of hazardous chemicals, and guidance on the safe handling, storage and disposal of these substances.

VOC Test Certificate

A test certificate by a laboratory accredited by National Association of Testing Authorities (NATA) or other ISO/IEC 17025 accredited laboratory. The test certificate must include:

- The numerical result;
- The test method used to obtain the results; and
- For tinted products, the TVOC value must be inclusive of tints.

For paints, adhesives and sealants, a safety data sheet (SDS) that includes VOC information is also an acceptable test certificate. The VOC content of the product must be presented numerically in grams per litre of ready-to-use product and also include a statement as to how the result was obtained, meaning either through experimental testing or a theoretical calculations.

Nominated Area

The nominated area is all primary, secondary and tertiary spaces.

Paints

Paints are defined as any liquid applied surface finishes, including varnishes and protective coatings.

GUIDANCE

Paint and Adhesives Testing Methods

The following VOC test methods are relevant to paints:

- ISO Method 17895 (2005), for a material with a presumed VOC content <1%;
- ISO Method 11890-2 (2006), for a material with a presumed VOC <15%;

- ISO Method 11890-1 (2007), for a material with a presumed VOC content >15%; and
- ASTM D3960, which is comprised of four individual testing procedures that measures TVOC (D2369) as well as density (D1475) and water content (D4017). Exempt compounds (D4457) must not be subtracted in the calculation of VOC content.

The testing method for adhesive and sealants is the ASTM D3960 as detailed for paints as well as South Coast Air Quality Management District Rule 1168.

Theoretical VOC Calculations

Where TVOC content for the individual items is known, a theoretical calculation based on the subtotal of the known VOC values of the product's raw material components is acceptable. This is not relevant to carpets and engineered wood products where experimental testing is required. The calculations must include the following:

- Numerical TVOC results expressed in g/litre of product; and
- Statement that the results have been obtained based on the subtotal of the known TVOC values of the product's raw ingredients.

This is not an acceptable option for Innovation claims.

Timber Veneer

A timber veneer itself is not an engineered wood product. However, in most cases, a veneer would be adhered to an engineered wood product. In the example of a veneered or laminated product a formaldehyde datasheet may be submitted for either the 'raw' or veneered or laminated product.

TVOC Including Other Products and Materials

For projects where a comprehensive approach to low-VOC's is being applied, including a significant volume and/or type of other internal products and materials, a Technical Question should be submitted to the NZGBC to decide the compliance and the opportunity to achieve an Innovation point.

INNOVATION

Exceeding Green Star Benchmarks – Ultra Low VOC Paints

||One (1) additional point may be awarded where over 50% of paints (by volume or cost) specified in the building have a maximum TVOC content of 5g/L. This must be verified by one of the approved paint test methods.

Projects targeting the Exceeding Green Star Benchmarks for Indoor Pollutant innovation Ultra-Low VOC Paints may use theoretical calculations to determine the grams of VOC per litre (g/L) in addition to the current methods of demonstrating that a paint, adhesive or sealant complies with this criterion. Total VOC (TVOC) values must reflect the final ready to use product, inclusive of tints (in the case of paints) and made in grams of VOC per litre (g/L)

of ready to use product. All theoretical calculations should be provided by the supplier on company letterhead or on the official product datasheet.

Documentation Requirements:

Please provide the following in your submission;

- Evidence that at least 95% of all internally applied paints, adhesives, sealants and carpets meet stipulated 'Total VOC Limits' and that one (1) point has been awarded for credit criterion 13.1 Paints, Adhesives, Sealants and Carpets.
- Evidence that over 50% of paints (by volume) specified in the building have a maximum TVOC content of 5g/L.
- All theoretical calculations on supplier letterhead or material safety data sheets, product safety data sheets, manufacturer's product specification sheets etc.
- A copy of this FAQ.

For Note: Theoretical calculations are only applicable when calculating ultra-low VOCs. Projects must demonstrate compliance for criteria 13.1 Paints, Adhesives, Sealants and Carpets and 13.2 Engineered Wood Products.|| R1.13.03

Innovation Challenge – Indoor Plants

One (1) additional point may be awarded where indoor plants are evenly distributed across the nominated area and are regularly maintained. One or more plants with a soil area of at least 500cm² (0.05 m²) are required per 10m² of nominated area (primary spaces and secondary spaces, excluding fully enclosed spaces smaller than 10m²)

Exceeding Green Star Benchmarks – Mattresses (health and hospitality projects only)

One (1) additional point may be awarded where 95% of all mattresses that are to be supplied to the building meet the GreenGuard emission criteria for bedding listed in the table below.

	Emission Limit
Formaldehyde	0.0135ppm (0.0165mg/m ³)
Total VOC	0.22mg/m

REFERENCED DOCUMENTS

ISO/IEC 17025 (General requirements for the competence of testing and calibration laboratories)

ADDITIONAL INFORMATION

Additional information can be found in the following documents:

- Environment Australia (2001), State of Knowledge Report: Air Toxics and Indoor Air Quality in Australia, Department of the Environment, Water, Heritage and the Arts (DEWHA), Commonwealth of Australia, [Air pollutants \(environment.gov.au\)](http://www.environment.gov.au)
- Health Canada, Environmental and Workplace Health Indoor Air Quality in Office Buildings: A Technical Guide, [AIR-E.CDR:CoreDRAW! \(multiscreensite.com\)](http://www.multiscreensite.com)
- International Agency for Research on Cancer (IARC) (2006), IARC Monographs Vol. 88 – Formaldehyde, 2-Butoxyethanol and 1-tert-Butoxypropan-2-ol, International Agency for Research on Cancer, <http://monographs.iarc.fr/ENG/Monographs/vol88/volume88.pdf>
- Liteplo, R. G. & Chénier, R. (2002), Concise International Chemical Assessment Document 40 – Formaldehyde, World Health Organization, <http://whqlibdoc.who.int/hq/2002/a73769.pdf>
- South Coast Air Quality Management District (US), Rules and regulations, www.aqmd.gov/rules/rulesreg.html
- US Environmental Protection Agency (US EPA) (no date), An Introduction to Indoor Air Quality: Organic Gases (VOCs), www.epa.gov/iaq/voc.html
- World Health Organization (WHO) (2000), Air Quality Guidelines for Europe – second edition, WHO Regional Publishers, www.euro.who.int/document/e71922.pdf
- Burchett, M. Torpy, F. Tarran, J. (2008), Interior Plants for Sustainable Facility Ecology and Workplace Productivity, Faculty of Science, University of Technology, Sydney.

DOCUMENTATION REQUIREMENTS

Please refer to the ‘*How Documentation is Described in the Submission Guidelines*’ section within the *Introduction* for further guidance on Documentation Requirements for project submissions.

Design Review submissions are optional.

Project teams must submit documentation supporting credit compliance. A list of recommended supporting evidence is provided in the following section, which can be used to demonstrate compliance. Alternate documentation to that listed below can also be used by project teams to demonstrate compliance.

The key requirement is that evidence is provided to support each claim made within the Submission Template.

SUBMISSION CONTENT

Project teams must submit the following documentation:

- **Submission Template**
- **Evidence** to support claims made in the Submission Template

Recommended Supporting Evidence

Specifications that demonstrate emission levels or formaldehyde contents.

Safety Data Sheets that demonstrate the compliant emission levels or formaldehyde content

Product VOC test certificates that demonstrate emission levels or formaldehyde contents.

Product certificates that demonstrate certification under a recognised product certification scheme or recognised standard

REVISIONS AND AMENDMENTS

Revision No.	Date of Release	Description
NZv1.0	11/04/2019	Initial release.
NZv1.1	04/2022	<p>R1.13.01 II Minor corrections to clarify product categories for internally applied intumescent paints and concrete sealers. Glazes and sealants applied offsite can be excluded.</p> <p>R1.13.02 II DIN EN 717-2 is now renamed to DIN EN ISO 12460-3:2016-0</p> <p>R1.13.03 II Additional guidance provided for Exceeding Green Star Benchmarks – Ultra Low VOC Paints. Compliance can be demonstrated by cost for this innovation.</p>
NZv1.1.1	07/2023	<p>R1.1.13.01 Reference to the NZGBC Website instead of GBCA Website for Recognized Product Certification Schemes.</p> <p>R1.1.13.02 A calculation clarification added to 13.2 Engineered Wood Products</p>

THERMAL COMFORT

Credit 14

Points available: 2

AIM OF CREDIT

To recognise projects that achieve high levels of thermal comfort.

CREDIT CRITERIA

Two points are available in this credit; the second point is dependent on the first being achieved.

14.1	Thermal Comfort*	1 point is available where a high degree of thermal comfort is provided to occupants in the space, equivalent to 80% of all occupants being satisfied in the space.
14.2	Advanced Thermal Comfort*	1 additional point is available where a high degree of thermal comfort is provided to occupants in the space, equivalent to 90% of all occupants being satisfied in the space.

* Where HVAC systems are not installed or fully fitted out at the time of As Built submission, thermal comfort modelling may be carried out as outlined in the Guidance section.

NOMINATED AREA

For this credit, the nominated area includes all **primary** and **secondary** spaces.

Please see the 'List of Areas' section of the Submission Guidelines for space type definitions.

Where the functional requirements of the space dictate that thermal comfort requirements differ from those of this credit (such as a laboratory), or if the space will not be regularly occupied (for example a warehouse floor), these areas may be excluded. The reasons for exclusion must be justified by the project team.

COMPLIANCE REQUIREMENTS

14.1 Thermal Comfort

One (1) point is awarded where project teams demonstrate that, for 95% of the nominated area and 98% of the year, a high degree of thermal comfort is provided. There are a number of options for demonstrating compliance depending on the type of space, as follows. **A combination of methods is acceptable.**

Naturally ventilated spaces – The internal temperatures in each space are within 80% of Acceptability Limit 1 of ASHRAE Standard 55-2013, in accordance with 14.1.1;

Mechanically ventilated spaces – The space meets specified prescriptive criteria for Thermal Comfort or the Predicted Mean Vote (PMV) levels are between -1 and +1, inclusive, in accordance with 14.1.2; and

14.1.1 Naturally Ventilated Spaces

For naturally ventilated spaces, project teams must demonstrate that internal temperatures in each space are within 80% of Acceptability Limit 1, as per standard ASHRAE 55-2013 or ASHRAE 55-2020, it must be shown that occupants have direct control over the opening and closing of windows, and that these are the main sources of ventilation. These spaces can contain ceiling fans or a heating system (see ASHRAE 55-2013 section 5.3 or ASHRAE 55-2020 Section 5.4.1(a) and section 5.4.1(d) for more information).

||Where projects are not in accordance with the methodology outlined in ASHRAE 55-2020 Section 5.4.1(a) and section 5.4.1(d), due to having an operating heating system and prevailing mean outdoor temperatures lower than 10°C which falls outside the applicability limits of the methodology, the winter discomfort or underheating should be assessed through the Predicted Mean Vote (PMV) methodology in accordance with the requirements outlined in 14.1.2. Summer discomfort and overheating can still be assessed using the adaptive comfort methodology outlined in ASHRAE – 55 provided all relevant applicability limits are met i.e a combination of assessment methods acceptable with PMV used during the heating season and adaptive comfort model approach used for the remainder of the year.|| R1.1.14.01

14.1.2 Mechanically Ventilated Spaces

Project teams must demonstrate that each space either:

- A. Meets prescriptive thermal comfort requirements, in accordance with 14.1.2A; or
- B. The Predicted Mean Vote (PMV) levels are between -1 and +1, inclusive, in accordance with 14.1.2B.

14.1.2A Prescriptive Thermal Comfort Requirements

||This option can be applied in climate zones 1-3, as identified on the climate zone map in H1/VM1 5th edition and H1/VM2 1ST edition. Any other location in climate zones 4 - 6 is required to demonstrate compliance via thermal modelling. || R1.14.01

To comply with this requirement, the HVAC system and building façade must meet the following requirements.

- HVAC system requirements:
- Dry bulb temperature must be between 20°C and 24°C.
- Relative humidity must be controlled between 40% and 60%.
- Air velocity must be no more than 0.2m/s with no supply air directed at occupants (unless they have direct control over air flow and/or direction).

- Systems must have modulation/turn down capability (i.e. the demonstrated ability to maintain both dry bulb temperature and relative humidity at low space loads).
- The system must have distinct internal zones (no more than 120 m²) and external perimeter zones (no more than 75m²) with independent temperature controls. Perimeter zones must have a maximum depth of 4m and cannot serve more than one orientation. Small deviations are allowed for zone sizes at the discretion of the mechanical engineer.
- Building façade requirements:
 - Solar Heat Gain Coefficient of façade glazing must be 0.3 or lower; OR, maximum solar heat gain through the glass must be calculated as no greater than 250W/m² peak.
 - Total glazing U-Value (inclusive of glass and frame) is 3.0W/m².K or lower.

14.1.2B Thermal Modelling Requirements

For this option, PMV levels must be calculated in accordance with either ISO 7730-2005 or ASHRAE Standard 55-2013. The specified PMV levels must be met for each zone, not as an average.

Modelling must be carried out in accordance with ASHRAE Standard 55-2013. All inputs into the modelling or calculations (e.g. building form, materials, air conditioning system(s), shading, internal loads, etc.) must be clearly justified and referenced consistently throughout the rest of the submission (i.e. in related credits such as 'Greenhouse Gas Emissions' (15) or 'Indoor Air Quality' (9)). Values must be justified and sourced from either ASHRAE Standard 55-2013 or ISO 7730-2005. Alternative values may be accepted with proper justification and sourcing.

For equitable assessment the model must comply with the following requirements:

- Perimeter zones shall have a maximum depth of 4m;
- Zoning shall match the air conditioning zones (with the exception of perimeter zones which must be 4m in depth) with exceptions permitted for small enclosed spaces at the discretion of the mechanical engineer (e.g. a small perimeter office);
- Inter-zone partitions should be modelled;
- Each perimeter shall be reported independently (e.g. North, South, East and West);
- Perimeter air conditioning zones cannot exceed 75m²;
- Perimeter zones shall be reported independently of interior zones;
- Model shall be completed with all systems assessed simultaneously;
- Comfort predictions shall be measured at the midpoint of each zone (i.e. if the perimeter zone is 4m deep then the comfort prediction will be 2m from the perimeter), or taken as an average across the zone.

- Comfort predictions shall be measured at a height of between 0.8 and 1.5m above finished floor level (FFL) of each zone, or taken as an average across the zone.

14.2 Advanced Thermal Comfort

One (1) additional point is awarded where project teams demonstrate that, for 95% of the nominated area and 98% of the year, a high degree of thermal comfort is provided. There are a number of methods for demonstrating compliance, as follows:

- Naturally ventilated spaces – The internal temperatures in each space are within 90% of Acceptability Limit 1 of ASHRAE Standard 55-2013, in accordance with 14.1.1;
- Mechanically ventilated spaces – The Predicted Mean Vote (PMV) levels are between -0.5 and +0.5, inclusive, in accordance with 14.1.2B; or

A combination of methods is acceptable.

By default, this additional point is deemed 'Not Applicable' for retail and industrial projects, given that the majority of the spaces in these buildings will be transitory. For other projects, this point may need to be made 'Not Applicable'. Please contact the NZGBC if you believe this should be the case.

INNOVATION

Innovative Technology or Process – Individual Comfort Control

One (1) additional point is available where the project has open plan work spaces (such as offices or education facilities), has achieved either the first or second 'Thermal Comfort' point, is mechanically ventilated, and meets the following requirements for individual thermal comfort control.

The individual comfort control system must allow control over at least one of the following:

- Air velocity;
- Temperature (whether radiant or from direct air temperature); or
- Air direction.

GUIDANCE

Spaces where HVAC is not Fully Installed at Time of Submission

Where HVAC systems are not installed or fully fitted out at the time of submission, thermal comfort modelling may be carried out in line with the following requirements, in addition to those in 14.1.2:

- Internal tenant loads including lighting and small power must be modelled using a notional fitout assuming the most energy intensive fitout allowable by the New Zealand Building Code Clause H1 Energy Efficiency and referenced New Zealand

Standards (code compliance minima), or according to the lease agreement or tenant fitout guide.

- HVAC system zoning, cooling capacity, delivered air velocity and delivered air temperature may be assumed as aligned with other like spaces or floors within the building. Alternatively, a design as provided by the mechanical engineer is acceptable.
- It may be assumed that an HVAC system has separate internal and perimeter zones with independent temperature control. The assumptions must then be provided to the tenant as part of the fitout guide.
- Outdoor air rates and base building HVAC supply and relief air rates must be aligned with the as built mechanical design.
- All other attributes are modelled in line with the requirements for 14.1.2.

Existing Buildings

An approximation of the estimated thermal and visual properties of an existing façade (e.g. the U-values and shading coefficients of walls/glazing) can be used, provided that all assumptions made are conservative (i.e. described the 'worst-case scenario').

REFERENCED DOCUMENTS

The following documents are referenced in this credit:

- American Society of Heating, Refrigerating and Air-conditioning Engineers (ASHRAE) (2013), ASHRAE Standard 55: *Thermal Environmental conditions for Human Occupancy*, Atlanta, www.ashrae.org
- International Organisation for Standardisation (ISO) (2005), *ISO 7730:2005 Ergonomics of the thermal environment – Analytical determination and interpretation of thermal comfort using calculation of the PMV and PDD indices and local thermal comfort criteria*, www.iso.org

ADDITIONAL INFORMATION

Additional information can be found in the following documents:

- Chartered Institution of Building Services Engineers, UK (CIBSE) Applications Manual 10-2005, *Natural Ventilation in Non-Domestic Buildings*
- Wyon, D. (2001), 'Enhancing productivity while reducing energy use in buildings', in *E-Vision 2000: Key issues that will shape our energy future*, Conference Proceedings, Science and Technology Policy Institute, Washington, D.C., June 2000, [Enhancing Productivity While Reducing Energy Use in Buildings](#)

DOCUMENTATION REQUIREMENTS

Please refer to the *'How Documentation is Described in the Submission Guidelines'* section within the *Introduction* for further guidance on Documentation Requirements for project submissions.

Design Review submissions are optional.

Project teams must submit documentation supporting credit compliance. A list of recommended supporting evidence is provided in the following section, which can be used to demonstrate compliance. Alternate documentation to that listed below can also be used by project teams to demonstrate compliance.

The key requirement is that evidence is provided to support each claim made within the Submission Template.

SUBMISSION CONTENT

Project teams must submit the following documentation:

- **Submission Template**
- **Evidence** to support claims made in the Submission Template

Recommended Supporting Evidence

14.1.1 NATURALLY VENTILATED SPACES

Drawings showing the building's natural ventilation strategy.

Modelling report showing the results of the natural ventilation compliance method.

14.1.2 MECHANICALLY VENTILATED SPACES

Confirmation from the relevant sub-contractors that all services have been installed and commissioned in line with the listed DTS criteria.

Drawings showing thermal properties of roof, windows, and façade.

Extract(s) from the Commissioning Report demonstrating via commissioning results that the building has been commissioned and the installed systems operate as intended by the design.

Mechanical drawings showing details of the HVAC system and zones.

Modelling report showing the results of the mechanically-ventilated compliance method (14.1.2B only).

|| *Where a NZGBC Accredited Energy Modeller has been engaged to undertake the energy modelling, a **Producer Statement** from the Accredited Energy Modeller may be submitted to show compliance of this credit, in lieu of a full energy report. || R1.1.14.02

REVISIONS AND AMENDMENTS

Revision No.	Date of Release	Description
NZv1.0	11/04/2019	Initial release.
NZv1.1	04/2022	R1.14.01 II Climate zones updated according to the newly released New Zealand Building Code in 2021
NZv1.1.1	07/2023	R1.1.14.01 II Clarifications added for Naturally Ventilated Spaces R1.1.14.02 II Clarify that a producer statement can be submitted in lieu of a full energy report

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ENERGY

The *Green Star - Design & As Built* 'Energy' category aims to reward projects that are designed and constructed to reduce their overall operational energy consumption below that of a comparable standard-practice building. Such reductions are directly related to reduced greenhouse gas emissions, lower overall energy demand as well as reductions in operating costs for building owners and occupants.

Through the 'Energy' category, *Green Star - Design & As Built* aims to facilitate reductions in greenhouse gas emissions by facilitating efficient energy usage and encouraging the utilisation of energy generated by low-emission sources.

The 'Energy' category rewards projects that achieve the following outcomes:

REDUCTION IN GREENHOUSE GAS EMISSIONS AND PEAK DEMAND

- The implementation of well designed systems, aimed at lower operating emissions.
- The selection of high efficiency equipment over less energy efficient alternatives.
- The implementation of well designed and zoned lighting that is energy efficient and appropriate for a space's use.
- The use of efficient supplementary equipment.
- The procurement of zero carbon and low carbon energy sources.

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GREENHOUSE GAS EMISSIONS

Credit 15

Points available: 18

AIM OF CREDIT

To encourage energy efficient buildings and the reduction of greenhouse gas (GHG) emissions associated with the use of energy in building operations.

CREDIT CRITERIA

15.1	Conditional Requirement	A Conditional Requirement must be met in order for the project to be eligible for <i>Green Star – Design & As Built</i> rating. Additional requirements must be met to receive a 5 Star or 6 Star rating.
15.2	GHG Emissions Reduction – Reference Building Pathway	<p>Up to 18 points are available where there is a specified reduction in the predicted GHG emissions of the proposed building.</p> <p>Points are awarded based on the project's predicted ability to reduce its operating energy consumption and emissions towards 'net zero'.</p>

COMPLIANCE REQUIREMENTS

15.1 Conditional Requirement

All projects are required to comply with the Conditional Requirement outlined in this credit.

Project teams must demonstrate that the operational greenhouse gas (GHG) emissions from the Proposed Building are at least 20% less than those of a Reference Building.

The Reference Building is a building which achieves the 'Deemed-to-satisfy' criteria outlined in the *Energy Consumption and Greenhouse Gas Emissions Calculation Guide*.

Additional GHG emissions reductions must be achieved to receive a 5 Star or 6 Star rating.

Project teams must also demonstrate that they have limited direct fossil fuel sources. The Proposed Building shall have no greater than 20% of its annual GHG emissions from direct fossil fuel use on site.

Additional fossil fuel limits must be achieved to receive a 5 Star or 6 Star rating.

Table 15.1: Conditional Requirements and Fossil Fuel Limits

Rating Targeted	Minimum GHG Emissions Reduction Threshold (Proposed to Reference)	Direct Fossil Fuel Use GHG Emissions Limit (Proposed Building)*
4 Star	20%	20%
5 Star	30%	10%
6 Star	50%	0%

*For 6 Star this includes any building process requirements such as cooking, manufacturing processes, etc. The next version of the Green Star will also prohibit direct fossil fuel use in 5 Star buildings.

Where fossil fuels are used solely for the purposes of emergency generation then any testing fuel consumption may be excluded from the assessment as viable alternatives are not available for many building types, and the quantity of associated emissions relatively low.

15.2 Reference Building Pathway

Refer to the *Energy Consumption and Greenhouse Gas Emissions Calculation Guide* for details on how to complete the calculation, including definitions.

Up to 18 points are available for this credit. Points are awarded on a continuous scale in accordance with Table 15.2.

Table 15.2: Points awarded for emissions reduction

Greenhouse Gas Emissions Reduction (Proposed Building relative to Reference Building)	Points Awarded
20% (minimum rewarded)	3.6
30%	5.4
40%	7.2
50%	9.0
60%	10.8
70%	12.6
80%	14.4
90%	16.2

100% (maximum rewarded)

18.0

SHARED SERVICES

This credit allows projects with shared energy supplies to be rewarded for a reduction in GHG emissions. The intent of this approach is to also reward buildings which connect to low-carbon energy sources at a utility-scale, rather than only rewarding those projects which produce low-carbon energy on-site.

The maximum benefit that can be derived from Shared Services is limited to the number of points awarded for GHG emission reduction due to the building design improvements alone. Hence full points for the credit will only be able to be achieved by buildings which have already achieved at least 50% emission reduction below the Benchmark Building. This calculation is performed by the *Greenhouse Gas Emissions Calculator*.

Project teams are encouraged to contact NZGBC to ensure points awarded under this credit element can be counted towards meeting the minimum requirement for 5 and 6 Star ratings.

Refer to *Shared Services and Low-Carbon Energy Supply Assessment Guidelines* for additional details.

INNOVATION

Innovative Technology or Process – Onsite Renewable Energy

Up to two points may be rewarded in the Innovation Category for installing renewable energy sources on site in accordance with Table 15.3.

Table 15.3: Points awarded for onsite renewable energy

	Amount	Points Available
Renewable Energy Contribution (including shared renewable services)	5%	1
	10% (maximum rewarded)	2

Refer to *Energy Consumption and Greenhouse Gas Emissions Calculation Guide* for details of how to claim the incentive.

Innovation Challenge – Net carbon zero buildings

An Innovation Challenge for projects seeking net zero emissions in scope 1, scope 2, and scope 3 is available for project teams. For more information, please contact NZGBC Green Star team.

REFERENCED DOCUMENTS

The following documents are referred to in this credit:

- AS 1668.4-2012 The use of ventilation and air-conditioning in buildings – Natural ventilation of buildings
- AS 3823.2-2013 Performance of electrical appliances – Air conditioners and heat pumps – Energy labelling and minimum energy performance standards (MEPS) requirements
- AS 4552-2005 Gas fired water heaters for hot water supply and/or central heating
- AS 4556-2011 Indirect gas-fired ducted air heaters
- ASTM E779-10 Standard test method for determining air leakage rate by fan pressurisation
- ATTMA TSL2 Air testing standard for non-dwellings for 2010 Part L2
- CIBSE TM23, 2000 Testing buildings for air leakage
- NABERSNZ Energy and Water for Offices: Rules for collecting and using data
- Energy Consumption and Greenhouse Gas Emissions Calculation Guide
- Green Star – Design & As Built: Greenhouse Gas Emissions Calculator
- Manufacturers may have the expected standing losses available, Alternatively, for straightforward typical systems, the following resources may provide a suitable reference:
 - AS/NZS 4692.1:2005 Electric water heaters – Energy consumption, performance and general requirements.
 - AS/NZS 4692.2:2005 Electric water heaters Minimum Energy Performance Standard (MEPS) requirements and energy labelling.

DEFINITION

Accredited Energy Modeller - An Accredited Energy Modeller has been selected based on the quality of their energy modelling reports, and the modeller's ability to explain their assumptions, rather than the number of models submitted. Accredited Energy modellers can issue Producer Statements for Green Star submissions, in lieu of a full energy report.

Reference Project – A hypothetical building of the same size, shape and floor area as the Proposed Building, but whose building fabric and building services characteristics are based predominantly on the Deemed-to-Satisfy provisions as defined in this document.

Direct Fossil Fuel Use – The use of coal, diesel, oil, gas, or any other fossil fuel, to generate any form of energy on site including but not limited to electricity, space heating, hot water heating, cooling and cooking etc.

DOCUMENTATION REQUIREMENTS

Please refer to the *'How Documentation is Described in the Submission Guidelines'* section within the *Introduction* for further guidance on Documentation Requirements for project submissions.

Design Review submissions are optional.

Project teams must submit documentation supporting credit compliance. A list of recommended supporting evidence is provided in the following section, which can be used to demonstrate compliance. Alternate documentation to that listed below can also be used by project teams to demonstrate compliance.

The key requirement is that evidence is provided to support each claim made within the Submission Template.

SUBMISSION CONTENT

Project teams must submit the following documentation:

- **Submission Template**
- Completed *Green Star – Design & As Built: Greenhouse Gas Emissions Calculator*
- **Evidence** to support claims made in the Submission Template

Recommended Supporting Evidence

15.2 REFERENCE BUILDING PATHWAY

Energy modelling report* in accordance with the *Energy Consumption and Greenhouse Gas Emissions Calculation Guide* following the structure of the guide and:

- Clearly identifying all default values used (e.g. occupant density).
- Clearly identifying all of the assumptions made, design-driven inputs and referencing drawings; whenever assumptions are used, they must be justified and conservative.
- Clearly corresponding to the design.

Extract(s) from the Specification(s)* demonstrating that all the inputs used in the energy simulation are reflected in the current design.

Extract(s) from the Commissioning Report demonstrating (through supporting evidence) that the building has been commissioned and operates as intended by the design (i.e. as described in the energy modelling report).

For naturally ventilated spaces, demonstrating that the building operates as a **naturally ventilated space** in accordance with AS 1668.4-2012 and **requires no mechanical air-conditioning** for occupancy.

As built drawings demonstrating that the facade details and materials are the same as described in the energy modelling report.

For naturally ventilated spaces, **drawings** for each space clearly showing openings and **dimensions** of ventilation inlets and outlets.

*Where a NZGBC Accredited Energy Modeller has been engaged to undertake the energy modelling, a **Producer Statement** from the Accredited Energy Modeller may be submitted to show compliance of this credit, in lieu of a full energy report.

SHARED SERVICES

Procurement Contract Approach

- Power Purchase Agreement (PPA) and Thermal Power Purchase Agreements identifying the duration of the power supply contract, supply availability and guaranteed GHG emission factor.
- Designer's statement indicating the total capacity of conventional chilled water, heating hot water heating, and domestic hot water heating plant installed in the building, the design heating or cooling load of each system, and hence the percentage of design load met by conventional plant.

Design Analysis Approach

- Design Intent Report (DIR) for the utility identifying its characteristics and associated GHG coefficient calculations.
- Power Purchase Agreement (PPA) and Thermal Power Purchase Agreements (TPPA)* for identifying the duration of the power supply contract, supply availability and an operational plan which corresponds with the DIR.
- Designer's statement indicating the total capacity of conventional chilled water, heating hot water heating, and domestic hot water heating plant installed in the building, the design heating or cooling load of each system, and hence the percentage of design load met by conventional plant.

Refer to the *Shared Services and Low-Carbon Energy Supply Assessment Guidelines* for more details regarding the above documents.

Design and construction documentation for the energy utility are **not** required for the purposes of the Green Star submission for the buildings.

REVISIONS AND AMENDMENTS

Revision No.	Date of Release	Description
NZv1.0	11/04/2019	Initial release.
NZv1.1	04/2022	The credit has been reframed with the following key changes: <ul style="list-style-type: none"> • Total points reduced from 20 to 18 • Separate points for energy efficiency improvement removed and added to overall GHG Emissions reduction. • Increased threshold for conditional requirements for 4, 5 and 6 Star ratings

-
- Fossil fuel limits set up for 4 and 5 Star buildings
 - Fossil fuel ban for 6 Star buildings
 - Shared services detail moved to Guidance Document
-

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PEAK ELECTRICITY DEMAND REDUCTION

Credit 16

Points available: 2

AIM OF CREDIT

To encourage the reduction of peak demand load on the electricity network infrastructure.

CREDIT CRITERIA

This credit includes two alternative pathways for project teams to demonstrate reductions in peak electricity demand.

16A	Prescriptive Pathway: On-site Energy Generation	1 point is available where it is demonstrated that the use of on-site electricity generation systems reduces the total peak electricity demand by at least 15%.
16B	Modelled Performance Pathway: Reference Building	Up to 2 points are available where it is demonstrated that the project's predicted peak electricity demand has been reduced below that of a Reference Building: 20%: 1 point 30%: 2 points

COMPLIANCE REQUIREMENTS

16A Prescriptive Pathway: On-Site Energy Generation

One (1) point is awarded where it is demonstrated that the use of on-site renewable energy or on-site generation sources reduces the peak electricity demand by at least 15%.

Peak electricity demand is the predicted annual peak calculated as the sum of all distribution boards (to include all miscellaneous loads) relevant to the building as shown in the as-installed electrical schematics. ||When using the prescriptive method, the output of on-site electricity generation should be that which occurs at the time when the peak load is expected to occur. Justification should be provided as to how the time of the peak load has been derived.|| R1.16.01

Peak electricity demand must be calculated in line with the below requirements:

- In accordance with AS/NZS 3000:2007 (or as subsequently amended);
- As the absolute design capacity of the system, after the application of diversity factors, but prior to the application of contingency factors as required for utility agreements (the value is likely to be about 30% less than that for the utility agreement); and

- To include all building end-use loads, except process loads, in the peak demand assessment.
- For mixed-mode ventilated buildings, peak demand must be calculated in the mechanically ventilated mode. Refer to the *Energy Consumption and Greenhouse Gas Emissions Calculation Guide* for the applicable assessment scope.

16B Modelled Performance: Reference Building

Up to two (2) points are awarded where it is demonstrated that the building's peak electricity demand is reduced when compared to that of the Reference Building. Points are awarded as follows:

- One (1) point is awarded for a 20% reduction in peak electricity demand; and
- Two (2) points are awarded for a 30% reduction in peak electricity demand.

Partial points are awarded based on a sliding scale of percentage improvement after a minimum achievement of 10% reduction in peak electricity demand. Refer to *Energy Consumption and Greenhouse Gas Emissions Calculation Guide* for details on how to complete the calculation, including the definition of the Reference Building.

GUIDANCE

Demand Response Ready HVAC Systems

Where all installed air conditioning equipment is Demand Response Ready (DDR) and has an activated receiver that is connected to a distribution network provider approved peak demand reduction program, please contact the NZGBC for an alternative pathway solution. Systems which instead offer the capability for building managers or occupants to shut down systems are not equivalent to a DDR system.

Mixed Use Projects

||A mixed-use project or building is deemed to be a building in which no single New Zealand Building Code Clause A1 Classified Use accounts for more than 80% of the building gross floor area (GFA), excluding car parks, etc.||^{R1.16.02} The overall points achieved by the project are calculated based on an area-weighting of the score achieved for each part of the building. Area-weighting is calculated in proportion to the GFA to which each compliance pathway is applied. Where the whole building is assessed using the reference building performance-based approach only, no area-weighting is required as the calculation method inherently accounts for all GHG emissions from the building.

Project teams are required to provide, for each separate part of the building, all documentation (as defined above) needed to demonstrate compliance with the relevant pathway used.

REFERENCED DOCUMENTS

The following documents are referred to in this credit:

- AS/NZS 3000:2007 (or as subsequently amended)
- Green Star – Design & As Built and Interiors NZv1.1 Energy Consumption and Greenhouse Gas Emissions Calculation Guide

DOCUMENTATION REQUIREMENTS

Please refer to the *'How Documentation is Described in the Submission Guidelines'* section within the *Introduction* for further guidance on Documentation Requirements for project submissions.

Design Review submissions are optional.

Project teams must submit documentation supporting credit compliance. A list of recommended supporting evidence is provided in the following section, which can be used to demonstrate compliance. Alternate documentation to that listed below can also be used by project teams to demonstrate compliance.

The key requirement is that evidence is provided to support each claim made within the Submission Template.

SUBMISSION CONTENT

Project teams must submit the following documentation:

- **Submission Template**
- **Evidence** to support claims made in the Submission Template
- Completed Green Star – Design & As Built NZv1.1 Greenhouse Gas Emissions **Calculator**

Recommended Supporting Evidence

16A PRESCRIPTIVE PATHWAY

Extract(s) from the specification(s)* where the proposed solution(s) are described.

Calculation of the peak electricity demand referencing as-installed drawings and AS/NZS 3000, detailing (with supporting calculations) the design, operation and justifying the capacity of the intended system.

Schematic electrical drawings clearly indicating the type, location and details of the proposed solution(s).

16B REFERENCE BUILDING PATHWAY

Energy modelling report containing a section specifically on peak electricity demand reduction, with information provided as per the requirements of *Energy Consumption and Greenhouse Gas Emissions Calculation Guide*.

|| *Where a NZGBC Accredited Energy Modeller has been engaged to undertake the energy modelling, a **Producer Statement** from the Accredited Energy Modeller may be submitted to show compliance of this credit, in lieu of a full energy report|| R1.1.16.01

Extract(s) from the Commissioning Report that specifically highlight the systems which contribute towards the peak electricity demand reduction, and demonstrate that they have been commissioned and operate as intended by the design (i.e. as described in the energy modelling report).

MIXED USE PROJECTS

Project teams are required to provide all documentation specified above, to demonstrate compliance with each relevant pathway used for each section of the building.

REVISIONS AND AMENDMENTS

Revision No.	Date of Release	Description
NZv1.0	11/04/2019	Initial release.
NZv1.1	04/2022	R1.16.01 II Additional guidance added for 16A. R1.16.02 II Additional guidance to define mixed-use project or building
NZv1.1.1	07/2023	R1.1.16.01 Clarify that a producer statement can be submitted in lieu of a full energy report.

TRANSPORT

The *Green Star - Design & As Built* 'Transport' category aims to reward projects that facilitate a reduction of the dependency of occupants on private car use as an important means of reducing overall greenhouse gas emissions. The use of motor vehicles directly contributes to climate change in two ways - through the high amounts of energy required to produce cars and build and maintain supporting road transport infrastructure and services; and the direct emissions that result from car operations.

If reliance on individual motor vehicle transportation is to be reduced, it is necessary to maximise alternative transportation options. Rather than limiting access to private fossil fuel vehicles, the 'Transport' category aims to encourage and reward initiatives that reduce the need for their use. This may include initiatives that encourage and make possible the use of mass transport options, cycling or walking, and the selection of sites that are close to a large number of amenities.

The 'Transport' category rewards projects that achieve the following outcomes:

REDUCTION OF CARBON-INTENSIVE MODES OF TRANSPORT

- The selection of sites that have readily accessible public transport options.
- The selection of sites within close proximity of a diversity of amenities.
- The facilitation and encouragement of the use of alternative transport options, such as bicycles or electric vehicles.

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SUSTAINABLE TRANSPORT

Credit 17

Points available: 10

AIM OF CREDIT

To reward projects that implement design and operational measures that reduce the carbon emissions arising from occupant travel to and from the project, when compared to a reference building. This also promotes the health and fitness of commuters, and the increased livability of the location.

CREDIT CRITERIA

17A Sustainable Transport Performance Pathway	Up to 10 points are available where projects provide access to sustainable transport infrastructure which decreases greenhouse gas emissions from transport, decreases mental and social impacts of commuting, and encourages the uptake of healthier active transport options. R1.17.01
17B Sustainable Transport Prescriptive Pathway	Up to 7 out of 10 points are available where projects provide access to sustainable transport infrastructure as demonstrated using specified prescriptive criteria.

COMPLIANCE REQUIREMENTS

17A Performance Pathway

The Performance Pathway only applies to *regular occupants* of the building.

Up to 10 points are awarded under this pathway. Points are awarded based on a holistic approach to reducing the impacts from transport, where the proposed building performance is improved when compared to a reference building across four indicators:

- Emissions reduction;
- Active mode encouragement;
- Vehicle kilometres travelled reduction; and
- Walkable location.

Points are awarded by completing the *17A Performance Pathway Sustainable Transport Calculator* with the predicted transport mode split as defined in a Travel Plan or Transport Plan specifically developed for the project. More information is available in the *17A Performance Pathway Sustainable Transport Calculator Guide*.

The Travel Plan or Transport Plan must be developed by a suitably qualified transport professional (see Definitions), as the plan will inform the inputs into the *17A Performance Pathway Sustainable Transport Calculator Guide*.

This pathway may be most appropriate for those projects that are not located in Central Business Districts, which are typically well connected to public transport networks. Projects located in suburban or regional settings may find this pathway the most appropriate to their sustainability goals. Project teams should consult with their transport specialists for advice about which pathway to use.

The *17A Performance Pathway Sustainable Transport Calculator* and Guide can be found here https://www.nzgbc.org.nz/Article?Action=View&Article_id=95

17B Sustainable Transport Prescriptive Pathway

The Prescriptive Pathway applies to regular *building occupants* and *visitors*.

Up to 7 out of 10 points are available based on the following credit elements:

Credit Element	Points Available
17B.1 Access by Public Transport	Up to 4 points are available based on the accessibility of the site by public transport.
17B.2 Reduced Car Parking Provision	1 point is available where there is a reduction in the number of car parking spaces in the proposed building when compared to a standard-practice building.
17B.3 Low Emission Vehicle Infrastructure	Up to 2 points are available where parking spaces and/or dedicated infrastructure is provided to support the uptake of low-emission vehicles.
17B.4 Active Transport Facilities	Up to 2 points are available where bicycle parking and associated facilities are provided to regular building occupants and visitors.
17B.5 Walkable Neighbourhoods	1 point is available where the project is located conveniently to amenities or the project achieves a specified Walk Score.

17B.1 Access By Public Transport

Up to four (4) points are awarded based on the accessibility of the site by public transport. The points score is determined by completing the *17B Prescriptive Pathway Public Transport Calculator*.

There are two methods for achieving points:

17B.1A Deemed-to-satisfy

Four points are automatically awarded to projects located within the following postcodes:

- Auckland CBD, postcodes 1010 and 1052

- Hamilton CBD 3204
- Wellington CBD 6011
- Christchurch CBD 8011, 8013* (*projects located on or south of Bealey Ave only)
- Dunedin CBD 9016

17B.1B Transport Calculator

Up to four points are awarded for the quality of mass transport options available to building users. The points are determined using the *17B Prescriptive Pathway Public Transport Calculator*, based on:

- The type(s) of mass transport services available within 1000m of the main building entrance
- The number of services during each weekday peak interval
- The number of compliant routes.

Points are calculated as follows:

Table 17B.1B: Points Awarded for Access to Public Transport

Calculator Score	Number of Points Awarded
20	1
40	2
60	3
80	4

17B.2 Reduced Car Parking Provision

Up to one (1) point is awarded where there is a reduction of car parking spaces for the proposed building, when compared to the maximum project planning allowance. The points awarded are based on the level of the reduction and the site's access to public transport, as per Table 17B.2.1.

This credit is applicable regardless of the location of the project, or the nature of local planning requirements, as neither of these factors lessens the environmental impact of the use of private motor vehicles.

Where project planning rules stipulate minimum car parking allowances, one (1) point is awarded if the project includes no more than the minimum car parking requirements.

Where no carparks are provided, one (1) point under 'Reduced Car Parking Provision' is awarded unless this has been enforced by local planning requirements, then this criterion becomes 'Not Applicable'.

||Projects that reduce the existing number of carparks (net total) on existing campuses (while also providing new carparks) also meet the credit criteria.|| R1.17.02

Table 17B.2.1: Maximum Car Parking Rates

Space Use Type	Points	Minimum Number of Individuals at Peak Building Occupancy per Car Parking Space		
		Accessibility Rating 1	Accessibility Rating 2	Accessibility Rating 3
Multi Unit Residential	0.5	3	3	4
	1	4	4	5
Office	0.5	5	6	7
	1	7	8	9
Public Building	0.5	5	6	7
	1	8	9	10
Retail Centre	0.5	4	5	6
	1	6	7	8
Education	0.5	15	20	25
	1	20	25	30
Industrial	0.5	3	4	5
	1	4	5	6
Healthcare	0.5	2	3	4
	1	3	4	5

Notes on calculating the project's maximum car parking rates:

- Total peak building occupancy must be justified by the project team.
- ||It is acceptable to use the peak population occupancy provided by a consultant Fire Report to determine the carparking provision. The Fire Report is a legally important document which is the basis for many items within the building, such as stair width, number of egress routes etc. and is crucial for NZBC compliance. ||^{R1.17.02}
- Where a building has multiple uses, a hybrid rate shall be determined based on the proportion attributable to each use.
- The project's Accessibility Rating is determined by the number of points awarded in criterion 17B.1 as follows:

Table 17B.2.2: Accessibility Rating

Points awarded for criterion 17B.1	Accessibility Rating
17B.1 not targeted	1
0	1
1	1
2	2
3	2
4	3

As an example: a theoretical retail building has a Public Transport Accessibility Rating of 2; number of peak building occupants is 1,000; and has provided 200 car parking spaces. The ratio of the number of peak building occupants to car parking spaces is 5:1 (1,000/200). According to Table 17B.2, the project achieves 0.5 points. If the building had 400 vehicle parking spaces, then the ratio would have been 2.5:1 (1,000/400), and as this is below the Minimum Ratio for 0.5 points, it achieves 0 points.

Projects in a campus-style situation, where one, or more, car parks/parking spaces exist to service a large number of buildings, must demonstrate that the number of car parks within 800 metres of the site has not increased at a ratio higher than that allowed in Table 17B.2 in order to claim this point. The time period this is assessed over is from the time of the building consent (or from two years prior to practical completion) through to 6 months after Practical Completion.

17B.3 Low Emission Vehicle Infrastructure

Up to two (2) points are awarded where parking spaces and/or dedicated infrastructure is provided to support the uptake of low-emission vehicles. The points are awarded as follows:

- One (1) point is available where 15% of parking is dedicated to fuel-efficient vehicles (see Definitions), with a maximum of 5% for motorcycle parking; AND
- One (1) point is available where 5% of parking is dedicated to electric vehicles and charging infrastructure is provided for each space;

For residential spaces, dedicated car share spaces and vehicles are provided at the rate of 1 per 70 project occupants.

Parking for Fuel-efficient and Electric Vehicles

Parking spaces for fuel-efficient and electric vehicles must be clearly designated, for example through use of different coloured line markings and highly visible signage. Spaces designated for small cars are not considered to be equivalent to spaces for fuel efficient vehicles.

Appropriate electric vehicle charging infrastructure must be easily accessed by the users of dedicated electric vehicle charging spaces. It must comply with all relevant Standards and health and safety legislation.

No Parking Spaces Provided

Where no parking spaces are to be provided, there is no opportunity to apply any of the above initiatives. In this instance, the 'Low Emission Vehicle Infrastructure' point is made 'Not Applicable'. Please see the Introduction section of the Submission Guidelines for additional information.

17B.4 Active Transport Facilities

Up to two (s) points are awarded as follows:

- One (1) point is available where cycle parking and associated facilities are provided to a proportion of the building's *regular occupants*.
- One (1) point is available where cycle parking and associated facilities are provided to a proportion of the building's *visitors*.

The specific proportion that must be met for regular occupants is outlined in Table 17B.4.1, and visitors in Table 17B.4.2.

The number of *regular occupants* and *visitors* is to be based on the project's design occupancy. The project team must justify how the number of *regular occupants* and *visitors* has been determined within the Submission Template. Please see the Definitions section for detail on *regular occupants* and *visitors*.

Default values for *regular occupants* and *visitors* may be determined as described in the Guidance section, however in all instances where project design occupancy values are available prior to issuing of Tender documentation, these take precedent.

Table 17B.4.1: Cycle Facilities for Regular Occupants

Building Type	Cycle Facilities								
Class 2: Multi Unit Residential	Secure bicycle parking for occupants is provided at a rate as follows:								
	<table border="1"> <thead> <tr> <th>No. of Units</th> <th>Requirement</th> </tr> </thead> <tbody> <tr> <td>0-50</td> <td>1 bicycle park for every 1 unit</td> </tr> <tr> <td>51-75</td> <td>50 bicycle parking spaces PLUS 1 bicycle park for every 1.5 units (over 51 units)</td> </tr> <tr> <td>76-100</td> <td>67 bicycle parking spaces PLUS 1 bicycle park for every 2 units (over 76 units)</td> </tr> </tbody> </table>	No. of Units	Requirement	0-50	1 bicycle park for every 1 unit	51-75	50 bicycle parking spaces PLUS 1 bicycle park for every 1.5 units (over 51 units)	76-100	67 bicycle parking spaces PLUS 1 bicycle park for every 2 units (over 76 units)
	No. of Units	Requirement							
	0-50	1 bicycle park for every 1 unit							
51-75	50 bicycle parking spaces PLUS 1 bicycle park for every 1.5 units (over 51 units)								
76-100	67 bicycle parking spaces PLUS 1 bicycle park for every 2 units (over 76 units)								

	Greater than 100	79 bicycle parking spaces PLUS 1 bicycle park for every 2.5 units (over 100 units)
Class 3 to 9: Office, Retail Centre, Industrial and Healthcare	Secure bicycle parking for regular occupants is provided for 10% of total regular occupants; with associated end-of-trip facilities, see Table 17.4.3. R1.17.03	
Class 9b – Primary and Secondary School	In addition to the Class 3 to 9 requirements, secure bicycle parking is provided for 40% of students over grade 4.	
Class 9b Education - Tertiary Education only	In addition to the Class 3 to 9 requirements, secure bicycle parking is provided for 10% of students, calculated at 75% of <i>peak occupancy</i> (see Definitions).	

Table 17B.4.2: Cycle Facilities for Visitors

Building Type	Cycle Facilities
Class 2: Multi Unit Residential	Secure bicycle parking is provided for 5% of dwellings.
All building classes	Secure bicycle parking is provided for 5% of peak visitors.

Facilities can be provided within the building’s boundary, or outside. If the facilities are outside the site boundary, they must be under the control of the building owner and be accessible to all building occupants and visitors (depending on the users being served by those facilities).

Secure bicycle parking is defined as that which is in accordance with AS 2890.3.

End-of-trip Facilities for Regular Occupants

Where the building type includes regular occupants working in the building (i.e. all non-residential buildings), end-of-trip facilities are also required. End-of-trip facilities are defined as showers, changing amenities with appropriate drying space, and lockers. The number of end-of-trip facilities that must be provided is specified in Table 17B.4.3.

End-of trip-facilities do not need to be provided for non-staff occupants such as students of schools, apartment residents or patients of healthcare buildings etc.

Table 17B.4.3: End-of-trip Facilities Requirements

Number of Regular Occupants	Showers	Lockers
0-12	1 (unisex)	1 per 1 bicycle space
13-49	2	1 per 1 bicycle space
50-149	3	1 per 1 bicycle space

150-299	4	1 per 1 bicycle space
300-500	5	1 per 1 bicycle space
Greater than 500	Additional 2 per extra 250 occupants	1 per 1 bicycle space

|| R1.17.03

The design of the end-of trip facilities must be appropriate to encourage their use over that of private vehicle use. Therefore, the project team is expected to justify how their location, locker sizes, privacy requirements, and size are conducive to this aim.

||Showers and bathrooms provided to meet statutory accessibility requirements are not included in the calculation of end of try facilities for Green Star projects.|| R1.17.04

17B.5 Walkable Neighborhoods

One (1) point is awarded where the project complies with one of the following options:

- The project is located so that at least four (4) amenities for industrial buildings, or at least eight (8) amenities for all other types of buildings, are within 400m of the project. The distance is to be measured from the centre of the project's site; or
- The project achieves a Walk Score of at least 70 for industrial buildings, or at least 80 for all other types of buildings, as determined by the website www.walkscore.com, using the 'street smart' method of calculation.

|| To confirm amenities are within 400m of the project, the site plan should show the measured walking distance (instead of the radial distance) from the centre of the project following a designated path to the amenity to meet the credit requirement. Its intent is to show that the amenity can be reached within a walkable distance. || R1.1.17.01

Guidance for Manual Method of Calculation

Amenities can be off or on-site and are defined as: convenience stores; pharmacies; post offices, restaurants, food and beverage outlets; gyms, pools and sports facilities; hospitals, clinics and healthcare centres; childcare centres; news agencies; retail centres; cinemas and theatres; supermarkets and grocery stores; libraries; banks or ATMs; public parks; community centres; churches; and educational facilities (i.e. schools or universities).

Amenities that are similar in nature to that of the development cannot be considered for purposes of this credit. For example, a project with residential unit cannot consider other residences as amenities. Where there are two or more of any one amenity this will count as only 2 amenities. Therefore, 3 restaurants will only count as 2 amenities, 4 convenience stores will only count as 2, etc.

DEFINITIONS

Fuel-efficient Vehicles

Fuel-efficient vehicles are those that have a minimum 5 Star fuel economy rating www.rightcar.govt.nz

||Low Emission Vehicle Infrastructure

Electric vehicle charging infrastructure can be defined as the provision of a standard domestic, commercial or industrial power outlet, or wiring to enable the future installation of electric vehicle charging equipment without the electric vehicle charging equipment itself being installed at the time of practical completion, thus making the project electric vehicle ready in the future. || R1.1.17.02

Peak Building Occupancy

Refers to the total building population peak occupancy as justified by the project team. This would include staff and visitors in an office building, and staff and students in an education facility, etc.

Regular Occupants

The population of people that regularly work, study or live in the building (e.g. staff, full-time students, unit tenants or owners).

Suitably Qualified Transport Professional

The suitably qualified transport professional shall hold a relevant tertiary qualification (including, but not limited to, architecture, engineering, sustainability and planning) and have produced a sustainable transport plan for a previous project of similar scale.

Visitors

PEOPLE THAT OCCUPY THE BUILDING ON AN IRREGULAR BASIS (E.G. VISITORS, CUSTOMERS AND INDUSTRIAL or commercial contractors).

INNOVATION

Improving on Green Star Benchmarks – No new car parks on site

One (1) point will be awarded where no new car parking is provided on-site, unless it was a regulatory requirement. This applies regardless of who operates the car parking, even if it's operated by an external party. If new car parking is present on-site, even if it is commercially operated, this Innovation point cannot be claimed.

In addition, for campus-style projects, where one, or more, car parks/parking spaces exist to service a large number of buildings, it must be demonstrated that the number of car parks within 800 meters of the site has not increased in order to claim this Innovation point. The time period this is assessed over is from the time of the building consent (or from two years prior to practical completion) through to 6 months after Practical Completion. If there is an increase in the number of car parks within 800m of the site that are included within the campus boundary, this Innovation point cannot be claimed.

GUIDANCE

Exclusions and Notes

This credit promotes reduced dependence on private car commuting and the associated benefits, the promotion of health and fitness to commuters, and the increased livability of the location of the site.

Car parks on adjacent sites are generally excluded from the car parking spaces available for the project, whether public or commercial. If external car parking spaces are intended to be

used by the building occupants (i.e. are owned or leased for this purpose) to meet the requirements of the building consent, these should be included in the assessment.

Disabled parking spaces and parking spaces designed to accommodate commercial vehicles required for the industrial or commercial activity in the building (i.e. vehicles not used to transport people to the building) may be excluded from the total number of parking spaces. These parking spaces should be clearly marked through use of different coloured line markings and highly visible signage. Where drop-off lanes/spaces are provided, these can be excluded in the total number of car parks used to demonstrate compliance. In order to be excluded, drop-off spaces on the drawings submitted must show that the spaces/lanes are marked to indicate “no stopping at all times” (or similar) and the design should clearly indicate they are drop-off lanes rather than car parks. R1.17.05

Active Transport Facilities – Worked Example (17B.4)

The following example is provided for calculating the number of cyclist facilities required for a hypothetical building project. An office building has 90 regular occupants, as supported by the owner’s project requirements document. The project team must demonstrate the provision of 9 bicycle parking spaces for regular occupants, in accordance with Table 17B.4.1.

$$90 \text{ occupants} \times 10\% = 9 \text{ bicycle spaces (rounded up)}$$

These bicycle parking spaces must also be serviced by end-of-trip facilities. The project team must demonstrate the provision of 3 showers and 9 lockers, in accordance with Table 17B.4.3.

$$90 \text{ occupants} = 3 \text{ showers}$$

$$7 \text{ bicycle spaces} \times 1.2 = 9 \text{ lockers (rounded up)} \quad \text{R1.17.03}$$

If the building is expected to have up to 17 visitors at any one time, the project team must demonstrate the provision of 1 bicycle parking space, in accordance with Table 17B.4.2.

$$17 \text{ visitors} \times 5\% = 1 \text{ bicycle space (rounded up)}$$

Where regular occupant and visitor numbers are not known prior to issue of Tender documentation, default values may be used. These may be determined based on reputable industry standards such as Legacy Green Star rating tools, occupancy rates prescribed within Table A1 Appendix A of AS 1668.2:2012 *The use of ventilation and air conditioning in buildings – Part 2: Mechanical ventilation in buildings*, or other suitable standards.

Walk Score (17B.5)

Walk Score is a globally recognised public access walkability index that assigns a numerical walkability score to any address in the United States, Canada, and Australia. Walk Score measures the walkability of any address using a patented system. For each address, Walk Score analyses hundreds of walking routes to nearby amenities. Points are awarded based on the distance to amenities in each category. Amenities within a 5 minute walk (.25 miles) are given maximum points. A decay function is used to give points to more distant amenities, with no points given after a 30 minute walk.

REFERENCED DOCUMENTS

The following documents are referenced in this credit:

- AS 2890.3 Parking Facilities Part 3: Bicycle Parking Facilities
- Green Star – Design & As Built: 17B Prescriptive Pathway Public Transport Calculator and Guide
- Green Star – Design & As Built: 17A Performance Pathway Sustainable Transport Calculator and Guide

ADDITIONAL INFORMATION

Additional information is provided in the following documents:

- AS 1158 Lighting for Roads and Public Spaces, Part 3.1: Pedestrian area lighting for lighting of pedestrian areas
- IEC 62196-1:2011 Plugs, Socket-Outlets, Vehicle Connectors and Vehicle Inlets – Conductive Charging of Electrical Vehicles – Part 1: General Requirements for Electric Vehicle Charge Points
- The Australian Bicycle Council’s fact sheet for Developers for End of Trip Facilities
http://cyclingresourcecentre.org.au/images/uploads/post/attachment/ABC_FactSheet_-_Bike_Parking.pdf
- www.rightcar.govt.nz

DOCUMENTATION REQUIREMENTS

Please refer to the *‘How Documentation is Described in the Submission Guidelines’* section within the *Introduction* for further guidance on Documentation Requirements for project submissions.

Design Review submissions are optional.

Project teams must submit documentation supporting credit compliance. A list of recommended supporting evidence is provided in the following section, which can be used to demonstrate compliance. Alternate documentation to that listed below can also be used by project teams to demonstrate compliance.

The key requirement is that evidence is provided to support each claim made within the Submission Template.

SUBMISSION CONTENT

Project teams must submit the following documentation:

- **Submission Template**
- **Evidence** to support claims made in the Submission Template

- Green Star transport **calculator**

Recommended Supporting Evidence

17B.1 ACCESS BY PUBLIC TRANSPORT

Screenshot from NZ Post website showing project location within the relevant postcode; or

Drawings showing relevant walking distances to transport stops and interchanges

Extract(s) from timetables for each compliant route showing number of services at peak periods. The timetable provided must not be more than six months old from the date of submission.

17B.2 REDUCED CAR PARKING PROVISION, 17B.3 LOW EMISSION VEHICLE INFRASTRUCTURE AND 17B.4 ACTIVE TRANSPORT FACILITIES

Project Drawings showing the proposed car parking spaces, bicycle parking spaces, and end-of trip facilities.

17B.5 WALKABLE NEIGHBOURHOODS

Walk Score Report

Site Plan* showing the amenities nearby.

REVISIONS AND AMENDMENTS

Revision No.	Date of Release	Description
NZv1.0	11/04/2019	Initial release.
NZv1.1	04/2022	<p>R1.17.01 Performance pathway incorporated</p> <p>R1.17.02 A peak population occupancy provided by a consultant Fire Report can be used to determine the carparking provision.</p> <p>R1.17.03 Changing the end-of-trip facilities requirements for Regular Occupants and its worked example</p> <p>R1.17.04 Showers and bathrooms provided to meet statutory accessibility requirements are not included in the calculation of end of trip facilities.</p> <p>R1.17.05 Clarifications provided for drop-off lanes/spaces</p>
NZv1.1.1	07/2023	<p>R1.17.01 To confirm amenities are within 400m of the project, the site plan should show the measured walking distance (instead of the radial distance) from the centre of the project following a designated path to the amenity to meet the credit requirement.</p>

R1.1.17.02 || Clarifying Low Emission Vehicle
Infrastructure

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WATER

The *Green Star – Design & As Built* 'Water' category aims to encourage and reward initiatives that reduce the consumption of potable water through measures such as the incorporation of water efficient fixtures and building systems and water re-use.

Reductions in operational water consumption may be achieved through maximisation of water-efficiency within a project, as well as through the utilisation of reclaimed water sources.

The 'Water' category rewards projects that achieve the following outcomes:

REDUCTION IN POTABLE WATER CONSUMPTION

- The selection of equipment that is more water efficient than comparable standard practice equivalents.
- The use of water-efficient supplementary equipment.
- The selection of water-efficient toilets, taps and showers.

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POTABLE WATER

Credit 18

||Points available: 10|| R1.18.01

AIM OF CREDIT

To encourage building design that minimises potable water consumption in operations.

CREDIT CRITERIA

This credit includes two alternative pathways to demonstrate reductions in potable water consumption.

18A Performance Pathway	 Up to 10 points R1.18.01 are available based on the magnitude of the predicted reduction in potable water consumption, when the project is compared against a Reference Building.
18B Prescriptive Pathway	Up to 5 points out of 10 are available where it is demonstrated that the building's potable water consumption has been reduced through best practice water saving design features.

COMPLIANCE REQUIREMENTS

There are two alternative pathways available for projects teams to demonstrate reductions in potable water:

- A. The Performance Pathway 18A; or
- B. The Prescriptive Pathway 18B.

18A Performance Pathway

Up to ten (10) points are awarded where it is demonstrated that the building's predicted potable water consumption has been reduced below that of a Reference Building. This credit addresses the potable water consumption from the use of sanitary fixtures, appliances, HVAC, irrigation systems, and swimming pools (where present).

Compliance Requirements and guidance for the Performance Pathway are detailed in the *Green Star Potable Water Calculator Guide*. Points achieved by the Performance Pathway are determined in accordance with the *Green Star Potable Water Calculator*.

Table 18A.1: Points Awarded for Potable Water Use Reduction

Percentage Reduction Compared to Standard Practice Benchmark	Points Awarded
0	No points
5	1.25
15	2.50
25	3.75
35	5.00
45	6.25
55	7.50
65	8.75
75	10.00 R1.18.01

Shared Services

This credit rewards projects for reduction in potable water usage due to the use of reclaimed water from on-site rainwater, greywater, blackwater, stormwater or supplied reclaimed water. The *Green Star Potable Water Calculator* allows for the inclusion of the amount of non-potable water that is available from a central or shared service for use within the building.

18B Prescriptive Pathway

Up to five (5) points are available where the building addresses the following water uses as outlined in the Table 18B.1.

Table 18B.1 Points Awarded for Prescriptive Credit Elements

Credit Element	Points Awarded
18B.1 Sanitary Fixture Efficiency	1
18B.2 Rainwater Reuse	1
 18B.3 Heat Rejection	1 R1.18.02
18B.4 Landscape Irrigation	1
18B.5 Fire System Test Water	1

18B.1 Sanitary Fixture Efficiency

One (1) point is awarded where all fixtures are within one star of the WELS rating stated below:

Table 18B.1 Nominated fixture WELS Rating

Fixture / Equipment Type	WELS Rating
Taps	6 Star
Urinals	6 Star
Toilet	5 Star
Showers	3 Star (> 4.5 but ≤ 6.0)**
Clothes Washing Machines	5 Star
Dishwashers	6 Star

** The 3 star (>4.5 but ≤6.0) requirement relates to Range F which is specified for both High Pressure and Low Pressure Showers as per Table 3.1 and Table 3.2 respectively of the AS NZS 6400-2016 Water Efficient Products standard.|| For showers, within one star of this Category F WELS rating means showers must be either:

- 3 Star Range E (6.0 - 7.5 L/min); or,
- 3 Star Range F (4.5 - 6.0 L/min); or,
- 4 Star Range E (6.0 - 7.5 L/min); or,
- 4 Star Range F (4.5 - 6.0 L/min)

Note that a 3 Star WELS rating high pressure shower sitting at the range of 7.5-9 L/min isn't compliant.|| R1.18.03

For Hotel developments, the benchmark against which potable water use reduction for showers will be measured is 2 Star WELS (12 L/min).

Where the project does not contain one or more of these fixtures or equipment items then the WELS rating for that item does not need to be achieved. One (1) point is available where the WELS rating of the remaining fixtures and equipment met the relevant WELS rating criteria.

||Specialist Fixtures

The performance of fixtures used in life safety applications should not be impacted by water efficiency requirements that compromise the required performance.

Where specialist water fixtures and fittings are used e.g. anti-ligature in mental health facilities, laboratories and clinical healthcare projects, project teams may still achieve points by demonstrating the specialist water fixtures and fittings are best in class, instead of meeting WELS requirements in the Submission Guidelines. A Technical Question should be submitted to justify accordingly.

For atypical facilities such as transport hubs, sporting facilities and arenas project teams can submit a project specific Technical Clarification when using the Performance pathway to demonstrate commensurate reductions compared to business-as-usual benchmark fixture potable water use e.g. 20% reduction compared to business as usual.

Excluded Fixtures

The following fixtures and fittings may be excluded, as the water consumption will not be altered significantly by reducing the water flow:

- Bath taps, laboratory taps, and taps dedicated to cleaning and facility management.
- Kitchen or café tap ware, where the primary use is for pot fill and container filling.
- Kitchen/ Café Chilled, Boiling and Sparkling tapware which are used to fill cups.||

R1.18.04

18B.2 Rainwater Reuse

One (1) point is awarded when a rainwater tank is installed to collect and reuse rainwater, within the project's site boundary as deemed appropriate by the project team. The rainwater tank size must meet the following criteria:

Table 18B.2 Rainwater Tank Volume Designations

Gross Floor Area (GFA in m ²)	Rainwater Tank Volume (kL)
2,500	25
5,000	50
10,000	100
20,000	200

Where the GFA of the building falls between the figures outlined in the above Table, or for projects above or below the areas listed in the Table, a ratio of 10 L/m² shall be used to determine the minimum tank size required to meet the Compliance Requirements.

The requirements provide a minimum tank size. To achieve the best outcome for the project the sizing of the rainwater tank should be based on the collection area, the rainfall in a particular location, and the demands for rainwater use on the project.

It is recognised that the sizing of the rainwater tank is highly dependent on the collection area, the rainfall in a particular location, and the demands for rainwater on the project. The sizing of the rainwater tank has been over-simplified for this DTS methodology.

Project teams should not rely on this sizing information to achieve the best outcome for their project.

Should projects wish to reduce the rainwater tank size and account for local rainfall, the Performance pathway *Potable Water Calculator* shall be used to carry out the water balance to inform tank sizing.

18B.3 Heat Rejection

One (1) points is awarded where no water is used for heat rejection. To comply, the project must be either naturally ventilated (allowing for the use of ceiling fans or similar) or the HVAC system must not use water for heat rejection.

To claim that the project is naturally ventilated, it must be demonstrated that the building is naturally ventilated in accordance with *AS1668.4-2012 The use of ventilation and air-conditioning in buildings – Part 4: Natural Ventilation of buildings*. To claim that no water based heat rejection system is used it must be demonstrated that the air conditioning needs of the project are met by means other than water based heat rejection.

Water-based heat rejection systems means cooling towers, evaporative cooling, or other systems of a similar nature that continuously use potable water for heat rejection i.e. this does not apply to closed-loop chilled and condenser water distribution networks that form part of an overall heat rejection system.

||A 90% reduction in the potable water used for water-based heat rejection systems meets the credit aim. Evidence of 90% or greater potable water saving with a wet/dry cooler should be provided in order to be awarded the one point via the prescriptive pathway. This could take the form of a manufacturer-provided calculation for the specified equipment in the project climate zone (using NIWA data). As this would need to be done as part of showing the savings this shouldn't be an additional calculation.|| R1.18.05

As different wet/dry coolers can operate differently, the additional credit 27 Microbial Control may be achieved by showing that the test data for no water particle generation is applicable to the specific cooler installed and the remaining cooling water is dumped each night.

This should take the form of a statement by a practicing mechanical engineer that they have reviewed the operation of the specific chiller to be installed and it has a similar water droplet formation to the one tested and shown to not produce droplets and any remaining cooling water shall be dumped each night. This meets the “that includes measures for Legionella control and Risk Management.” requirement.

18B.4 Landscape Irrigation

One (1) point is awarded where either drip irrigation with moisture sensor override is installed, or where no potable water is used for irrigation.

The landscaping and associated systems must be designed to reduce the consumption of potable water required for irrigation through the installation of subsoil drip irrigation and moisture sensor controls.

In the case of a xeriscape garden, the provision of irrigation systems must be able to be removed within three months of landscaping installation and the landscaping must not require watering after this time.

Where the building has no landscaping (including roof, vertical and planter gardens) or landscaping represents less than 1% of the site area, this point is 'Not Applicable' and is excluded from the points available.

18B.5 Fire Protection System Test Water

One (1) point is awarded when one of the following conditions is met:

- The fire protection system does not expel water for testing; or
- When sprinkler systems are installed, each floor must be fitted with isolation valves or shut-off points for floor-by-floor testing.

||The Fire Protection System Test Water criterion (18B.5) is deemed 'Not Applicable' for projects where:

- A sprinkler system is not required under the New Zealand Building Code, or
- A sprinkler system is not provided by the project team, and does not include a water-based fire protection system.

The aim of this credit is to encourage building design that minimises potable water consumption in operations. For the fire protection system test water point It is only applicable to situations where the building and environment benefit from having additional valves or other systems in place which reduce the amount of water used. Single-storey building do not achieve the second criteria of shut-off points for floor-by-floor testing by default, and therefore cannot comply with this requirement and the point cannot be assessed as 'Not Applicable'. For single-storey buildings, teams would need to demonstrate through a project specific Technical Clarification how their project would minimize water use during fire protection system test/maintenance to achieve this credit.|| R1.18.06

GUIDANCE

Relevant Authority Approval

Where greywater and/or blackwater treatment and reuse systems are present, it is the project team's responsibility to seek and achieve any relevant authority approval, and comply with the relevant legislation.

WELS Standard

The WELS (Water Efficiency Labelling and Standards) standard is a joint initiative by the Australian government and industry. The referenced standard is *AS/NZS 6400: 2016: Water Efficient Products – Rating and Labelling*. For more information, please see <https://www.waterrating.gov.au/about/standards>.

Rainfall Data

Rainfall data for NIWA weather stations can be found on the NIWA National Climate Database, CliFlo (www.cliflo.niwa.co.nz). Once subscribed, users can choose a suitable weather station that is representative of the climate conditions of site being assessed. The *Potable Water Calculator* includes 10-year average representative rainfall data for Auckland, Hamilton,

Wellington, Christchurch and Dunedin. The *Potable Water Calculator Guide* includes instructions regarding how to determine 10-year average rainfall data for other sites.

|| Onsite Testing

Where a project cannot provide WELS certifications to demonstrate compliance for the Potable Water credit, onsite testing results can be acceptable in place of WELS certifications. In this case, the onsite testing should follow the Appendix F Onsite Compliance Schedule in the Homestar v5 https://12253-console.memberconnex.com/Attachment?Action=Download&Attachment_id=44934. In order to achieve the point, the testing results still need to achieve the efficiency of the nominated fixture WELS rating as required in the Green Star Submission Guidelines || R1.1.18.01

DEFINITIONS

Blackwater: blackwater is water from kitchen sinks and toilets that is contaminated with human waste or food.

Greywater: greywater can be recovered from sinks and showers, washing machines, cooling towers and other water sources that do not contain food or human waste.

Rainwater; rainwater refers to the water that arrives on the site through rain events, falling on roofs within the site boundary.

Stormwater: stormwater refers to the water that arrives on the site through rain events, falling on hard surfaces other than roofs within the site boundary.

INNOVATION

Innovative Technology or Process - Heat rejection systems in equipment requiring process cooling (Prescriptive Pathway 18.B)

One Innovation point is available where water use from process cooling in medical, laboratory, or industrial equipment, is at least 10% of the building's total water consumption. In such a case, an innovation point can be achieved if:

- 95% of the water requirement for once-through cooling of equipment requiring process cooling is sourced from non-potable water; OR,
- All equipment requiring process cooling uses cooling systems other than once-through cooling systems.
- This innovation point is deemed 'Not Applicable' where the project does not contain equipment requiring process cooling.

Innovation Technology or Process – Passive Design

One Innovation point is available for projects that use passive water treatment systems (such as vegetation to treat water passively) to achieve at least one point in the *Potable Water Calculator*.

Improving Green Star Benchmarks – Discharge to sewer

One Innovation point is available for a 90% or greater reduction in flow to sewer as determined by the *Potable Water Calculator*.

REFERENCE DOCUMENTS

AS/NZS 6400-2016 Water Efficient Products – Rating and Labelling

AS1668.4 2012 The use of ventilation and air-conditioning in buildings – Natural ventilation of buildings

Potable Water Calculator Guide

DOCUMENTATION REQUIREMENTS

Please refer to the *‘How Documentation is Described in the Submission Guidelines’* section within the *Introduction* for further guidance on Documentation Requirements for project submissions.

Design Review submissions are optional.

Project teams must submit documentation supporting credit compliance. A list of recommended supporting evidence is provided in the following section, which can be used to demonstrate compliance. Alternate documentation to that listed below can also be used by project teams to demonstrate compliance.

The key requirement is that evidence is provided to support each claim made within the Submission Template.

SUBMISSION CONTENT

Project teams must submit the following documentation:

- **Submission Template**
- **Evidence** to support claims made in the Submission Template

Recommended Supporting Evidence

WELS certificates for all toilets, urinals, taps, showers, dishwashers, and residential-scale laundry equipment.

||Manufacturer’s data for commercial-scale laundry equipment, **supplier/manufacturer literature** or **packaging/photos of packaging** showing the WELS rating should be submitted in lieu of WELS certificates.|| R1.1.18.01

18A PERFORMANCE PATHWAY

Completed Green Star – Design & As Built Potable Water Calculator

Drawing(s) clearly showing the location of all heat rejection equipment installed on the project.

Drawings showing the landscape design and the irrigation system, listing the name, location, and plant species zone as it appears in the Calculator.

Manufacturer’s information showing that the application efficiency for the landscape irrigation system.

Manufacturer’s information including backwash volume and frequency of filter cleaning.

Drawing(s) of process cooling water usage loops.

Contract from off-site water supplier stating the volume to be supplied and date of commencement of delivery where off-site reclaimed water supply is included in the design.

18B PRESCRIPTIVE PATHWAY

Tank specification indicating size and location of the rainwater system and the connections to the water end uses.

Landscape/Hydraulics drawings showing either the drip irrigation system, or showing the location of the xeriscape garden.

18B.5 FIRE SYSTEM TEST WATER

Drawings demonstrating that:

- The fire system does not expel water for testing.
OR
- When sprinkler systems are installed, each floor must be fitted with isolation valves or shut-off points for floor-by-floor testing.

REVISIONS AND AMENDMENTS

Revision No.	Date of Release	Description
NZv1.0	11/04/2019	Initial release.
NZv1.1	04/2022	<p>R1.18.01 Total points for credit 18 reduced from 12 to 10. The two points previously set up for unrealistic reduction targets have been relocated to credit 19 Life Cycle Impacts.</p> <p>R1.18.02 1 point available for Heat Rejection under the prescriptive pathway.</p> <p>R1.18.03 Clarifications added for showers’ WELS rating.</p> <p>R1.18.04 Clarifications provided for specialist fixtures and excluded fixtures.</p> <p>R1.18.05 Additional guidance provided for showing compliance of water saving from heat rejection</p> <p>R1.18.06 Additional guidance provided for Fire Protection System Test Water</p>
NZv1.1.1	07/2023	R1.18.01 Allow on-site testing as a way to show compliance

R1.1.18.02 || Allowing supplier/manufacture literature or packaging/photos of packaging showing the WELS rating to be submitted in lieu of WELS certificates

MATERIALS

The *Green Star Design & As Built* 'Materials' category aims to address the consumption of resources within a building construction context, by encouraging the selection of lower-impact materials. The category also encourages absolute reductions in the amount of waste generated or the recycling of as much of the waste generated as possible.

The 'Materials' category rewards projects that achieve the following outcomes:

USE OF PRODUCTS AND MATERIALS WITH LOWER IMPACT

- Addressing life cycle impacts of construction materials and products.
- The selection of furniture, assemblies and flooring materials that are certified or reused.
- The use of products and materials that are subject to chain of custody agreements.

REDUCTION IN WASTE TO LANDFILL

- The minimisation of waste through efficient design and material selections.
- The consideration of waste minimisation across the entire project life cycle.
- The use of materials with high levels of recycled content, or the selection of reused products and materials.

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LIFE CYCLE IMPACTS

Credit 19

Points available: 11

AIM OF CREDIT

To reward:

- The assessment and reduction of upfront carbon emissions.
- Long-term storage of carbon in construction materials as a method of temporarily removing carbon dioxide from the atmosphere.
- The assessment and reduction of both carbon and other environmental impacts throughout the whole life of the building.

CREDIT CRITERIA

There is a **Conditional Requirement** for all Green Star projects to demonstrate reductions in upfront carbon emissions.

19.1	Conditional Requirement – 4 Star	A minimum reduction in upfront carbon emissions of 10% is required to achieve 4 Star Green Star rating.
	Conditional Requirement – 5 Star	A minimum reduction in upfront carbon emissions of 10% is required to achieve 5 Star Green Star rating.
	Conditional Requirement – 6 Star	A minimum reduction in upfront carbon emissions of 15% is required to achieve 6 Star Green Star rating.
19.1A	Upfront Carbon Reduction – Absolute Value Pathway *	Up to 6 points are available for reductions in upfront carbon relative to an absolute value.
19.1B	Upfront Carbon Reduction – Reference Building Pathway	Up to 6 points are available for reductions in upfront carbon relative to a reference building.
19.2	Comparative Life Cycle Assessment	Up to 3 points are available where whole-of-building, whole-of-life (cradle to grave) comparative Life Cycle Assessment (LCA) is conducted and relevant reductions in Life Cycle Impacts are achieved relative to an appropriate reference building.

19.3	Long-term Carbon Storage	Up to 2 points are available for where long-term carbon storage is incorporated into built project.
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||* Note: The current industry datasets are not enough to support determination of a unified absolute value. Ongoing updates to this pathway will be provided through Technical Clarifications as more data can be collected. Should any project want to pursue this pathway with a self-proposed absolute value, please submit a Technical Question to justify. || R1.1.19.01

COMPLIANCE REQUIREMENTS

There are a total of 11 points available in Credit 19 with 19.1 requiring a mandatory minimum achievement. There are two pathways for upfront carbon reduction assessment, which include the reduction of such emissions in comparison to a reference building or in comparison to an absolute value. ||The absolute value should be agreed by the NZGBC to represent industry average performance. || R1.1.19.01

19.1 Upfront Carbon Reduction Assessment

A total of six points is available upon the submission of a report demonstrating upfront carbon reduction. It is recognised that as upfront carbon reduction methods develop over time, elements of credit 19.1 will become easier to implement. The following timeline is proposed to allow for development of the requirements. All percentage improvements use 2022 as a baseline year.

Projects registered after 1 st of January 2022	Conditional Requirement – 4 Star	A minimum reduction in upfront carbon emissions of 10% is required to achieve 4 Star Green Star rating.
	Conditional Requirement – 5 Star	A minimum reduction in upfront carbon emissions of 10% is required to achieve 5 Star Green Star rating.
	Conditional Requirement – 6 Star	A minimum reduction in upfront carbon emissions of 15% is required to achieve 6 Star Green Star rating.
Projects registered after 1 st of January 2024	Conditional Requirement – 4 Star	A minimum reduction in upfront carbon emissions of 10% is required to achieve 4 Star Green Star rating.
	Conditional Requirement – 5 Star	A minimum reduction in upfront carbon emissions of 15% is required to achieve 5 Star Green Star rating.
	Conditional Requirement – 6 Star	A minimum reduction in upfront carbon emissions of 20% is required to achieve 6 Star Green Star rating.

Projects registered after 1 st of January 2026	Conditional Requirement – 4 Star	A minimum reduction in upfront carbon emissions of 15% is required to achieve 4 Star Green Star rating.
	Conditional Requirement – 5 Star	A minimum reduction in upfront carbon emissions of 20% is required to achieve 5 Star Green Star rating.
	Conditional Requirement – 6 Star	A minimum reduction in upfront carbon emissions of 25% is required to achieve 6 Star Green Star rating.

Points are awarded based on upfront carbon reduction performance as shown below. ||Whole-of-life embodied carbon must be calculated to achieve a rating, but it is not part of the points calculation. Calculation of whole-of-life embodied carbon is intended to support project teams to design buildings that have both low upfront carbon and low whole-of-life embodied carbon. These calculations will also be used by NZGBC to check if a trend emerges where buildings are being designed with lower upfront carbon but higher whole-of-life embodied carbon (implying a trade-off has occurred).|| R1.1.19.02

Table 19.1 Percentage Reduction table

Improvement	Points Awarded
10%	Mandatory
15%	1 Points total
20%	2 Points total
25%	3 Points total
30%	4 Points total
35%	5 Points total
40%	6 Points total

||To demonstrate compliance, project teams must model the proposed and reference buildings following the Green Star NZ Embodied Carbon Methodology

Projects must document a reduction in upfront carbon according to the materials and products in the scope. || R1.1.19.03

||For projects demonstrating a 40% reduction in upfront carbon emissions or more, or demonstrating any carbon reduction using a calculator (or software) other than the Green Star NZ Embodied Carbon Calculator, the calculations should comply with quality assurance requirements by meeting one of the following two options:

- Option A: The report is produced by an LCA Certified Practitioner, subject to organisational quality assurance, which has been certified in accordance with ISO9001.

Option B: The report is produced by an Experienced Individual and is peer reviewed by an LCA Certified Practitioner or independent Experienced Individual || R1.1.19.04

Refer to the *Definitions* section for competency requirements.

||To demonstrate compliance, projects can either:

- Calculate upfront carbon using the *Embodied Carbon Calculator*, or
- Calculate upfront carbon by modelling the proposed building following the methodology outlined in the Green Star NZ Embodied Carbon Methodology. || R1.1.19.03

Reductions in upfront carbon must occur through good design and material selection. The calculation must include modules A1 to A5 of EN 15978 and must not account for:

- Compensation-type carbon offsetting.
- Non-permanent carbon removals, e.g., biogenic carbon sequestered in products.
- Recycling credits (which are part of module D in EN 15804)

||The building components in scope of assessment are defined in the *Embodied Carbon Calculator Guide*. || R1.1.19.03

There are two pathways available for this credit, defined as below:

- Upfront carbon reductions relative to an absolute value (19.1A). The value should be based on baseline averages from New Zealand-specific data on the upfront carbon emissions of non-residential buildings.
- Upfront carbon reductions relative to a reference building (19.1B).

Offsetting Demolition Works

Irrespective of the pathway followed, where an existing building less than 30 years old has been fully or partially demolished for construction, an embodied carbon calculation must be completed for the demolished portion. Following this, both the upfront emissions (modules A1-A3) of the demolished materials, and the demolition process (modules C1-C4), must be offset through the purchase of verified carbon credits.

Where the existing building is between 30 and 50 years old, the contribution of embodied emissions shall be calculated and discounted at 5% for every additional years past year 30. Both the upfront emissions (modules A1-A3) of the demolished materials and the demolition process (modules C1-C4) must be offset through the purchase of verified carbon credits.

Beyond 50 years, there are no requirements.

Put another way, if a project reuses structural elements from a previous building which are over 50 years old, the use is considered to have a carbon footprint of zero. Only reprocessing and transporting of materials would need to be included within the upfront carbon calculations.

To demonstrate compliance, project teams can either:

- Model the existing building following the methodology of the 19.2 Comparative Life Cycle Assessment for modules A1 – A5.
- Complete the 'Existing Building' section of the *Embodied Carbon calculator*.

Projects which require demolition of an existing building as a result of it not being fit-for-purpose (e.g., due to earthquake damage, or a significant lack of NZ Building Code compliance) are able to be excluded from offsetting demolition works. This is to be disclosed clearly in application and agreed upon with the Green Star assessor.

19.1A Absolute Value Pathway

||NZGBC is in the process of collecting industry data to establish this absolute value pathway. A total of six points will be available via this pathway. Projects pursuing this pathway can achieve points by demonstrating appropriate reductions in upfront carbon emissions relative to the predetermined benchmark, as measured in kg CO₂e per square metre of gross floor area.

The benchmark will reflect average performance on the market, not the performance of any specific building. If the original building concept has an upfront carbon that is worse than average, the reduction required to achieve Green Star could be much more than 10%.||

R1.1.19.01

19.1B Reference Building Pathway

A total of six points are available via the 19.1B Reference Building Pathway, in which the project has demonstrated appropriate reductions in upfront carbon emissions relative to an accepted reference building. While this pathway can be used for any project, it is intended for projects where there is not yet an Absolute Value Pathway benchmark available or for projects whose design is outside of the average range (e.g., difficult ground conditions, special requirements for buildings such as hospitals, etc.)

To allow for all projects to be considered, there are two approaches which can be taken to 19.1B.

19.1B.A. Standard practice reference building - A hypothetical building that represents standard contemporary construction and operation practices.

19.1B.B. Actual reference building - A building constructed in the last five years that is similar to the usage, construction and operation of the project building. Where there is no actual reference building which has comparable scale characteristics, projects must adjust data from the actual reference building to reflect the scale of the project building.

||For more detail for the assessment of credit 19.1, please refer to the *Embodied Carbon Calculator Guide*. || R1.1.19.03

19.2 Comparative Life Cycle Assessment

All projects are encouraged to conduct a peer reviewed whole-of-life comparative LCA (modules A – D), in conformance with EN 15978 for those building elements described in the

Life Cycle Impacts Calculator Guide. This must be conducted by a competent LCA practitioner as defined in the *Life Cycle Impacts Calculator Guide*.

There are a total of three points which are available for the demonstration of reductions in life cycle impacts of the project building as shown below. Further details are provided in the *Life Cycle Impacts Calculator Guide*.

Table 19.2 Percentage Reduction table

Improvement	Points Awarded
10%	1 Point total
20%	2 Points total
30%	3 Points total

19.3 Long-term Carbon Storage

Two points are available for projects which incorporate the long-term storage of carbon previously removed from the atmosphere into the fabric of the building. This is to encourage the use of materials which have intrinsic carbon storage properties, for example, wood/biomass. Note, such storage of carbon is excluded as an upfront carbon emissions reduction method in 19.1 Upfront Carbon Reduction Assessment; however, is valid in credit 19.3.

The separation of carbon emissions from carbon removals is in line with the latest consultation documents produced by the New Zealand Government under its draft Building for Climate Change policy framework.

For the allocated points to be awarded, projects must demonstrate at least 50 kg CO₂e/m² of atmospheric carbon storage for a forecasted period of at least 50 years.

One (1) point will be awarded to those projects which demonstrate between 50 and 100 kg CO₂/m² of atmospheric carbon storage for a forecasted period of at least 50 years.

Two (2) points will be awarded to those projects which demonstrate at least 100 kg CO₂/m² of atmospheric carbon storage for a forecasted period of at least 50 years.

If these points are pursued, the long-term carbon storage is to be calculated and reported separately from 19.1's upfront carbon emissions calculations so as not to be included as a method of reduction. For long-term carbon storage arising from wood sources, the timber is required to have a Forest Stewardship Council (FSC), Programme for the Endorsement of Forest Certification (PEFC), or PEFC-endorsed chain of custody certification.

DEFINITIONS

Whole-of-life Embodied Carbon

Carbon emissions associated with materials and construction processes throughout the whole lifecycle of a building or infrastructure, excluding use stages (B6, B7). Embodied carbon includes modules A1-A5, B1-B5, and C1-C4. Benefits beyond the system boundary (D) should be reported separately to modules A-C.

Upfront Carbon

The emissions caused in the materials production and construction phases (modules A1-A5) of the lifecycle. In contrast to other categories of emissions listed here, these emissions have already been released into the atmosphere before the building is occupied or the infrastructure begins operation.

Use Stage Embodied Carbon

Emissions associated with materials and processes needed to maintain the building or infrastructure during use such as for refurbishments. It includes modules B1-B5. These are additional to operational carbon emitted due to heating, cooling and power.

Acidification Potential of Land and Water

Acidification potential quantifies acidifying pollutants and their wide variety of impacts on soil, groundwater, surface waters, biological organisms, ecosystems, materials and buildings. The major acidifying pollutants are sulphur dioxide (SO₂), nitrogen oxides (NO_x) and reactive nitrogen (NH_x).

Climate Change

Climate change is defined as the impact of human emissions on the radiative forcing of the atmosphere with its adverse impacts on ecosystem health, human health and material welfare. The major climate change gases are carbon dioxide (CO₂) and methane (CH₄).

CML

CML refers to the Institute of Environmental Sciences at the Universiteit Sciences, specifically the CML-IA database which contains characterisation factors for life cycle impact assessment. <http://cml.leiden.edu/software/data-cmlia.html#downloads>

Eutrophication Potential

Eutrophication potential quantifies compounds with high nutrient content that are released into water sources. Eutrophication is a natural process for a water body, but human activity such as material extraction, processing, manufacturing, construction and maintenance procedures can greatly speed up the process. This impact is measured in kilograms phosphate equivalents (kg PO₄³⁻ eq).

Human Toxicity

Human toxicity is an indication of the risk to human health based on material concentrations tolerable to humans.

Ionising Radiation

Ionising radiation refers to radiation resulting from nuclear reaction.

LCA Certified Practitioner

A person who is qualified as an “LCA Certified Practitioner” by LCA NZ, ALCAS, ACLCA, or another similar scheme.

Experienced Individual

An individual who has produced, co-produced and/or independently reviewed at least three LCA or carbon footprint studies of buildings or building products in accordance with EN15804/EN15978 and either ISO14040/14044 or ISO14067 within the past three years.

Independent Practitioner

An external Competent LCA Practitioner, independent of the LCA for the project. The LCA practitioner and peer reviewer cannot be the same individual or organisation.

IPCC AR5

Intergovernmental Panel on Climate Change: Fifth Assessment Report of the Intergovernmental Panel on Climate Change.

||IPCC AR6

Intergovernmental Panel on Climate Change: Sixth Assessment Report of the Intergovernmental Panel on Climate Change. || R1.1.19.05

Land Use

Land use refers to transformation of land through use in human activities.

Life Cycle Assessment (LCA)

An evaluation of the environmental effects of a product or activity holistically, by analysing the entire life cycle. The LCA consists of four complimentary components: goal and scope definition, inventory analysis, impact assessment and interpretation. Further definitions and guidance can be found in ISO 14040 and ISO 14044.

Mineral and Fossil Fuel Depletion

These metrics are related to extraction of scarce minerals and fossil fuels. This is generally based on remaining reserves and rate of extraction. The impacts are measured in kilograms Antimony equivalents (kg Sb eq) and megajoules (MJ) net Calorific Value. This impact category is also known as abiotic depletion.

Particulate Matter

Particulate matter is defined as a mixture of solid and liquid particles of organic and inorganic substances resulting from human activities and suspended in the atmosphere.

Photochemical Ozone Creation Potential

Photochemical ozone (smog) creation potential quantifies the formation of reactive chemical compounds such as ozone (O₃) by the action of sunlight on certain primary air pollutants.

Stratospheric Ozone Depletion

The thinning of the stratospheric ozone layer as a result of anthropogenic emissions.

Water Depletion

Water depletion refers to scarcity of water.

WMO 1999

World Meteorologic Organization Scientific Assessment of Ozone Depletion:1999.

Biobased Materials

Materials derived from predominantly living matter/biomass. In this instance, biobased materials generally refers to timber products.

||Biogenic Carbon

Biogenic carbon is carbon captured from the atmosphere by plants and stored in construction materials such as timber. || R1.1.19.06

Carbon Storage

Carbon storage refers to the storage of biogenic carbon in products for a period of time, resulting in the temporary reduction of CO₂ concentration in the atmosphere.

Module D

In alignment with EN 15978, module D refers to the benefits and loads beyond the building's life cycle.

INNOVATION

Exceeding Green Star Benchmarks – Long-term Carbon Storage

A total of 2 innovation points are available for projects which significantly exceed the benchmark for the long-term storage of carbon (which was previously removed from the atmosphere and then incorporated into the fabric of the building) in accordance with table below:

Innovation Points Available	Long-term carbon storage (kg CO ₂ e/m ²)
1	>200
2	>300

REFERENCED DOCUMENTS

The following documents are referenced in this credit:

- ISO 14040:2006, Environmental management — Life cycle assessment — Principles and framework.
- EN 15804+A1:2013, Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.
- EN 15804+A2:2019, Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.
- EN 15978:2011, Sustainability of construction works — Assessment of environmental performance of buildings — Calculation method.
- ISO 14044:2006, Environmental management — Life cycle assessment — Requirements and guidelines.
- New Zealand Building Code/Building Act 2004.

DOCUMENTATION REQUIREMENTS

Please refer to the *'How Documentation is Described in the Submission Guidelines'* section within the *Introduction* for further guidance on Documentation Requirements for project submissions.

Design Review submissions are optional.

Project teams must submit documentation supporting credit compliance. A list of recommended supporting evidence is provided in the following section, which can be used to demonstrate compliance. Alternate documentation to that listed below can also be used by project teams to demonstrate compliance.

The key requirement is that evidence is provided to support each claim made within the Submission Template.

SUBMISSION CONTENT

Project teams must submit the following documentation:

- Submission Template
- Evidence to support claims made in the Submission Template
- Embodied Carbon Emissions calculator
- Life Cycle Assessment report

Recommended Supporting Evidence

Bill of Quantities (BoQ) and/or cost plan with material quantities

Evidence of the use of low-carbon building materials E.g., an invoice showing the use of concrete with cement replacement in the foundation.

LCA Report - The LCA report is to be presented in accordance with ISO 14044. The LCA report must confirm the LCA methodology of the credit has been followed and that no impact increases by more than 10% when compared to the reference building score. The peer review statement, comments of the practitioner and any response to recommendations made by the reviewer shall be included in the LCA report. If points are claimed for the use of LCA in materials and/or construction impact reduction, or within design review, the processes and findings shall be clearly stated in the LCA Report.

Peer Review Statement - A peer review statement is a summary of the peer review findings signed by the peer reviewer, it must be clear that the peer reviewer statement refers to the final LCA report for the project, the same report which is submitted for this credit, by reference to specific document versions, dates or other means.

LCA practitioner competencies statement or LCACP certificate for practitioner and peer reviewer.

Peer Review Statement (if applicable) - A peer review statement is a summary of the peer review findings signed by the peer reviewer, it must be clear that the peer reviewer statement refers to the final LCA report for the project, the same report which is submitted for this credit, by reference to specific document versions, dates or other means. || R1.1.19.03

Standard Practice Reference Building Documentation - Signed declarations from the principal architect and engineer for the project, confirming that the reference building was constructed in accordance with the specific requirements and guidance of this credit. Also confirming the reference building design, technologies and construction are true representation of contemporary practice for the type and function of the project.

Actual Reference Building Documentation - Signed declarations from the principal architect and engineer for the project, confirming and demonstrating how the reference building meets the specific guidance above.

REVISIONS AND AMENDMENTS

Revision No.	Date of Release	Description
NZv1.0	11/04/2019	Initial release.
NZv1.1	04/2022	<p>This credit has been reframed with the following key changes:</p> <ul style="list-style-type: none"> • Total points increased from 7 to 11 • New criteria set up for upfront carbon emissions and long-term carbon storage • No prescriptive pathway • A conditional requirement added for upfront carbon emissions • Specific guidance and pathways provided to guide projects' calculations of upfront carbon emissions.
NZv1.1.1	07/2023	<p>R1.1.19.01 Clarifications added for the absolute value pathway</p> <p>R1.1.19.02 Addressing the purpose of calculating Whole-of-life embodied carbon</p> <p>R1.1.19.03 Guidance added for upfront carbon reduction assessment by referencing newly developed resources including the Green Star NZ Embodied Carbon Methodology, Embodied Carbon Emissions Calculator and Guide.</p> <p>R1.1.19.04 Updates to peer review requirements</p> <p>R1.1.19.05 Add the definition of IPCC AR6</p> <p>R1.1.19.06 Updates to the definition of Biogenic Carbon</p>

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RESPONSIBLE BUILDING MATERIALS

Credit 20

Points available: 3

AIM OF CREDIT

To reward projects that include building materials that are responsibly sourced or have a sustainable supply chain.

CREDIT CRITERIA

- | | |
|---|--|
| <p>20.1 Structural and Reinforcing Steel</p> | <p>1 point is available where 95% of the building's steel (by mass) is sourced from a Responsible Steel Maker; and</p> <p><u>For steel framed buildings,</u></p> <p>at least 60% of the fabricated structural steelwork is supplied by a responsible steel fabricator/steel contractor. For a steel fabricator to be considered a responsible source of steel, they must show that they are both</p> <p>a current member of the New Zealand Sustainable Steel Council and accredited to the SSC's Environmental Sustainability Charter.</p> <p>Hold a recognised Environmental Management System (EMS) either to ISO14001 standard or, as a minimum, Enviromark GOLD®</p> <p><u>For concrete framed buildings,</u></p> <p>at least 60% (by mass) of all reinforcing bar and mesh is produced using energy-reducing processed in its manufacture (measured by average mass by steel maker annually); OR</p> <p>60% (by mass) of all reinforcing bar and mesh supplied to the project holds Environmental Choice EC-41-15 certification.</p> <p>Where the cost of structural and reinforcing steels is less than 1% of the Project Contract Value, or there are no new structural or reinforcing steels used in the project, this criterion is made 'Not Applicable'.</p> |
| <p>20.2 Timber</p> | <p>1 point is available where at least 95% (by cost) of all timber used in the building and construction works is either:</p> <p>Certified by a recognised forest certification scheme;</p> |

Is from a reused source.

Where the cost of timber is less than 0.1% of the Project Contract Value, this criterion is made 'Not Applicable'.

20.3 Permanent Formwork, Pipes, Flooring, Blinds and Cables

1 point is available where 90% (by cost) of all permanent formwork, pipes, flooring, blinds and cables in a project either:

Do not contain PVC and have a recognised product declaration;
OR

Meet the GBCA's Best Practice Guidelines for PVC.

Where the cost of PVC products in the project is less than 1% of the Project Contract Value this criterion is made 'Not Applicable'.

COMPLIANCE REQUIREMENTS

20.1 Structural and Reinforcing Steel

One (1) point is awarded where project teams can demonstrate that 95% (by mass) of the building's steel is sourced from a Responsible Steel Maker, and:

A. For steel framed buildings: Responsible Steel Fabricator (20.1A)

At least 60% of the fabricated structural steelwork is supplied by a responsible steel fabricator/steel contractor. For a steel fabricator to be considered a responsible source of steel, they must show that they are both

- a current member of the New Zealand Sustainable Steel Council and accredited to the SSC's Environmental Sustainability Charter.
- Hold a recognised Environmental Management System (EMS) either to ISO14001 standard or, as a minimum, Enviromark GOLD®.

OR

B. For concrete framed buildings (20.1B)

At least 60% (by mass) of all reinforcing bar and mesh is produced using energy-reducing processed in its manufacture (measured by average mass by steel maker annually).

OR

60% (by mass) of all reinforcing bar and mesh supplied to the project holds Environmental Choice EC-41-15 certification.

Where the cost of structural and reinforcing steels is less than 1% of the Project Contract Value, or there are no new structural or reinforcing steels used in the project, this criterion is made 'Not Applicable'.

Responsible Steel Maker

For a steel manufacturer or a steel maker to be considered a responsible source of steel, they must show that they comply with both of the following initiatives:

The steel making facilities where the structural and/or reinforcing steel for the project is sourced have a currently valid and certified ISO 14001 Environmental Management System (EMS) in place. Valid ISO 14001 Environmental Management System (EMS) certificates must be provided from the steel making facilities where the structural and/or reinforcing steels in the project were produced.

20.1A Responsible Steel Fabricator

For a steel fabricator to be considered a responsible source of steel, they must show that they are both:

- A current member of the New Zealand Sustainable Steel Council and accredited to the SSC's Environmental Sustainability Charter.
- Hold a recognised Environmental Management System (EMS) either to ISO14001 standard or, as a minimum, EnviromarkGOLD®.

20.1B Energy-Reducing Processes in Steel Reinforcement Production

Steel manufacturers who hold Environmental Choice EC-41-15 certification for 60% of the products supplied to the project, are deemed compliant with this criterion.

Alternatively, compliance must be demonstrated as outlined below.

Energy reduction arising from energy-reducing processes must equate to at least 40 MJ/tonne, measured as a percentage of annual mass of reinforcing steel produced by the steel maker.

To determine compliance with this benchmark, a lifecycle assessment must be made in accordance with the *Protocol for Demonstrating Equivalency in Energy Reduction* provided in the Guidance section.

20.2 Timber

One (1) point is awarded where project teams can demonstrate that, at least 95% (by cost) of all timber used in the building and construction works is either:

A. Certified by a forest certification scheme, in accordance with 20.2A;

OR

B. From a reused source, in accordance with 20.2B.

A combination of both initiatives may be used to achieve 95% compliance. This must be clearly demonstrated within the timber schedule in the Submission Template.

This requirement applies to all timber applications within the building and construction works. No distinction is made between temperate, tropical, hardwood and softwood timbers and engineered wood products.

Typical timber uses include, but are not limited to:

- Formwork and other temporary installations of timber (e.g. hoardings);
- Structural and non-structural timber, including internal walls, floors and roof structures;
- External and internal cladding;
- Flooring, wall, and ceiling finishes;
- Internal and external joinery, windows, doors, and other specialist uses of timber, such as installed furnishings or balustrades; and
- Furniture items made from timber or including timber components.

Where the cost of timber in the project is less than 0.1% of the Project Contract Value, this criterion is made 'Not Applicable'.

||If the 'Responsible Building Materials - Timber' credit criterion is made 'Not Applicable', the project is not eligible to claim the innovation point for timber furniture.|| R1.20.01

20.2A Certified Timber

Timber must be sourced from forests that have been certified by recognised forest certification schemes.

Timber and timber products sourced from certified forests must be accompanied by a relevant Chain of Custody (CoC) in order to be recognised as certified timber. Currently, FSC International and PEFC-accredited forest certification schemes are recognised as compliant within this criterion.

||NZGBC recognises 'FSC Mix' certification. The full cost (100%) of the 'FSC Mix' certified product may be used to demonstrate compliance.|| R1.20.02

20.2B Reused Timber

Timber that is reused includes timber that is pre-existing in a building and timber that is procured from a second-hand source (refer to the Definitions section for further details).

20.3 Permanent Formwork, Pipes, Flooring, Blinds and Cables

One (1) point is awarded where project teams can demonstrate that, 90% (by cost) of all permanent formwork, pipes, flooring, blinds and cables (including any mechanical ductwork that contain PVC pipes or cables) in a project either:

- Do not contain PVC and have a recognised product declaration, in accordance with 20.3A; OR
- Meet the GBCA's *Best Practice Guidelines for PVC*, in accordance with 20.3B.

Reused PVC products may be excluded from this credit. ||Carpet underlay should be included as flooring for the purpose of the credit criteria. Mechanical ductwork that contain PVC pipes or cables must be accounted for when project teams demonstrate compliance under the credit criteria.|| R1.20.03

Where the cost of PVC products in the project is less than 1% of the Project Contract Value this criterion is made 'Not Applicable'.

In order to determine the project's total cost of PVC products, the cost of the entire product (excluding installation costs) shall be used in calculations; the percentage of PVC in the product is irrelevant. The costs of non PVC items must also be calculated in the same way.

||An AA1000 Licensed Assurance Provider can provide Auditor Verification for Green Star PVC certification. The AA1000 Account-Ability Standards, an international methodology for sustainability-related assurance engagements, is considered an 'equivalent national or international auditor accreditation system' as endorsed by the Vinyl Council. A Licenced-Assurance Provider under this standard is qualified to sign off on PVC best practice audit/assurance documentation.

For the auditing requirements of the [Best Practice Guidelines for PVC](#), an appropriate method of compliance can be a simple statement that a limited assurance review according to ASAE 3100 Compliance Engagements has been completed.|| R1.20.04

20.3A Products That Do Not Contain PVC

For this option, project teams shall demonstrate that PVC products used in the project do not contain PVC by providing either a:

- Safety data sheet (SDS) or equivalent, that describes the composition of the products; or
- Environmental Product Declaration (EPD) for the product. Compliance may be demonstrated with an industry-wide EPD.

20.3B Best Practice Guidelines for PVC

For this option, project teams shall demonstrate that PVC products used in the project meet the GBCA's *Best Practice Guidelines for PVC*. Compliance of a PVC product to the Guidelines shall be demonstrated using any of the following options:

- A valid audit verification certificate for each of the PVC products specified or used in the project. The certificate must clearly state the product name, compliance against the GBCA's *Best Practice Guidelines for PVC*, date of validity, auditor's name, and signature. The auditor must be JAS-ANZ accredited.
- A product accreditation certificate from a Green Building Council of Australia accredited scheme. The scheme must clearly reference the guidelines in their standard.

Note: An *Auditor Verification Guidance* document is available on the GBCA website, this document provides the means by which the auditor must establish compliance.

DEFINITIONS

Project Contract Value

The Project Contract Value is defined as the dollar value required to complete the works for

the entire project, including site works (landscaping, external paving, etc.) if applicable. The following must be excluded when determining Project Contract Value:

- Demolition works;
- Consultants, design fees, project management fees;
- Works outside the site area; and
- Buildings or areas within the site that are not being assessed for purposes of Green Star.

Where a number of amenities or services are shared between stages in a larger development, the NZGBC expects that the cost apportioned to the rated stage is equivalent to the use that the stage will have of those facilities.

Reused PVC

PVC products pre-existing in a building or fitout, or PVC products procured from a second hand source. Reused PVC product sources may include, but are not limited to second hand retailers, removalists, auction houses, and demolition works from previous sites.

Virgin Timber

Refers to timber and wood-derived products that are not recycled. Sawmill co-products are deemed to fall within the category of virgin timber.

GUIDANCE

Cost

When calculating the cost of PVC and Timber items it is acceptable to either include or exclude labour costs associated with the installation of the product, provided that the same approach is used consistently across all calculations. That is, either labour costs are always included or always excluded. Where it is necessary to remove or add labour costs to individual PVC or Timber items in order to achieve a consistent approach, it is acceptable for a member of the project team to estimate the proportion of the total cost that labour might represent and adjust the costs accordingly.

Sustainable Steel Council's (SSC) Environmental Sustainability Charter (ESC)

For information on the Sustainable Steel Council's Environmental Sustainability Charter, visit:

[SSC Certification | Sustainable Steel Council](#)

World Steel Association (WSA) Climate Action Programme (CAP)

The World Steel Climate Action recognition programme is a scheme which recognises that a steel producer has fulfilled its commitment to take part in the world steel CO₂ data collection program.

The data collection program is at the core of the steel industry's global steel sectoral approach to climate change. Based on a common methodology, definitions and agreed boundaries, the data collection programme enables individual steel plants to compare

themselves against both average and best performance and identify its scope for improvement.

Polymer Injection Technology (PIT)

Polymer injection involves the use of polymers (e.g. rubber from used car tyres) as a partial substitute for coke and as an alternate carbon injectant to produce foaming slag in Electric Arc Furnace (EAF) steel making.

This technology holds environmental benefits in the form of:

- Reduced energy consumption;
- Lower greenhouse gas emissions;
- Reduced quantities of injectants; and
- Reduced emission levels for NO_x, CO and SO₂.

Reinforcing Steel Products

Reinforcing steel includes reinforcing bar and mesh used in concrete reinforcement in the building structure. This includes steel in-situ, stressed and pre-cast concrete applications. Post-tensioning tendons are not considered reinforcing steel. The high strength-to-weight ratio of this still application results in less material being used, achieving the aim of this credit.

Protocol for Demonstrating Equivalency in Energy Reduction (Equivalency Protocol)

The Equivalency Protocol is based on the same LCA methodology used in the Polymer Injection Technology (PIT) study by PE-Australasia and the University of New South Wales (PE and UNSW 2010) used to inform this credit. The energy reduction equivalency benchmark relates to the energy reduction outcomes from using PIT in an Electric Arc Furnace (EAF) steel manufacturing plant compared with standard Coke Injection Technology (CIT).

The methodology can be summarised as follows:

1. Lifecycle Assessment generated in accordance with internationally applicable LCA techniques specified in ISO 14040:2006 (Environmental management - Life cycle assessment - Principles and framework) and ISO 14044:2006 (Environmental management - Life cycle assessment - Requirements and guidelines);
2. The function considered is the production of steel billet. Other functions relating to the generation of co-products from steel production to be allocated on the basis of procedures recommended in ISO 14044:2006;
3. The functional unit is 1 tonne of steel billet;
4. The standard measure for Energy in MJ;
5. Boundary conditions are 'cradle to gate', meaning all production stages from raw materials mined (cradle) to finished steel billet ready to be converted to products (gate);

6. Carbon Footprint calculated and reported in terms of scope 1, 2 and 3 emissions, as defined according to World Business Council for Sustainable Development / World Resources Institute Greenhouse Gas Protocol, Corporate Accounting and Reporting Standard (WBSCD/ WRI, 2004); and
7. A single independent peer review conducted on the LCA according to ISO 14044:2006.

Where the reinforcing steel products are not made using EAF technology, it shall be shown that the alternative production method is at least environmentally equivalent to EAF steel, including the requirement for reduction of energy in production.

Bamboo and Cork

There are no clear forest management standards that specifically apply to the sources of bamboo and cork projects which can be certified. These products are therefore excluded from the scope of this criterion and do not need to be documented.

Calculating Percentage Compliance

In order to demonstrate compliance, the total cost of timber products used in the project is required to be determined. This shall then be compared with the total cost of compliant timber products.

The percentage comparison shall be determined based on the following:

$$\frac{\textit{Total cost of compliant timber products}}{\textit{Total cost of timber products}}$$

These calculations should be clearly outlined using the timber schedule included in the Submission Template.

Recognised Forest Certification Schemes

Recognised Forest Certification Schemes are those that meet the GBCA's 'Essential Criteria', available from the following link: <https://www.gbca.org.au/green-star/revise-d-timber-credit/>

Formwork

New formwork must be made from certified timber to comply with this criterion.

Formwork, not made from certified timber, that is purchased as new for a project and is reused within the same project may not be claimed as reused and does not comply with the credit criteria irrespective of the number of times it is reused on the same project.

Formwork, not made from certified timber and that has been previously used in another project, and is used again in a new project can be claimed as reused.

Recycled Timber

If a timber product is produced from 100% post-consumer recycled timber without the incorporation of any virgin timber content, then this shall be included as 'reused timber'.

Third-party verification, in the form of a signed statement, is required to confirm the 100% recycled content, in order for the product to be recognised as ‘reused timber’. The third-party verification statement must be provided by an auditor registered by Exemplar Global (formerly RABQSA), or other equivalent national or international auditor accreditation system.

Timber Costs

Where the actual cost of the item is known then this cost must be reported. Where the actual cost of reused items is not known then the cost may be estimated on the basis of replacement cost (i.e. the cost of an equivalent new item).

Timber Schedule

For Green Star submissions, the percentage (by cost) and certification status of all timber products addressed by this credit and installed in the fitout shall be demonstrated using the Timber schedule included in the Submission Template.

Best Practice Guidelines for PVC in the Built Environment

The *Best Practice Guidelines for PVC in the Built Environment* have been developed by the PVC Expert Reference Panel and the GBCA. The Guidelines cover environmental impacts and health risks associated with the manufacture and end of life management of the common uses of PVC products used in buildings.

The *Literature Review and Best Practice Guidelines for the Life Cycle of PVC Building Products* is available from the following link: <http://new.gbca.org.au/pvc/>

BEP PVC Product Registry

The Vinyl Council of Australia has developed a registry of products compliant with GBCA’s *Best Practice Guidelines for PVC*. This registry is designed to help Green Star projects identify compliant PVC products with confidence since the Vinyl Council checks the audit certificates product suppliers are using. Although it is not a register of all products claiming compliance, it may be used as a reference for already audited products.

The register is available from the following link: <http://www.vinyl.org.au/bep-pvc-product-registry>

Calculating Percentage Compliance

In order to demonstrate compliance, the total cost of PVC products (permanent formwork, pipes, flooring, blinds and cables) used in the project is required to be determined. This shall then be compared with the total cost of compliant PVC products.

The individual PVC products’ costs shall be the entire cost of the product (excluding installation costs), irrelevant of the percentage of PVC in the product.

The percentage comparison shall be determined based on the following:

$$\frac{\text{Total cost of compliant PVC products}}{\text{Total cost of PVC products}}$$

These calculations should be clearly outlined using the PVC schedule included in the Submission Template.

Recycled PVC Content

Products containing recycled PVC content must be documented and comply with the *Best Practice Guidelines for PVC* because PVC products with high recycled content generally require some virgin PVC in their production. Claims of recycled content in such products by suppliers or manufacturers must be independently verified. This requirement is incorporated in the *Best Practice Guidelines for PVC*.

REFERENCED DOCUMENTS

The following documents are referenced in this credit:

- GBCA 'Auditor Verification Guidance': <http://new.gbca.org.au/pvc/>
- GBCA 'Literature Review and Best Practice Guidelines for the Life Cycle of PVC Building Products': <http://new.gbca.org.au/pvc/>
- Sustainable Steel Council (SSC) (NZ) [Home | Sustainable Steel Council](#)

DOCUMENTATION REQUIREMENTS

Please refer to the '*How Documentation is Described in the Submission Guidelines*' section within the *Introduction* for further guidance on Documentation Requirements for project submissions.

Design Review submissions are optional.

Project teams must submit documentation supporting credit compliance. A list of recommended supporting evidence is provided in the following section, which can be used to demonstrate compliance. Alternate documentation to that listed below can also be used by project teams to demonstrate compliance.

The key requirement is that evidence is provided to support each claim made within the Submission Template.

SUBMISSION CONTENT

Project teams must submit the following documentation:

- **Submission Template**
- **Evidence** to support claims made in the Submission Template

Recommended Supporting Evidence

20.1 STRUCTURAL AND REINFORCING STEEL

Bill of Quantities / Report from Quantity Surveyor / Cost Planner / Project Manager or other qualified professional

Structural drawings

Structural Specifications

Steel Producer's ISO14001 certificate

Details of Steel Fabricators membership of Sustainable Steel Council membership

Energy-Reducing Processes Report from every reinforcing steel maker, explaining the energy-reducing processes used in their steel making process and confirming that it is used in the production of at least 60% of the reinforcement products they produce on an annual basis. (See Polymer Injection Technology and Equivalency Protocol explanations in Guidance). The report must contain a summary of the life cycle assessment result for this technology in accordance with the Equivalency Protocol; OR copy of Environmental Choice NZ accreditation for the products supplied to the project.

Confirmation from the Supplier stating, where relevant based on the credit criteria claimed:

- That they are a responsible steel maker, and listing their compliance documentation.
- The total quantities (by mass) of structural and/or reinforcing steel supplied to the building.

20.2 TIMBER

Bill of Quantities / Report from Quantity Surveyor / Cost Planner / Project Manager or other qualified professional

Invoices confirming types of timber product and quoting chain of custody code.

20.3 PERMANENT FORMWORK, PIPES, FLOORING, BLINDS AND CABLES

Bill of Quantities / Report from Quantity Surveyor / Cost Planner / Project Manager or other qualified professional

Best Practice Guidelines Certificate for PVC product.

Invoices confirming types of PVC products used

Product data sheets and **SDSs** or **EPDs**.

REVISIONS AND AMENDMENTS

Revision No.	Date of Release	Description
NZv1.0	11/04/2019	Initial release.
NZv1.1	04/2022	<p>R1.20.01 II If the 'Responsible Building Materials - Timber' credit criterion is made 'Not Applicable', the project is not eligible to claim the innovation point for timber furniture.</p> <p>R1.20.02 II Recognition of 'FSC Mix' certification</p> <p>R1.20.03 II Clarifying the PVC criterion should apply to carpet underlay and mechanical ductwork.</p> <p>R1.20.04 II Clarifications added for auditing requirements of best practice PVC</p>
NZv1.1.1	07/2023	Steel manufacturers are no longer required to be a member of the World Steel Association's (WSA) Climate Action Programme (CAP). Steel making facilities are only required to have a currently valid and certified IS 14001 Environmental Management System in place.

SUSTAINABLE PRODUCTS

Credit 21

Points available: 3

AIM OF CREDIT

To encourage sustainability and transparency in product specification.

CREDIT CRITERIA

21	Product Transparency and Sustainability	<p>Up to 3 points are available when a proportion of all materials used in the project meet transparency and sustainability requirements under one of the following initiatives:</p> <ul style="list-style-type: none"> A. Reused Products; B. Recycled Content Products; C. Environmental Product Declarations; D. Third-Party Certification; or E. Stewardship Programs. <p>Points are calculated based on specified benchmarks for the percentage of compliant products used in the project.</p>
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COMPLIANCE REQUIREMENTS

Up to three (3) points are available when project teams can demonstrate that a specified percentage of eligible products meet one of the following initiatives:

- A. Reused Products, in accordance with 21A;
- B. Recycled Content Products, in accordance with 21B;
- C. Environmental Product Declarations, in accordance with 21C;
- D. Third-Party Certification, in accordance with 21D; or
- E. Stewardship Programs, in accordance with 21E.

Points are awarded based on the percentage value of the products that meet one of the specified initiatives. This is demonstrated by calculating the Project Sustainability Value (PSV) and comparing it with the Project Contract Value (PCV).

Points are calculated by completion of the *Green Star – Design & As Built: Sustainable Products Calculator*. Points are awarded as follows:

Table 21.1: Example of percentage compliant product points allocation

Points Achieved	% Compliant Products
1	3%

2	6%
3	9%

Product Sustainability Value (PSV)

To calculate the sustainability value that an individual product can contribute towards points in this credit, the dollar cost of the product must be multiplied by a Sustainability Factor (SF) that reflects the weighted benefit of the initiative, in accordance with Table 21.2.

$$\text{Product Sustainability Value} = \text{Product cost (\$)}^* \times \text{SF}$$

The projects' overall Project Sustainability Value (PSV) is then calculated as the combined value for all compliant products on the project.

$$\text{Project Sustainability Value} = \Sigma \text{ All Products Sustainability Value}$$

Table 21.2: Sustainability Factors

Path	Transparency and Sustainability Initiative	Sustainability Factor (SF)
21A	Reused Product	1.0
21B	Recycled Content Product	0 - 1.0*
21C	Environmental Product Declarations – product-specific	0.75
	Environmental Product Declarations – industry-wide	0.5
21D	Product has Level A Third Party Certification	1.0
	Product has Level B Third Party Certification	0.75
	Product has Level C Third Party Certification	0.5
21E	Stewardship Program	0.5

* The Sustainability Factor is the mass fraction of Recycled Content.

Sustainability Factors are not cumulative. Products which have two or more applicable sustainability initiatives are to use the highest Sustainability Factor (SF) available to them only. Individual Sustainability Factors cannot be added together.

Project Contract Value (PCV)

The Project Contract Value is the dollar value that will be required to complete the works for the entire project, including site works (landscaping, external paving, etc.), but excluding all non-material costs. Project Contract Value is intended to be an approximation of the cost of materials used in the project.

Project Contract Value (PCV) is equal to the Total Project Contract Value, minus the cost of the following elements:

- Demolition works;
- Consultants, design fees, project management fees;
- Works outside the project site area; and
- Buildings or areas within the site that are not being assessed for purposes of Green Star.

Accordingly, PCV is an indicative, approximate cost of the following:

- | | |
|-----------------------|---|
| • Loose furniture | • Cladding |
| • Fixed furniture | • Masonry |
| • Internal Partitions | • Glazing |
| • Assemblies | • Ceilings |
| • Joinery | • Timber |
| • Flooring | • Steel |
| • Wall coverings | • Concrete |
| • Ceilings | • All other products or materials used in a project which could potentially have a 'Transparency or Sustainability Initiative', whether or not these are currently available. |

||The credit of Sustainable Products takes account of all the products and materials including buildings' mechanical, hydraulic, transportation and electrical systems. Responsible and sustainable systems that meet transparency and sustainability requirements in the credit can contribute to achieved points. || R1.21.01

Product Cost

Costs entered into the *Sustainable Products Calculator* can either include or exclude labour and transport associated with that product. However this must be consistent for all costs entered. As such, all individual product costs, and the project's PCV, will either include or exclude labour and transport costs.

Where project teams are provided with some costs that include labour and transport, and some that exclude it, it is acceptable to choose one approach (i.e. include or exclude these costs) and then adjust the non-conforming figures accordingly.

As an example, the product costs available to a project team for loose furniture and flooring excludes labour and transport, but all other product costs include it. In this case, the project team could make educated estimates for the labour and transport costs associated with the installation of loose furniture and floor coverings and add these costs to the original values

provided. If this kind of adjustment is performed, please describe the methodology and justification for these calculations in the credit's Submission Template.

21A Reused Products

Reused products are items that have been previously used and are incorporated in the project without significant changes to the structure or function of the item. ||The cost of reused products/materials shall be entered as the replacement cost for a new product/material with the same characteristics. ||^{R1.21.02}

Cleaning, making good, repairs, recovering and resurfacing are allowed.

21B Recycled Content Products

Recycled content items are items produced with recovered materials. The Sustainability Factor of a recycled content product represents the fraction of pre- and post-consumer recovered content included in the product by mass. For example, if a product has 75% recycled content, the Sustainability Factor is 0.75.

21C Environmental Product Declarations (EPDs)

There are several independent EPD schemes operating globally, providing services associated with the release and publishing of EPDs on behalf of scheme participants. EPD schemes can differ in format and scope, including in the life cycle stages considered and whether the EPDs are independently verified.

Only EPDs published by schemes that consider a minimum cradle-to-gate scope and include independent verification are recognised in this credit. Published EPDs shall confirm compliance to listed standards and include the scope considered, and by whom the EPD was verified.

For compliance with this credit, two EPD formats are recognised as follows:

Products with a product-specific, third-party verified EPD

For this format the following minimum requirements apply:

- The EPD is issued in conformance with ISO 14025 or EN15804;
- The EPD must be independently-audited; and
- The EPD must be based on a cradle-to-gate scope as a minimum.

Products with an industry-wide, third-party verified EPD

For this format the following minimum requirements apply:

- The EPD is issued in conformance with ISO 14025 or EN15804;
- The EPD must be independently-audited;
- The EPD must be based on a cradle-to-gate scope as a minimum; and
- The product manufacturer must be recognised as a participant in the EPD.

||Project teams can claim EPDs for the cement that goes into the concrete for the credit of Sustainable Products, if the concrete cannot be recognised. The cost of cement should be entered into the material calculator rather than the cost of concrete. Counting EPDs for both the cement and concrete in the assessment is considered double dipping and hence not acceptable for a submission.|| R1.21.03

21D Third Party Certification

Several certification schemes have been assessed against the GBCA *Framework for Product Certification Scheme* and meet the requirements for the Third Party Certification requirement in this credit. These schemes are listed on the GBCA website. Other certification schemes can apply for assessment.

For more information, refer to the Product Certification information page on the GBCA's website: <http://new.gbca.org.au/product-certification-schemes/>

21E Stewardship Programs

Product stewardship programs encourage projects and suppliers to share responsibility for the effective reduction, reuse, recycling or recovery of products. Product stewardship also helps manage environmental harm arising from the product when it becomes waste.

Products stewardship programs must be demonstrated with a product stewardship contract. The two types of Product Stewardship Contracts, for a leased item and a purchased item, are defined below.

Product Stewardship Contract – Leased Item

For this arrangement the following minimum requirements apply:

- The contract must be between a supplier and the building owner or tenant;
- The supplier must agree to collect the item *at the lease end* for re-lease, re-use or recycling; and
- The contract may not include exemptions which relate to timing, quality or quantity that will be accepted for collection.

Product Stewardship Contract – Purchased Item

For this arrangement the following minimum requirements apply:

- The contract must be between a supplier and the building owner or tenant;
- The supplier must agree to collect item *at the end of use* for re-lease, re-use or recycling; and
- The contract may not include exemptions which relate to timing, quality or quantity that will be accepted for collection.

GUIDANCE

Interaction with other Green Star Credits

Products or materials which are being used to claim points in the 'Life Cycle Impacts' (19) or 'Responsible Building Materials' (20) credits may be used to target points in this credit. This is only possible where these products or materials have a Transparency or Sustainability Initiative, as listed in Table 21.2, in addition to meeting the requirements of these other credits. Where this is the case, the additional Transparency or Sustainability Initiative will be rewarded by this credit.

As an example, timber products have been used to claim points in the 'Responsible Building Materials' credit (20.2) as they comply with forest certification scheme requirements. In this case these timber products could be used to claim points in the 'Sustainable Products' credit if they also have an additional Transparency or Sustainability Initiative, such as a Third-Party Certification. Compliance with the forest certification scheme cannot be used to target points within this credit as this is already being rewarded by the 'Responsible Building Materials' credit.

Credit Scope

In Legacy Green Star rating tools, the scope of credits such as this one were limited to specific materials or products which were installed into a finished building, such as furniture, partitions, ceilings etc.

In New Generation Green Star rating tools, such as this one, the scope of this credit has been deliberately widened to include all products and materials used in the construction and fitout of a building, including concrete, steel and glazing etc.

This is due to the increasing availability of all types of building materials which have eligible Sustainability and Transparency Initiatives. Additionally, by increasing the scope of this credit this rating tool is working to increase the demand for such initiatives in the market.

Components of façade

Where some, but not all, major components of a façade (e.g. glass, aluminium extrusions or insulation product) are compliant with credit 21 Sustainable Products, project teams may include only those compliant parts in the calculation of the PSV. The product cost included in the calculation must be for only the compliant components, not the whole of the façade, and evidence of how this has been determined should be included in the submission. || R1.1.21.01

REFERENCED DOCUMENTS

The following documents are referenced in this credit:

- EN 15804 Sustainability of Construction Work - Environmental Product Declarations - Core Rules for the Category of Construction Products.
- ISO 14025 Environmental labels and declarations - Type III environmental declarations -

- Principles and procedures
- ISO 14040 Environmental management - Life cycle assessment - Principles and framework
- ISO 14044 Environmental management - Life cycle assessment - Requirements and guidelines
- ISO 14001 Environmental Management Systems
- Green Star – Design & As Built: Sustainable Products Calculator

INNOVATION

Exceeding Green Star Benchmarks – Product Transparency and Sustainability

One (1) Innovation point is awarded where the percentage of compliant products is increased by 3% to 12%. A further 3% improvement is rewarded with a second point.

DOCUMENTATION REQUIREMENTS

Please refer to the *'How Documentation is Described in the Submission Guidelines'* section within the *Introduction* for further guidance on Documentation Requirements for project submissions.

Design Review submissions are optional.

Project teams must submit documentation supporting credit compliance. A list of recommended supporting evidence is provided in the following section, which can be used to demonstrate compliance. Alternate documentation to that listed below can also be used by project teams to demonstrate compliance.

The key requirement is that evidence is provided to support each claim made within the Submission Template.

SUBMISSION CONTENT

Project teams must submit the following documentation:

- **Submission Template**
- **Evidence** to support claims made in the Submission Template
- ***Sustainable Products Calculator***

Recommended Supporting Evidence

Confirmation of Project Cost from quantity surveyor or other qualified professional

Confirmation from supplier that products supplied are recycled, recycled content and cost

Product Certification Certificate outlining the environmental credentials of the product

Quantity Surveyors Report or other evidence of cost of certified products

Environmental Product Declarations certificates

Evidence of product cost

Product Stewardship contracts

REVISIONS AND AMENDMENTS

Revision No.	Date of Release	Description
NZv1.0	11/04/2019	Initial release.
NZv1.1	04/2022	<p>R1.21.01 II Responsible and sustainable systems can be included in the assessment of this credit.</p> <p>R1.21.02 II The cost of reused products/materials shall be entered as the replacement cost for a new product/material with the same characteristics</p> <p>R1.21.03 II Clarifications provided for cement and concrete products with EPDs</p>
NZv1.1.1	07/2023	R1.1.21.01 II Guidance added for showing compliance of façade major components

CONSTRUCTION AND DEMOLITION WASTE

Credit 22

Points available: 1

AIM OF CREDIT

To reward projects that reduce construction waste going to landfill by reusing or recycling building materials.

CREDIT CRITERIA

This credit includes a **minimum requirement** that must first be met to qualify for points, and two alternative pathways to demonstrate reductions in waste going to landfill.

22.1 Reporting Accuracy	The minimum requirement is met where the waste contractors and waste processing facilities servicing the project demonstrate compliance with the <i>New Zealand Green Star Construction and Demolition Waste Reporting Criteria</i> .
22.2A Fixed Benchmark	1 point is available where the construction waste going to landfill is reduced by: Minimizing the total amount of waste sent to landfill when compared against a typical building.
22.2B Percentage Benchmark	1 point is available where the construction waste going to landfill is reduced by: Diverting a significant proportion of waste from going to landfill.

COMPLIANCE REQUIREMENTS

Up to one (1) point is awarded based on the reduction of waste going to landfill. There are two options for demonstrating compliance with this credit:

- A. Minimising the total amount of waste sent to landfill when compared against a fixed benchmark, in accordance with 22.2A; or
- B. Minimising the total amount of waste sent to landfill as a proportion of total waste generated, in accordance with 22.2B.

22.1 Reporting Accuracy

All waste contractors and waste processing facilities that provide waste management and reporting services to Green Star projects must either:

- Hold a 'Compliance Verification Summary' issued by a 'Suitably Qualified Auditor', confirming compliance with the *Green Star Construction and Demolition Waste Reporting Criteria*; or
- Where a 'Compliance Verification Summary' has not been obtained, complete a 'Disclosure Statement' outlining how much of the *Green Star Construction and Demolition Waste Reporting Criteria* has been implemented.

For full details and definitions of the terms 'Compliance Verification Summary' and 'Suitably Qualified Auditor', please refer to the *Green Star Construction and Demolition Waste Reporting Criteria*.

This verification of compliance is a prerequisite for the recognition and acceptance of the waste reports to be provided under either of the below two pathways.

22.2A Fixed Benchmark

For this option, up to one (1) point is awarded where the construction and demolition waste going to landfill meets a fixed benchmark, defined in kilograms of waste per square meter of gross floor area (GFA).

Points are awarded in accordance with the waste benchmarks for a typical building, as per Table 22.2A.

Table 22.2A: Waste Benchmarks

Waste kg/m ² (GFA)	Points Awarded
Greater than 15	0
Less than 15	1

Any number of initiatives can be used to achieve compliance, such as reusing or recycling construction waste, or implementing waste avoidance measures like incorporating design solutions that make use of modular and prefabricated installations.

||Where the pre vs post Gross Floor Area (GFA) of the project site differs for major refurbishments, the GFA before the refurbishment took place should be used when calculating the maximum allowable waste going to landfill in credit 22 Construction and Demolition waste.|| R1.22.01

22.2B Percentage Benchmark

For this option, one (1) point is awarded where the project team can demonstrate that at least 70% of the waste generated during construction and demolition has been diverted from landfill. Waste shall be reported in kilograms.

To calculate the amount of waste diverted from landfill, the project team is required to report the total amount of waste generated and the total amount of waste diverted from landfill, and report on the proportion diverted as a percentage.

DEFINITIONS

Excavation Waste – includes unwanted material resulting from excavation activities such as a reduced level dig and site preparation and levelling, and the excavation of foundations, basements, tunnels and service trenches typically consisting of soil and stones.

Special Waste – includes asbestos waste and asbestos containing material, or other hazardous waste and restricted solid waste as defined by the NSW Environment Protection Authority Environmental Guidelines and Policies for Waste.

GUIDANCE

||Green Star Construction and Demolition Waste Reporting Criteria (22.1)

The *Green Star Construction and Demolition Waste Reporting Criteria* establishes the minimum acceptable standards of operations and reporting for waste contractors and waste processing facilities that provide services and reports to Green Star projects. The introduction of such compliance standards and checks aims to ensure contractors and facilities are operating with environmentally responsible due diligence, on behalf of Green Star projects.

The *New Zealand Green Star Construction and Demolition Waste Reporting Criteria* is available at: [New Zealand Green Building Council \(nzgbc.org.nz\)](http://nzgbc.org.nz)

All waste operators and waste processing facilities associated with Green Star projects pursuing this credit must be issued a Compliance Verification Summary which shows they are in compliance with the Reporting Criteria document.|| R1.22.02

Excluded Waste (22.2A and 22.2B)

Special waste and *excavation waste* shall be excluded from consideration in this credit. However, soil generated from site clean-up works which incorporates soil leaving the site mixed with general construction and demolition waste, must be included in the waste-to-landfill calculations, as it forms part of the building site's general waste profile.

Volume to Weight Conversion (22.2A and 22.2B)

Waste contractors are often required to determine the weight of particular waste material streams from visual inspections of a load's volume for the purpose of reporting the estimated weights of material types removed from site (e.g. timber, steel, plasterboard, concrete, carpet).

The conversion factors in Table 22.2 may be used to convert measurement of waste types from volume to weight.

Table 22.2: Waste Volume to Weight Conversion Factors

Source: Converting Volumes to Tonnes – Western Australia Waste Authority

Material	Density (tonne/m ³)	Material	Density (tonne/m ³)
Aluminium cans - whole	0.026	Hazardous Wastes	0.2
Aluminium cans - flattened	0.087	Insulation	0.05
Aluminium cans - baled	0.154	Litter trap	0.75
Asphalt / Bitumen	0.8	Metals	0.9
Bricks	1.2	Oil	0.8
Car Batteries	0.375	Other Textiles	0.15
Carpets	0.3	Others	0.3
Cement Sheet	0.5	Paint	0.8
Ceramics	1	Paper / Cardboard	0.1
Clean Soil	1.6	Plasterboard	0.2
Cobbles / Boulders	1.4	Plastic containers - whole	0.01
Commingled containers (plastic, glass, steel and aluminium cans)	0.063	Plastic containers - whole, some flattened	0.013
Concrete	1.5	Plastic containers - baled	0.139
Garbage	0.15	Rubber	0.3
Garden / Vegetation	0.15	Soil / Rubble<150mm	1.4
Glass bottles - whole	0.174	Steel cans - whole	0.052
Glass bottles - semi-crushed	0.347	Steel cans - flattened	0.13

Steel cans - baled	0.226
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Wood / Timber	0.3
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Project teams can refer to the REBRI standard (as stated here <https://www.branz.co.nz/sustainable-building/reducing-building-waste/assessing-waste/volume-weight/>) to undertake volume to weight conversion, instead of using the table for Waste Volume to Weight Conversion Factors in the Submission Guidelines.

||Integrated Fitout Projects

Fixed Benchmark Pathway (22A)

Projects teams delivering a Green Star rated Interiors project within a *Green Star Design & As Built* rated base building may aggregate the base building and fitout construction and demolition waste to determine the maximum waste allowance based on the combined GFA and NLA.

Up to one (1) point for the base building (GFA) and up to three (3) points are awarded for the fitout (NLA) where the construction and demolition waste going to landfill meets a fixed benchmark, defined in kilograms of waste per square metre in the Construction and Demolition Waste Fixed Benchmark pathway.

Points are awarded based on the maximum waste allowance calculated using the combined GFA and NLA:

$(\text{GFA} \times \text{targeted waste benchmark}) + (\text{NLA} \times \text{targeted waste benchmark}) = \text{cumulative waste total}$.

Points are awarded in accordance with the waste benchmarks for a typical building, and typical fitout as per the table below;

<u>Design & As Built (base building)</u>		<u>Interiors (fitout)</u>	
Waste kg/m ² (GFA)	Points Awarded	Waste kg/m ² (NLA)	Points Awarded
> 15	0	> 3.5	0
<15	1	2.6 - 3.5	1.5
		1.6 - 2.5	3
< 5	1 INN	< 1	1 INN

Please note only one innovation point is available and that points may be pro-rated in between benchmarks.

Percentage Benchmark Pathway (22B)

Projects teams delivering a Green Star rated Interiors project within a *Green Star Design & As Built* rated base building may aggregate the base building and fitout construction waste when targeting a percentage benchmark. Up to one (1) point for the base building (GFA) and up to one (1) point for the fitout (NLA) is awarded where at least 70% of aggregated base building and fitout waste, generated during construction and demolition, has been diverted from landfill (waste reported in kilograms) as defined in the 22.2B Construction and Demolition Waste - Percentage Benchmark pathway. ||R1.22.03

REFERENCED DOCUMENTS

The following documents are referenced in this credit:

[New Zealand Green Building Council](https://www.nzgbc.org.nz/Attachment?Action=Download&Attachment_id=45049), 'New Zealand Green Star Construction and Demolition Waste Reporting Criteria', available at:

https://www.nzgbc.org.nz/Attachment?Action=Download&Attachment_id=45049

Green Building Council of Australia, 'Green Star Construction and Demolition Waste Reporting Criteria', available at: <http://new.gbca.org.au/construction-and-demolition-waste/>

Western Australia Waste Authority, 'Converting Volumes to Tonnes', [Home | Waste Authority WA](#)

REBRI Resource Efficiency in the Building and Related Industries. See www.rebri.org.nz

INNOVATION

Improving on Green Star Benchmarks

One (1) additional point is available where the construction and demolition waste going to landfill meets a fixed benchmark of 5kg of waste per square meter of gross floor area (GFA) or at least 90% of the waste generated during construction and demolition has been diverted from landfill.

DOCUMENTATION REQUIREMENTS

Please refer to the 'How Documentation is Described in the Submission Guidelines' section within the *Introduction* for further guidance on Documentation Requirements for project submissions.

Design Review submissions are optional.

Project teams must submit documentation supporting credit compliance. A list of recommended supporting evidence is provided in the following section, which can be used to demonstrate compliance. Alternate documentation to that listed below can also be used by project teams to demonstrate compliance.

The key requirement is that evidence is provided to support each claim made within the Submission Template.

SUBMISSION CONTENT

Project teams must submit the following documentation:

- **Submission Template**
- **Evidence** to support claims made in the Submission Template

Recommended Supporting Evidence

22.1 REPORTING ACCURACY

Compliance Verification Summaries from waste contractor(s) and waste processing facilities as detailed in the *Green Star Construction and Demolition Waste Reporting Criteria* document.

Disclosure Statement from waste contractor(s) and waste processing facilities outlining how much of the *Green Star Construction and Demolition Waste Reporting Criteria* has been implemented.

22.2A FIXED BENCHMARK AND 22.2B PERCENTAGE BENCHMARK PATHWAYS

Demolition or Site Drawings* indicating the structures on site at time of purchase, extent of demolition and retained structure and façade.

Cumulative waste report generated from the monthly waste reports provided by the waste contractor over the entire duration of construction and demolition works. The monthly reports and supporting waste disposal dockets do not need to be included in the credit submission.

REVISIONS AND AMENDMENTS

Revision No.	Date of Release	Description
NZv1.0	11/04/2019	Initial release.
NZv1.1	04/2022	<p>R1.22.01 II Calculation clarifications provided for the fixed benchmark pathway</p> <p>R1.22.02 II Refer to the updated <i>New Zealand Green Star Construction and Demolition Waste Reporting Criteria</i>.</p> <p>R1.22.03 II Guidance added for Integrate Fitout Projects</p>

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LAND USE & ECOLOGY

The *Green Star - Design & As Built* 'Land Use & Ecology' category aims to reduce the negative impacts on sites' ecological value as a result of urban development and reward projects that minimise harm and enhance the quality of local ecology.

The 'Land Use & Ecology' category rewards projects that achieve the following outcomes:

SITE SUSTAINABILITY

- Addressing the ecological 'Conditional Requirement' criterion.
- Selecting site for development on 'previously developed land'.
- Where required the site has been remediated in accordance with a best practice remediation strategy.

REDUCING ECOLOGICAL IMPACTS FROM OCCUPIED SITES

- Dealing with stormwater at best practice levels.
- Reducing the impact of heat island effects from hard surfaces.
- A specified reduction in light pollution has been achieved by the project.

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ECOLOGICAL VALUE

Credit 23

Points available: 3

AIM OF CREDIT

To reward projects that improve the ecological value of their site.

CREDIT CRITERIA

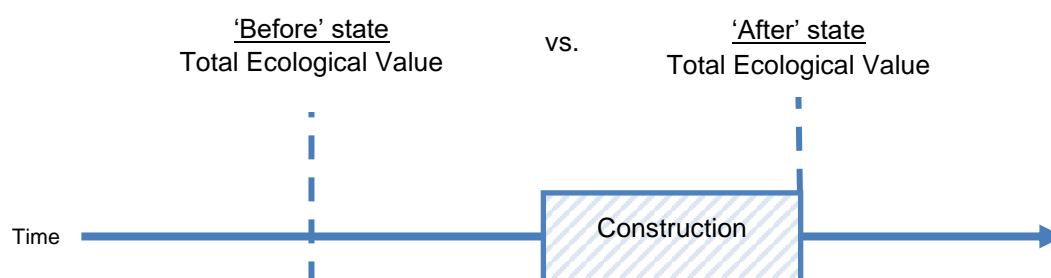
23	Ecological Value	<p>Up to 3 points are awarded where the ecological value of the site is improved by the project.</p> <p>The number of points awarded is determined by the <i>Ecological Value Calculator</i> based on a comparison of the condition of the site before and after design/construction.</p>
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COMPLIANCE REQUIREMENTS

Up to three (3) points are available for this credit. To determine the points that can be awarded, project teams must complete the *Ecological Value Calculator*.

The change in ecological value is determined by comparing the Ecological Value Score of the site at the time of purchase ('before' state) to the Ecological Value Score of the site as built ('after' state). The change in Ecological Value between the two states is used to determine the relative improvement.

Illustration of Change in Total Ecological Value of the Site



Partial points are awarded based on improvement in Ecological Value achieved, in accordance with Table 23.1.

Table 23.1: Points for Improvement in Ecological Value Score

Improvement in Ecological Value	Points Achieved
0.01	1
0.10	2
0.20	3

Demonstrating Compliance

To calculate the Ecological Value of the site (both 'before' and 'after' state), the total area of the site must be divided up into sections of the same land type, as defined in Table 23.2.

The Ecological Value score of each section is the plan area of each section or land type multiplied by the weighting for the land type obtained from Table 23.2. The total Ecological Value of the site is the sum of all Ecological Value scores.

Table 23.2: Land Types and Relative Weightings

Land Type	Weighting
Hard surface (including building / concreted area and bare ground)	0.00
Exotic vegetation (including exotic garden, lawns, weed infestation, non-native plantation forest, crop-farming)	0.05
Non-improved pastures (paddocks with minimal cover of native grasses (<25% cover))	0.35
Novel native ecosystem i.e. with non-local native species	0.4
Planted native vegetation (including native garden, indigenous native garden, green roof, native plantation forest)	0.50
Artificial water-bodies (including dams, constructed wetlands, channels, bores)	0.50
Regenerating native habitat (re-growth) < 5 years old	0.50
Regenerating native habitat (re-growth) 5 – 10 years old	0.75
Regenerating native habitat (re-growth) > 10 years old	0.90

Land Type	Weighting
Remnant native vegetation (including indigenous native grassland and indigenous native habitat)	1.00
Natural water-bodies (including wetlands, rivers, creeks, billabongs, streams)	1.00

Land Types with High Weightings

If the project is claiming land types with a weighting greater than 0.5 this must be confirmed in a report by a *qualified Ecologist*.

Vertical Gardens and Green Roofs

Only the soil surface area of gardens contributes towards recognition in this credit. That is, in vertical gardens and green roofs, only the surface area of soil/substrate in which the plants are rooted is recognised, not the total area covered by the plants.

Vertical gardens are to be included as follows:

- Only outdoor vertical gardens can be included in the calculator.
- Only the soil/substrate surface area of the vertical garden can be counted in the calculator. The area inputted in the calculator will be halved (automatically by the calculator) to account for the ecological improvement relative to horizontal gardens.

The Ecological Land Type is determined by the associated vegetation.

DEFINITIONS

Suitably Qualified Professional

A Suitably Qualified Profession includes someone:

- With a degree in Ecology (or similar), or
- With a minimum of five years continuous experience working as an Ecologist.

Natural Wetland

A 'natural wetland' can be defined as a naturally occurring swamp or marsh that supports indigenous vegetation within it that is distinct from the adjacent upland areas. More specifically, a wetland is an area where a water table is at, near, or above the surface or where soils are water-saturated for a sufficient length of time that excess water and resulting low oxygen levels are principal determinants of vegetation and soil development.

The definition of ‘wetland’ does not include continually or intermittently flowing bodies of fresh water such as:

- Rivers
- Streams
- Modified watercourses
- Creeks
- Ephemeral Creeks

||Native Vegetation

Only species native to the Ecoregion as defined by the Department of Conservation would be considered “native” to the site. The latest mapping for Ecological Regions of NZ can be viewed and downloaded here <https://www.doc.govt.nz/our-work/maps-and-data/>. || R1.23.01

Novel Native Ecosystem

This is a system where the planting species mix used were to include nationally but not necessarily regionally native species. || R1.23.01

GUIDANCE

||Cooling properties of artificial water bodies are considered comparable to those of natural water bodies, both having beneficial urban cooling properties contributing to the outcomes of this credit. || R1.23.02

Plant density is irrelevant to the calculation performed by the *Ecological Value Calculator*. The credit recognises the surface area of the soil/substrate in which the plants are rooted, not the total area covered by the plant foliage, nor the plant density. ||R1.23.03

REFERENCED DOCUMENTS

Green Star – Design & As Built: Ecological Value Calculator

DOCUMENTATION REQUIREMENTS

Please refer to the *'How Documentation is Described in the Submission Guidelines'* section within the *Introduction* for further guidance on Documentation Requirements for project submissions.

Design Review submissions are optional.

Project teams must submit documentation supporting credit compliance. A list of recommended supporting evidence is provided in the following section, which can be used to demonstrate compliance. Alternate documentation to that listed below can also be used by project teams to demonstrate compliance.

The key requirement is that evidence is provided to support each claim made within the Submission Template.

SUBMISSION CONTENT

Project teams must submit the following documentation:

- **Submission Template**
- **Evidence** to support claims made in the Submission Template
- Ecological Value **Calculator**

Recommended Supporting Evidence

Site Plans marked up with land type regions.

Aerial Site Photographs marked up with land type regions.

Landscape Drawings and Specifications showing types of planting, hard-standing, water-bodies, etc.

REVISIONS AND AMENDMENTS

Revision No.	Date of Release	Description
NZv1.0	11/04/2019	Initial release.
NZV1.1	04/2022	R1.23.01 II Definitions introduced for Native Vegetation and Novel Native Ecosystem R1.23.02 II Clarification added for cooling properties of artificial water bodies R1.23.03 II Clarification added for Plant density

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SUSTAINABLE SITES

Credit 24

Points available: 2

AIM OF CREDIT

To reward projects that choose to develop sites that have limited ecological value, that reuse previously developed land, and that remediate contaminated land.

CREDIT CRITERIA

24.1 Conditional Requirement: Ecological Protection and Highly Productive land.	To achieve a certified rating the project must not be located on a site of high ecological value and must not convert or otherwise prevent the use of highly productive land for agricultural purposes. R1.24.01
24.2 Reuse of Land	1 point is available where 75% of the site was previously developed land at the date of site purchase, or, for previously owned land, at the project's Green Star registration date.
24.3 Contamination and Hazardous Materials	1 point is available where the site, or an existing building was previously contaminated, and the site has been remediated in accordance with a best practice remediation strategy.

COMPLIANCE REQUIREMENTS

||24.1 Conditional Requirement: Ecological Protection

To achieve a certified rating the project must not be located on a site of high ecological value and must not convert or otherwise prevent the use of highly productive land for agricultural purposes.

At project registration the project team must provide evidence to confirm that:

- The type of development that is proposed in the project area meets the intent of the underlying planning zone;
- The site protects ecologically significant areas (as defined below) within it and, preferably avoids, but, has at most less than minor adverse effects on ecologically significant areas either within the site or near to the site and upon which the development could have impacts (e.g. wetlands downstream);

- The project does not transform, convert, or change to another land-use any Highly Productive Land (as defined below) or otherwise prevent its continued use of for primary production purposes.

||Note that if the project land has been planned for high density development by central or local governments, the project is still considered to be compliant with this conditional requirement as the project itself isn't changing, transforming, or converting its land-use and primary production purposes. In this case, please provide evidence showing government plan for the land. || R1.1.24.01

To achieve a certified rating under the *Green Star – Design & As Built* rating tool the project must protect and have less than minor effects on any ecologically significant area present within the site at the date of site purchase or option contract, Ecologically significant areas are defined as:

- Natural wetlands, Lakes, and Rivers

Either a default 100m 'setback' should be included between these features and construction activity (whether they are on the applicant's property or on an adjacent property), or a plan provided that an ecological professional approves as sufficient to prevent (avoid or minimise) adverse effects upon the feature(s) within 100m or with sufficient hydrological connection to be potentially affected.

- Land containing significant indigenous vegetation, naturally uncommon ecosystems, or significant habitats for indigenous flora & fauna – especially for any nationally threatened species or organisms⁸.
- Any legally protected area defined under the Conservation Act 1987, Reserves Act 1977, QEII National Trust Act 1977, or RMA Section 108 (1), (c) and (d).
- Where mapped, any Significant Natural or Significant Ecological Areas as designated by Councils.

If the site is part of a greenfield development, NZGBC recommend use of local authority GIS mapping to assist determining compliance. Please contact NZGBC for further guidance.

Where any of the above listed conditions is present on a project site, the project team should notify and discuss with NZGBC to determine whether this affects the project's eligibility. If the development does not require a Resource Consent for activities in relation to potential impacts to significant ecological/natural areas (e.g., vegetation removal, reclamation or matters under the National Environmental Standard for Freshwater), then it is deemed eligible under this Conditional Requirement subject to further assessment.

24.1.1 Conditional Requirement: Ecological Value

The evidence confirming that the site prior to development meets the requirements may be in the form of:

- Correspondence from the relevant local Council OR a qualified Ecologist confirming that the site prior to development meets the criteria; OR
- Local planning maps with relevant overlays applied; OR
- A letter from the local Territorial Authority; OR

- A qualified Environmental Specialist's report; OR
- An Assessment of Environmental Effects for Resource Consent approved by Local Council, and clearly demonstrating that the site is not ecologically significant; OR
- If any ecologically significant sites are potentially affected, the project must provide evidence which sets out how any impacts will be mitigated through avoidance or minimisation, at least to a degree that adverse ecological effects are less than minor (prior to any restoration, offsetting or compensation measures) having regard to Section 6c of the Resource Management Act and the provisions of the relevant territorial authority Plan. If any less than minor effects are predicted then restoration, offsetting or compensation measures resulting in a net gain must be demonstrated for the biodiversity values for which the area is designated as ecologically significant. If no adverse effects are predicted then no mitigation is required.

Regardless of the evidence type supplied, if it is clear that either no sites of ecological significance are present or that adverse effects can be avoided altogether then the project will be deemed eligible. If further justification of ecologically significant status or potential effects mitigation is required, expert evidence may be requested during the assessment phase to demonstrate the requirement can be met.

24.1.2 Conditional Requirement: Highly Productive Land

Evidence of the LUC class can be provided by referring to the NZ Land Resource Inventory which maps the LUC distributions across New Zealand at a scale of 1:50,000 <https://iris.scinfo.org.nz/layer/48076-nzlr-land-use-capability/>)

24.2 Reuse of Land

One (1) point is awarded where either of the following conditions is met:

- A. 75% of the site was 'previously developed land' at the date of site purchase; or
- B. The project is a building extension, and 75% of the extension (including landscaping) falls within an area of the site that was 'previously developed land' at the project's Green Star registration date.

Previously Developed Land

Previously developed land includes land that is, or was, occupied by a permanent structure, associated *curtilage*, road, car park or other hardstand including working areas of mines, landfills, brick pits, quarries or other industrial, commercial, institutional and residential activity and associated *curtilage*.

The definition excludes:

- Previously developed land that has undergone ecological restoration or land that is scheduled to be restored through development control procedures.
- Land that was previously developed but where they developed areas have been reclaimed by the surrounding landscape via natural process and the passing of time, to the

extent that it can be reasonably be considered as covering more than 50% of the site and an integral part of the natural surroundings.

- Land that was used for agricultural purposes at the time the site was purchased; and
- Land in built up areas that has not been developed previously, even though these areas may contain certain urban features such as paths pavilions and other buildings.

24.3 Contamination and Hazardous Materials

One (1) point is awarded where at least one of the following conditions 24.3A or 24.3B is met:

24.3A Site Contamination

- The site has been previously contaminated to the extent that the intended uses, as permitted under the relevant planning scheme, were initially precluded;
- The developer has adopted and implemented a best practice site remediation strategy; and
- The best practice site remediation strategy and implementation has been signed off by a qualified Environmental Specialist prior to issue of the occupation certificate.

For the purpose of this credit element, 'contamination' refers to any contamination in the soil and groundwater (regardless of extent, concentration, toxicity, or otherwise) where the site uses, as permitted under the local planning scheme, were precluded by the contamination present.

For this credit element to be claimed, there must be substantial recommendations for containment and/or removal made in the site contamination report. Minor local contamination will occur on many previously-used sites and such minor decontamination is not awarded by this credit element. Contamination resulting from the project construction works (e.g. asbestos from demolition of the existing buildings), cannot contribute to this credit element.

To be deemed 'no longer contaminated', the site must meet the regulated levels deemed suitable by a qualified Environmental Specialist.

||"Minor local contamination" should be interpreted as contamination that would not trigger soil remediation under the National Environmental Standard for Assessing and Managing Contaminants in Soil.

To be eligible for these points, the site should be initially precluded by either the NES (National Environmental Standard) or the regional authority rules for its intended use before the best practice remediation takes place. Supporting evidence needs to clearly document the contamination present on the site and confirm which rules or standards precluded this development for the intended use prior to remediation.|| R1.24.03

Best Practice Remediation Strategy

Remediation Forum document titled ‘*A Framework for Assessing the Sustainability of Soil and Groundwater Remediation*’, dated April 2011.

||For the purposes of this credit, the ISO standard 18504: Soil quality: Sustainable Remediation can be used as an alternative to the above document|| R1.24.04

Where contamination is found on site and the site is remediated to meet requirements of the relevant authority using methods other than those set out in a best practice remediation strategy (e.g. the standard practice of removal to landfill), no points will be awarded under this credit element.

24.3B Hazardous Materials

- A comprehensive hazardous materials survey has been carried out on any existing buildings or structures on the project site, in accordance with the relevant ||Health and Safety at Work legislation|| R1.24.05; and
- Where the survey identified asbestos, lead or PCBs in any existing buildings or structures the materials have been stabilised, or removed and disposed of in accordance with best practice guidelines; or the survey concluded that no hazardous materials were found in any existing buildings or structures on the project site.

One (1) point is awarded where a hazardous materials survey has been conducted and any materials made or composed of lead, asbestos and polychlorinated biphenyls (PCBs) within the building have been removed or stabilised in accordance with the legislation listed in Table 24.3B: List of Relevant Legislation and Standards.

Hazardous Materials Survey

The project team must carry out a comprehensive hazardous materials survey within the existing building, as defined by the relevant Health and Safety at Work legislation. This includes enclosed or encapsulated materials, materials listed as part of a heritage building, or materials that existed prior to the new construction works.

If a Hazardous Materials Survey has been conducted (in accordance with relevant Health and Safety at Work legislation) for the existing building after 1 January 2005, there is no need to conduct a new survey. This survey can be used to claim points for this credit element.

Hazardous Materials Best Practice Management

In addition to the hazardous materials survey, a register and management plan must be developed for each type of hazardous material (as defined in this credit) found within the existing building. The register and management plans must be developed and kept current, in accordance with the applicable codes of practice for each type of hazardous material. The results of the survey must include:

- Location of the hazardous material.
- Composition and type of material and the material friability.

- Risk to health based on the condition, potential disturbance, and occupancy level; and
- Recommendations to control or further minimise risk to occupant health.

Hazardous Materials Removal or Stabilisation

Where hazardous materials have been found within the existing building, these shall be stabilised, or removed and disposed of in accordance with the legislation or standards listed in 24.3B: List of Relevant Legislation and Standards. Where hazardous materials have been found on site, the two acceptable methods of meeting this requirement are:

- A contractual commitment to stabilise or remove and dispose of hazardous materials; OR
- Evidence that hazardous materials have been stabilised or removed and disposed of.

Table 24.3B: List of Relevant Legislation and Standards

Hazardous Materials	Relevant Standards or Legislation
Asbestos	Health and Safety at Work legislation and relevant environmental legislation
Lead	AS/NZS 4361 Guide to Lead Paint Management
Polychlorinated Biphenyls (PCBs)	ANZECC Polychlorinated Biphenyls Management Plan

New Buildings

This credit element is deemed 'Not Applicable' if the existing building on the project site began construction after 1 January 2005. This includes projects that are refurbishments or building extensions of existing buildings for which construction started after 1 January 2005.

The use of the hazardous materials targeted by this credit element have been banned in New Zealand for a number of years, so this topic presents no environmental benefit to new buildings.

Please see the Introduction Section of the Submission Guidelines for additional information on 'Not Applicable' criteria.

DEFINITIONS

Asbestos

Although asbestos is now rarely used in construction, many asbestos-containing products and materials can still be found in existing buildings. These include vinyl asbestos tiles, laboratory table tops, roofing felts, suspended ceiling tiles, and asbestos cement products (including pipes, roof and wall cladding). These types of materials do not present a significant health risk unless they are tooled, cut, drilled, sanded or otherwise abraded or machined so as to release asbestos dust.

Sprayed insulation materials containing asbestos may occur throughout buildings and other structures, especially those built from the 1950s to the mid-1980s. Such buildings will often have asbestos used in sprayed-on fireproofing/soundproofing/thermal insulation, and acoustic plaster soundproofing.

Contaminated Land

Contaminated land is defined in the Resource Management Act 1991 (RMA), as amended in 2005, as land of one of the following kinds

- If there is an applicable national environmental standard on contaminants in soil, the land is more contaminated than the standard allows; or
- If there is no applicable national environmental standard on contaminants in soil, the land has a hazardous substance in or on it that:
 - Has significant adverse effects on the environment or
 - Is reasonably likely to have significant adverse effects on the environment.

Curtilage

The enclosed area surrounding a building or dwelling including yards and paved surfaces. Yards are defined as highly modified landscaped areas including lawns, sporting courts and sports fields within the site boundary previously used for regular recreation or outdoor activities related to the building. Curtilage excludes areas of remnant vegetation, parkland and agricultural land.

Hazardous Materials

For the purposes of this credit, refers to lead, asbestos and polychlorinated biphenyls (PCBs).

Hazardous Material Stabilisation

A best practice, on-site technique that minimises risks from hazardous materials according to the relevant legislation.

Highly Productive Land

Highly Productive Land (HPL) is defined as land which is classed as either Land Use Capability (LUC) class 1, 2, or 3⁹. This covers land of the highest capability and versatility to support primary production. HPL excludes all urban zoned areas and all future urban zoned areas in District Plans.

Lead

Lead is a soft metal counted as one of the heavy metals; it is a neurotoxin that accumulates both in soft tissues and the bones. Lead damages the nervous system and causes brain disorders. In relation to lead, this credit is mainly concerned with lead found in paints.

In 1997 the maximum lead content of domestic paints was reduced to 0.1%.

Natural Wetland

A 'natural wetland' includes any permanently or intermittently wet area, shallow water, or land water margin that supports a natural ecosystem of plants and animals that are adapted to wet conditions. A 'wetland' is an area where a water table is at, near, or above the surface or where soils are water-saturated for a sufficient length of time that excess water and resulting low oxygen levels are principal determinants of vegetation and soil development.

The definition of 'wetland' does not include continually or intermittently flowing bodies of fresh water such as:

- Rivers
- Streams
- Modified watercourses
- Creeks
- Ephemeral Creeks

Neither does the definition of 'natural wetland' include a wetland constructed by artificial means (unless it was constructed to offset impacts on, or restore, an existing or former natural wetland); or any area of improved pasture that, at the commencement date, is dominated by (that is more than 50% of) exotic pasture species and is subject to temporary rain-derived water pooling.

Options Contract

An agreement to purchase or transfer ownership of a site at a later date, depending on the agreed conditions being met.

Polychlorinated Biphenyls (PCBs)

PCBs were typically used within the electrical industry as an insulating fluid inside transformers and capacitors. From 1950-1970 capacitors containing PCBs were installed in

equipment such as fluorescent light fittings, ceiling fans, dishwashers, clothes dryers, electric motors, vacuum pumps, air conditioners and small washing machines.

GUIDANCE

Best Practice Remediation Guidance

A site wishing to be eligible for these points would normally be expected to be on the national HAIL (Hazardous Activities and Industries List).

In remediating the site, there should be substantial recommendations for containment and/or removal in the site contamination report. The evidence required (such as a site investigation) and sampling and analysis should be in keeping with Ministry for the Environment guidelines. The signed statement confirming that the site has been correctly and appropriately remediated can be provided by either the relevant local Council or an Environmental Specialist. Wetland Management Plan.

A Wetland Management plan is a document prepared by an ecologist that includes a list of risks and threats to the conservation of the wetland values associated with the development, the proposed risk-management actions for all construction and operation stages and requirements for ongoing monitoring, reporting and management of the wetland ecosystem.

Wetland Management Plan

A Wetland Management Plan is a document prepared by an ecologist that includes a list of risks and threats to the conservation of the wetland values associated with the development, the proposed risk-management actions for all construction and operation stages and requirements for ongoing monitoring, reporting and management of the wetland ecosystem.

REFERENCED DOCUMENTS

The following documents are referenced in this credit:

- Sustainable Remediation Forum document titled “A Framework for Assessing the Sustainability of Soil and Groundwater Remediation” dated April 2011
- AS4361 ‘Guide to Lead Paint Management’
- ANZECC Polychlorinated Biphenyls Management Plan
- Conservation Act 1987
- <http://www.legislation.govt.nz/act/public/1987/0065/79.0/DLM103610.html>
- Resource Management Act 1991, Section 6
- RAMSAR Convention on Wetlands - <https://www.ramsar.org/wetland/new-zealandContaminatedLandManagementGuidelines> - <http://www.mfe.govt.nz/land/risks-contaminated-land/managing-contaminated-land/contaminated-land-management-guidelines>.

- Health and Safety at Work legislation
- ISO standard 18504: Soil quality: Sustainable Remediation

DOCUMENTATION REQUIREMENTS

Please refer to the *'How Documentation is Described in the Submission Guidelines'* section within the *Introduction* for further guidance on Documentation Requirements for project submissions.

Design Review submissions are optional.

Project teams must submit documentation supporting credit compliance. A list of recommended supporting evidence is provided in the following section, which can be used to demonstrate compliance. Alternate documentation to that listed below can also be used by project teams to demonstrate compliance.

The key requirement is that evidence is provided to support each claim made within the Submission Template.

SUBMISSION CONTENT

Project teams must submit the following documentation:

- **Submission Template**
- **Evidence** to support claims made in the Submission Template

Recommended Supporting Evidence

24.1 CONDITIONAL REQUIREMENT: ECOLOGICAL VALUE

Projects target this credit should show compliance with 'Conditional Requirement – Ecological Protection'. The evidence confirming that the site prior to development meets the requirements may be in the form of

- **Correspondence** from the relevant local Council OR a qualified Ecologist confirming that the site prior to development meets the criteria; OR
- **Local planning maps** with relevant overlays applied; OR
- **A letter** from the local Territorial Authority; OR
- **A qualified Environmental Specialist's report**; OR
- **An Assessment of Environmental Effects for Resource Consent** approved by Local Council, and clearly demonstrating that the site is not of high ecological significance; OR
- If any sensitive sites are affected, the project must provide **evidence** which sets out how any impacts will be avoided, remedied or mitigated, having regard to Section 6 of the

Resource Management Act 1991, and the provisions of the relevant territorial authority Plan.

24.2 REUSE OF LAND

- **As Built Drawings** showing the areas that were previously developed land at the time of purchase or Green Star Registration.
- **Aerial Photographs** showing the areas that were previously developed land at the time of purchase or Green Star Registration.

24.3 CONTAMINATION AND HAZARDOUS MATERIALS

For 24.3A Site Contamination:

- **Certificate from** a qualified Environmental Specialist or relevant authority confirming that the site has been correctly and appropriately decontaminated in accordance with the relevant legislations, dated prior to the commencement of the construction phase of the project.
- **Contamination Report OR Site Assessment**
 - Completed in line with Contaminated Land Management Guidelines.
 - Current at the time of site purchase or otherwise reflective of the site condition at the time of purchase; and
 - Clearly documenting the contamination present on the site and confirming this contamination precludes the development.

For 24.3B Hazardous Materials:

- **Confirmation** that a hazardous materials survey has taken place.
- **Hazardous Materials Survey.**
- **Hazardous Materials Management plan.**
- **Copy of the hazardous materials contract** or commitment to stabilise and/or remove and dispose of the hazardous materials, describing the methods used.
- **Clearance Certificate** confirming that hazardous materials have been stabilised and/or removed and disposed of.

REVISIONS AND AMENDMENTS

Revision No.	Date of Release	Description
NZv1.0	11/04/2019	Initial release.
NZv1.1	04/2022	R1.24.01 II Updated requirements and guidance to provide clarity of ecologically significant sites.

		<p>R1.24.02 II Guidance added for eligibility check</p> <p>R1.24.03 II Clarifications provided for minor local contamination and credit eligibility.</p> <p>R1.24.04 II ISO standard 18504: Soil quality: Sustainable Remediation is a recognized option for Best Practice Remediation Strategy</p> <p>R1.24.05 II Health and Safety at Work legislation is referenced for compliance of Hazardous Materials</p>
NZv1.1.1	07/2023	<p>R1.1.24.01 II Guidance added for lands that have been planned for high density development.</p>

EMISSIONS

The *Green Star - Design & As Built* 'Emissions' category aims to assess the environmental impacts of 'point source' pollution generated by projects. Negative impacts commonly associated with buildings include damage to the environment through refrigerant leaks or disturbances to native animals and their migratory patterns as a result of light pollution.

The 'Emissions' category rewards projects that achieve the following outcomes:

MINIMISATION OF POINT SOURCE POLLUTION EMISSIONS

- The reduction of impacts to wildlife from light pollution.
- The best practice application of microbial controls within air conditioning systems.
- The reduction of impacts from refrigerant use and leaks.

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STORMWATER

Credit 25

Points available: 2

AIM OF CREDIT

To reward projects that minimise peak stormwater outflows from the site and reduce pollutants entering the public sewer infrastructure or other water bodies.

CREDIT CRITERIA

25.1 Stormwater Peak Discharge	1 point is available where the post-development peak Average Recurrence Interval (ARI) event discharge from the site does not exceed the pre-development peak ARI event discharge.
25.2 Stormwater Pollution Targets	1 additional point is available, where the first point has been achieved and all stormwater discharged from site meets specified pollution reduction targets.

COMPLIANCE REQUIREMENTS

25.1 Stormwater Peak Discharge

One (1) point is awarded where project teams demonstrate that the post-development peak event stormwater discharge (including the effects of climate change) from the site does not exceed the pre-development peak event stormwater discharge, using the 2 year and 5 year Average Recurrence Intervals (ARI). The effect of climate change on rainfall can be obtained from the HIRDS v4 database (NIWA, 2019).

25.1.1 Climate Change Scenarios

If the project is targeting the 'Adaptation and Resilience' credit (3), the Risk Assessment included in this credit submission shall be used to determine the appropriate climate change scenario.

If the project is not targeting the 'Adaptation and Resilience' credit (3), the project may refer to local council flood level guidance.

25.1.2 Management of Stormwater Peak Flows

Management of stormwater peak flows may include one or more of the following techniques:

Water detention;

Water retention:

- Infiltration
- Harvesting and reuse
- Evapotranspiration

Infiltration to native soils, or otherwise, filtered through an appropriately designed soil and plant stormwater treatment system, such as vegetated swales, raingardens and pervious paving;

Stormwater reuse (including roof collection and use); and

Stormwater evapotranspiration.

Where specific measures are in place to collect and store stormwater in lakes, rivers or groundwater aquifers, projects are advised to submit a Technical Question to the NZGBC.

25.2 Stormwater Pollution Targets

Where criterion 25.1 has been achieved, one (1) additional point is awarded where it is demonstrated that all stormwater discharged from the site meets the required pollution reduction targets for the identified contaminants of concern when compared to untreated runoff in accordance with the following requirements.

It is noted that some local governments may provide pre-determined infrastructure solutions that are 'deemed to comply' with the aim of this credit criterion. If this is the case the project team shall have this approach approved by a Technical Question.

In circumstances where this credit specifies levels or targets that are less stringent than those specified in relevant local legislation/regulations, the local legislation/regulations shall take precedence.

Appropriate calculations must be undertaken by suitably qualified professionals. Any calculations and assumptions must be outlined, easy to follow, and in accordance with common practice protocols (see Guidance).

||25.2.1 The project must meet the average reductions listed in Column A of Table 25.2 when compared to untreated runoff over the simulation period:

Table 25.2 Pollution Reduction Targets

Pollutant	Reduction Target (% of the typical urban annual load)		
	A	B	C
Total Copper	60%	70%	80%
Total Zinc	60%	70%	80%
Total Suspended Solids (TSS)¹	80%	80%	90%

Gross Pollutants	85%	90%	95%
Total Nitrogen (TN)²	30%	45%	60%
Total Phosphorus (TP)²	30%	60%	70%
Total Petroleum Hydrocarbons³	60%	90%	90%
Free Oils³	90%	90%	98%

|| R1.25.01

Notes:

1. Load based on the following particulate size distribution (by mass): 20% <20 µm; 20% 20-60 µm; 20% 60-150 µm; 20% 150-400 µm; 20% 400-2000 µm.
2. Load includes particulate and dissolved fraction.
3. This requirement is not applicable where the site contains less than a total of 200m² of uncovered areas where vehicles are likely to transit and/or park e.g. roads, loading docks, refuelling bays, car parking etc.

While petroleum hydrocarbons and free oils cannot be readily modelled in MUSIC, it is possible to address petroleum hydrocarbons and free oils via stormwater treatment devices such as gross pollutant traps (GPTs).

If the project would like to nominate other contaminants for the identified concern for certain building types, contact the NZGBC via a Technical Question.

25.2.2 Stormwater treatment performance for TSS, gross pollutants, TN and TP must be demonstrated for compliance by numerical modelling of pollutant export. Modelling must be undertaken based on a continuous simulation of catchment hydrology using models, parameters and methodologies in accordance with the relevant local government requirements (see Guidance).

||If the project team can provide evidence as to why the building and its associated site will not generate pollutants, i.e. Zinc and/or Copper, they are not required to include them in the model. For example, if it can be shown that a steel roof has been appropriately coated to remove the likelihood of Zinc runoff than the project would not need to include Zinc in the model. Please submit a Technical Question with supporting documentation if this is to be pursued.|| R1.25.02

INNOVATION

Exceeding Green Star Benchmarks – Stormwater Pollution Targets

Up to two additional points may be awarded where projects can demonstrate achieving Pollution Reduction Targets from column B (1 point) or C (2 points) as stated in Table 25.2.

Currently, the use of biological treatment systems is generally considered the only viable method of achieving compliance with the Pollution Reduction Targets of column C. Where a treatment train that does not contain biological treatment is being used to achieve the

Pollution Reduction Targets in column C, independently verified performance certification is required to show that the equipment is capable of achieving those targets.

Innovation Challenge - Water Sensitive Urban Design

Project teams may develop an Innovation Challenge that demonstrates that the criteria of the credit have been exceeded by employing Water Sensitive Urban Design principles.

GUIDANCE

Date of Site Purchase

Where indicated, the requirements are applied to the state of the site that existed at the date of site purchase. In cases where the site has been owned by the current owner for more than five years (from the project's Green Star registration date), the requirements are applied to the state of the site that existed at least five (but not more than ten years) prior to the project's Green Star registration date.

Modelling

Pollutant export modelling should predict the discharge pollutant loads from a given area. The results of the simulation must show a comparison against the relevant reduction targets for the specified treatment system/train.

Rainfall Data for Modelling Programs Using Continuous Simulation

The following considerations for rainfall simulation shall be adopted:

- Continuous simulation of a minimum of 5-year rainfall series;
- 5-minute time step (intervals);
- Localised climatic sequences;
- Water balances; and
- Treatment train operation.

The selection of the software varies due to the different purpose and the variety of targeted contaminants. Available water quality modelling software includes MUSIC, DHI package, Innovyze package (Infoworks ICM), SWMM, delft3D and QUAL2E. The model of the catchment contaminant load model (C-CALM) from NIWA and Freshwater management tool that Auckland Council is developing can also be the tool to model the water quality modelling. Project shall contact NZGBC if an alternative, yet equivalent modelling software is to be used.

As an alternative to computer modelling, stormwater treatment performance calculations may be performed manually, in accordance with methodologies outlined in procedural manuals such as WSUD Engineering Procedures – Stormwater (CSIRO, 2005).

Reducing Stormwater Impacts

Stormwater impacts from a site result from runoff from impervious and semi-pervious surfaces. Runoff from a site has impacts on both water quality and flow rates occurring offsite. Techniques which can reduce these offsite impacts include flow management, which slows runoff rates and/or reduces the total volume of water that impacts on waterways, and pollutant management, which treats a range of pollutants in stormwater runoff. Both are necessary to protect receiving waters from degradation by stormwater runoff.

To reduce the offsite impacts from stormwater runoff, pollutant management and flow management techniques can be considered individually or in combination to achieve the desired offsite impacts. The final stormwater management strategy should be chosen to suit site constraints, and has the potential to affect other Green Star credits, such as those in the Water Category.

Stormwater Design Considerations

Effective Stormwater Systems must be able to adequately manage small, minor and major storm events. They can be designed to do this by considering the management objectives of each design event and the scale at which the solution is to apply, examples as stated in Table 25.

Table 25 Management Objectives and System Performance Outcomes Related to Rainfall Design Events (extract from Water Sensitive Urban Design: Stormwater Design Considerations, Government of Western Australia Department of Water, June 2011)

Up to 1-year ARI	Greater than 1-year ARI and up to 5-year ARI for residential and rural-residential, and 10-year ARI events for commercial and industrial areas.	Up to the 100-year ARI event
<ul style="list-style-type: none"> • Retain or detain stormwater runoff from constructed impervious surfaces generated by up to the 1-year, 1-hour ARI event at its source, preferably in lots and road reserves. • Reduce the area and connection of impervious surfaces. • Maintain pre-development peak flow rates and total volumes runoff from the whole sub-catchment at outlets from the site at the critical 1-year ARI event. • Control pollutants at their source. 	<ul style="list-style-type: none"> • These flows use the 'minor system conveyance' (road gutters, overflow pipes, verges, swales and living streams) and detention or retention areas. • Attenuate critical 5-year event flows to the capacity of downstream natural channels or constructed drainage infrastructure. • Maintain serviceability of roads and infrastructure. 	<ul style="list-style-type: none"> • Flow paths need to be identified during urban design. • Contain flows within 'major system conveyance' - roads, verges, public open space, living streams, waterways and wetlands. • Protection of people and buildings – establish or confirm design flood levels. • Reduce risk of flooding and manage flow rates.

<ul style="list-style-type: none"> • Improve water quality, via soil and vegetation filtration. • Protect ecological values and maintain hydrological regimes. 	<ul style="list-style-type: none"> • Manage flow rates to prevent erosion. 	
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Typical Urban Annual Load

Typical urban annual loads can be estimated using continuous simulation modelling. Where available, relevant guideline values for pollutant concentrations for the catchment land use and surface type should be used.

Water Sensitive Urban Design

Water-sensitive urban design (WSUD) is a land planning and engineering design approach which integrates the urban water cycle, including stormwater, groundwater and wastewater management and water supply, into urban design to minimise environmental degradation and improve aesthetic and recreational appeal.

DEFINITIONS

Average Recurrence Interval (ARI)

The average, or expected value of the periods between exceedances of a given rainfall total accumulated over a given duration. Data can be obtained from the *National Institute of Water and Atmospheric Research (NIWA)*.

Pre-development

The conditions of the site at the date of site purchase.

Site

The 'site' is defined by the scope of Green Star assessment. If a development consists of several buildings, the site must be defined for each registered building.

Untreated Runoff

The post development stormwater runoff with no pollutant treatment. It means the run-off from the completed development to the same design location and use as proposed with no design measures to reduce pollution.

Stormwater

For the purposes of this credit, all rainwater falling on the site is stormwater. Rainwater hitting the roof of a structure and running into the stormwater system (either directly or indirectly) is stormwater, and must comply with the credit criteria. For stormwater that is captured, used on site, and not discharged to the stormwater system, there is no requirement to treat the pollutants in that stormwater beyond those required under the relevant legislation. Rainwater hitting the roof of a structure, being captured, and then used in a system that discharges or overflows to the stormwater system, must be treated in accordance with the credit criteria prior to discharge.

Suitably Qualified Professional

A professional with a formal tertiary environmental, hydraulic or civil engineering qualification or with a minimum five years' experience in developing and implementing designs for water management.

REFERENCED DOCUMENTS

The following documents are referred to in this credit:

MfE. (1998). Environmental Guidelines for Water Discharges from Petroleum Industry Sites in New Zealand. [Online]. https://www.mfe.govt.nz/sites/default/files/media/Hazards/water-discharges-guidelines-dec98_0.pdf

Model for Urban Stormwater Improvement Conceptualisation (MUSIC) model (CRCCH, 2005)

NIWA. 2019. HIRDSv4 Usage. [Online]. <https://www.niwa.co.nz/information-services/hirds/help>

STORM computer modelling program

WSUD Engineering Procedures – Stormwater (CSIRO, 2005).

Auckland Council Guideline Document GD01 (2017) – Stormwater Management Devices in the Auckland Region

Auckland Council Technical Publication 108 (1999) Guidelines for Stormwater Runoff Modelling in the Auckland Region

<http://www.aucklandcity.govt.nz/council/documents/technicalpublications/TP108%20Part%200A.pdf>

ADDITIONAL INFORMATION

Additional information can be found in the following:

- <http://www.wsud.org/>
- <http://waterbydesign.com.au/whatiswsud/>
- <http://www.newwaterways.org.au/About-Us/What-is-water-sensitive-urban-design>

DOCUMENTATION REQUIREMENTS

Please refer to the *'How Documentation is Described in the Submission Guidelines'* section within the *Introduction* for further guidance on Documentation Requirements for project submissions.

Design Review submissions are optional.

Project teams must submit documentation supporting credit compliance. A list of recommended supporting evidence is provided in the following section, which can be used to

demonstrate compliance. Alternate documentation to that listed below can also be used by project teams to demonstrate compliance.

The key requirement is that evidence is provided to support each claim made within the Submission Template.

SUBMISSION CONTENT

Project teams must submit the following documentation:

- **Submission Template**
- **Evidence** to support claims made in the Submission Template

Recommended Supporting Evidence

25.1 STORMWATER PEAK DISCHARGE & 25.2 STORMWATER POLLUTION TARGETS

Calculation/Modelling Report by a suitably qualified professional. The report should describe:

- Software or calculation methods used.
- Data sets and tables that were applied.
- Sizing of all stormwater treatment systems installed.
- Quantity of stormwater discharge to be addressed by each stormwater treatment system (annually).
- Comparing the results of the pollutant export modelling/calculations with the Pollution Reduction Targets in the relevant column of Table 25.2 (where Stormwater Pollution Targets criterion is targeted).
- If relevant, summarizing how hydrocarbons and free oils have been addressed.

Civil/Hydraulics drawings showing the stormwater collection, storage and treatment facilities and detailing their functional elements.

Hydraulics drawings showing all the capture, storage, piping and discharge route.

Site plans showing the total areas of uncovered areas where vehicles are likely to transit and/or park (e.g. roads, loading docks, refuelling bays, and car parking, etc).

25.2 STORMWATER POLLUTION TARGETS

Independently verified performance certification for each manufactured stormwater treatment device, proving its ability to achieve the pollution reduction targets nominated in Table 25.2.

REVISIONS AND AMENDMENTS

Revision No.	Date of Release	Description
NZv1.0	11/04/2019	Initial release.
NZv1.1	04/2022	<p>R1.25.01 II Change from 'dissolved' Zinc and Copper to 'total' Zinc and Copper under table 25.2 Pollution Reduction Targets.</p> <p>R1.25.02 II Incorporation of a technical clarification issued in April 2020 which allows the Zinc and Copper to be excluded from modelling when proper source control methods are available.</p>

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LIGHT POLLUTION

Credit 26

Points available: 1

AIM OF CREDIT

To reward projects that minimise light pollution.

CREDIT CRITERIA

To qualify for points in this credit a **minimum requirement** must first be met.

26.1 Light Pollution to Neighbouring Bodies	The minimum requirement is met where the project complies with AS 4282:1997 <i>Control of the obtrusive effects of outdoor lighting</i> .
26.2 Light Pollution to Night Sky	1 point is available where it can be demonstrated that a specified reduction in light pollution has been achieved by the project. Two options are available for demonstrating a reduction in light pollution.

COMPLIANCE REQUIREMENTS

26.1 Light Pollution to Neighbouring Bodies

To qualify for points under this credit, project teams must demonstrate that all outdoor lighting on the project complies with AS 4282: 2019 *Control of the obtrusive effects of outdoor lighting*.

The conditions shall be applied to all boundaries, apart from boundaries with roads. The boundary shall be taken as the site boundary, with no setback and no consideration of the location of adjacent buildings (i.e. worst-case scenario).

The following values from ||Table 2.1 of AS 4282:2019 || R1.26.01 must be applied:

- For Class 2 buildings (residential), the values are in Columns 4 and 5; or
- For Class 3 to 9 buildings (non-residential), the values can be found in Column 3.

The system must comply with both pre- and post-curfew requirements.

Exclusion(s)

Signage related to emergency exits and external emergency lighting that only illuminates in the event of an emergency/power failure are excluded from the requirements of this credit.

Lighting related to other safety requirements are also excluded, for example, the lighting of ATMs. ||Light pollution to existing neighbouring buildings within campus may be excluded from the criteria for light pollution to neighbouring bodies.|| ^{R1.26.02}

External emergency lighting that is integrated into the general external lighting scheme must comply with the requirements of the credit. For example, lights that act as general lighting but have a battery pack to ensure that they also stay on in the event of a power failure must comply.

26.2 Light Pollution to Night Sky

One (1) point is awarded where it can be demonstrated that one of the following specified reductions in light pollution has been achieved by the project.

- A. Control of upward light output ratio (ULOR) or ||Upward Waste Light Ratio (UWLR)|| ^{R1.26.03}, in accordance with 26.2A; or
 B. Control of direct illuminance, in accordance with 26.2B.

This credit covers all external lighting of a project. In addition to other types of external lighting, for the purposes of this credit, luminaires inside glazed atria and those on the uppermost (uncovered) deck of an outdoor car park are considered to be external.

||The following exterior lighting is exempt from the requirements, provided it is controlled separately from the non-exempt lighting:

- specialized signal, directional, and marker lighting for transportation;
- lighting that is used solely for façade and landscape lighting in MLO lighting zones 3 and 4, and is automatically turned off from midnight until 6 a.m.;
- lighting for theatrical purposes for stage, film, and video performances;
- government-mandated roadway lighting;
- hospital emergency departments, including associated helipads;
- lighting for the national flag in MLO lighting zones 2, 3, or 4; and internally illuminated signage.|| ^{R1.26.04}

Where luminaires are mounted within an atrium or skylight, these must be included as an external light source.

26.2A Control of Upward Light Output Ratio (ULOR) or Upward Waste Light Ratio (UWLR)

For this option, the project team must demonstrate that no external luminaire on the project has a ULOR that exceeds 5%, relative to its actual mounted orientation.

||Projects may use UWLR (Upward Waste Light Ratio) instead of (ULOR) Upward Light Output Ratio when targeting Light Pollution. An external luminaire with a UWLR not exceeding 5% may be used to demonstrate evidence.|| ^{R1.26.03}

Project teams must demonstrate that the ULOR or UWLR provided or calculated in the documentation, is relevant to the as-installed orientation of the luminaire. A luminaire with a ULOR as nominated in the manufacturer's data sheet, will have a different ULOR when the mounting orientation of the luminaire is changed. In the event that any external luminaire is mounted in an orientation other than the one nominated by the manufacturer, the ULOR or UWLR must be recalculated and provided by project teams.

Awnings

Awnings can be used as a means of achieving compliance with the 5% ULOR requirement where a section drawing showing the light output of the luminaire can be provided, and where the awning has the effect of blocking 95% of the output of the lamp above the horizontal. This credit cannot be awarded where it is not clear that the awning is a permanent structure.

26.2B Control of Direct Illuminance

For this option, the project team must demonstrate that direct illuminance from external luminaries on the project produces a maximum initial point illuminance value no greater than:

- 0.5 Lux to the site boundary; and
- Lux to 4.5 metres beyond the site into the night sky, when modelled using a calculation plane set at the highest point of the building.

Calculations shall be in accordance with AS 4282: 2019.

The calculation plane must cover the area between the site boundary and building façade or vertical service to be illuminated. The horizontal calculation plane shall be set at the top of the building fabric, excluding spires. Calculation plane grid points shall have a 0.5m spacing. All illumination results shall be reported to within 2 decimal places. Guidance

DEFINITIONS

Upward Light Output Ratio

The ratio of the luminous flux emitted by a luminaire above the horizontal to that emitted by the lamp.

Outdoor Lighting

Outdoor lighting refers to lighting under the control of the building management. In addition to other types of external lighting, for the purposes of this credit luminaries inside glazed atria and those on the uppermost (uncovered) deck of an outdoor car park are considered to be external.

GUIDANCE

||Time Clock Methodology

To demonstrate compliance with the credit criteria for the Light Pollution to Neighbouring Bodies and/or Light Pollution to Night Sky, projects using a time clock methodology must ensure that all the relevant building lights are commissioned to ensure that the lights are operating as designed. Evidence of commissioning must be submitted as part of the Green Star assessment.|| R1.26.05

For the purposes of the credit criteria Building Commissioning, all building lights, including those installed with a time clock, fall within the definition of 'nominated building systems'.

REFERENCED DOCUMENTS

AS 4282:2019 Control of the Obtrusive Effects of Outdoor Lighting

DOCUMENTATION REQUIREMENTS

Please refer to the *'How Documentation is Described in the Submission Guidelines'* section within the *Introduction* for further guidance on Documentation Requirements for project submissions.

Design Review submissions are optional.

Project teams must submit documentation supporting credit compliance. A list of recommended supporting evidence is provided in the following section, which can be used to demonstrate compliance. Alternate documentation to that listed below can also be used by project teams to demonstrate compliance.

The key requirement is that evidence is provided to support each claim made within the Submission Template.

SUBMISSION CONTENT

Project teams must submit the following documentation:

- Submission Template
- Evidence to support claims made in the Submission Template

Recommended Supporting Evidence

As Built drawings indicating the location of all external luminaires and showing the aiming point and mounting orientation of all external luminaires.

Luminaire schedule* for all external lighting, nominating the type, lighting distribution and quantity of each luminaire and including the relevant photometric data such as ULOR.

Calculation Plots* for all external lighting, showing that all grid points on the calculation plane return compliant Lux values.

Excerpt from lighting control system, or similar, demonstrating automatic deactivation of lights, based on external lux levels, where deactivation is required to achieve compliance.

REVISIONS AND AMENDMENTS

Revision No.	Date of Release	Description
NZv1.0	11/04/2019	Initial release.
NZv1.1	04/2022	<p>R1.26.01 II Reference to a newer standard</p> <p>R1.26.02 II Light pollution to existing neighbouring buildings within campus may be excluded from the criteria for light pollution to neighbouring bodies.</p> <p>R1.26.03 II Projects may use UWLR (Upward Waste Light Ratio) instead of (ULOR) Upward Light Output Ratio when targeting Light Pollution</p> <p>R1.26.04 II Guidance added for exterior lighting that can be exempted</p> <p>R1.26.05 II Guidance added for time clock methodology</p>

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MICROBIAL CONTROL

Credit 27

Points available: 1

AIM OF CREDIT

To recognise projects that implement systems to minimise the impacts associated with harmful microbes in building cooling systems.

CREDIT CRITERIA

This credit includes three alternative pathways to demonstrate the minimisation of impacts associated with harmful microbes.

27 Legionella Impacts from Cooling Systems	1 point is available where the building: Is naturally ventilated; or Has waterless heat-rejection systems; or Has water-based heat rejection systems that includes measures for Legionella control and Risk Management.
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COMPLIANCE REQUIREMENTS

One (1) point is awarded where it can be demonstrated that impacts associated with harmful microbes in building cooling systems are minimised through one of the following:

- A. Naturally ventilated buildings, in accordance with 27A; or
- B. Waterless heat-rejection systems, in accordance with 27B; or
- C. Water-based heat rejection systems that include best practice measures for Legionella Control and Risk Management, in accordance with 27C.

27A Natural Ventilation

For this option, project teams must demonstrate that the building is naturally ventilated and does not require a building cooling heat rejection system.

27B Waterless Heat Rejection Systems

For this option, project teams must demonstrate that any building cooling heat rejection systems do not use or contain water.

27C Water-Based Heat Rejection Systems

For this option, project teams must demonstrate that any installed water-based heat rejection system has been designed to mitigate risks from Legionella.

27C.1 System Design

Where water-based heat rejection systems are present, they must be designed and built in accordance with AS/NZS 3666.1:2011 and the risks managed in accordance with the Building Act 2004 administered by the Ministry of Business, Innovation and Employment (MBIE), and enforced by the local Territorial Authority through the Warrant of Fitness regime. In addition, the system must comply with the following conditions:

- The system is designed and built to maintain constant movement to prevent water stagnation in the system;
- The water contained in the system is never at a temperature between 20°C and 50°C while not moving; and
- The system does not release an aerosol spray during operation.

27C.2 Legionella Risk Management Plan

A Legionella Risk Management Plan shall be provided to the building owner/operator as part of the Building Users Guide. The Legionella Risk Management Plan must meet the requirements of the Building Act 2004 by MBIE and associated regulations, e.g. Health and Safety in Employment Act at the time of project registration.

The Legionella Risk Management Plan must, as a minimum, contain provisions for:

- Regular and periodic inspections (at least monthly) and maintenance of the system(s) (at least every three months) as per AS/NZS 3666.2:2011 or as per a performance based maintenance program developed in accordance with AS/NZS 3666.3:2011;
- Flushing of the system(s) where the system(s) is not in operation for more than three days; and
- Inspection, cleaning and flushing of the system(s) prior to reactivation.

27C.3 Legionella Growth

Water that is stored at a temperature between 20°C and 50°C has a direct impact on the growth of Legionella. The design of the system, and the ongoing operation and maintenance, must ensure that the temperature of the water is not within this range.

Non-compliant Solutions

Disinfection systems, such as ultraviolet light, chlorination, heat or any other method, are not an equivalent method for meeting the requirements of this credit.

Drift eliminators are not an acceptable solution to claim the elimination of aerosol spray during operation or maintenance. An aerosol spray is defined as droplets which are suspended in the air. Typically, these droplets are less than five micrometres in size.

INNOVATION

Innovative Technology or Process – Microbial Control in Warm Water Systems

A project team may claim one (1) Innovation point where it is demonstrated that warm water systems have also been designed to manage the risk of microbial contamination. This may be done in association with operational practices that are to be implemented, as long as there are also design features that facilitate the achievement of the aim of the credit.

Project teams must contact the NZGBC prior to making this Innovation claim, as compliance requirements have to be developed in collaboration with the project team.

REFERENCED DOCUMENTS

The following documents are referenced in this credit:

- AS/NZS 3666.1:2011 Air-handling and water systems of buildings - Microbial control – Part 1 Design, installation and commissioning.
- AS/NZS 3666.2:2011 Air-handling and water systems of buildings - Microbial control – Part 2 Operation and maintenance.
- AS/NZS 3666.3:2011 Air Handling & Water Systems of Buildings – Microbial Control – Part 3 Performance-based maintenance of cooling water systems.
- Ministry of Business, Innovation and Employment (MBIE) - Legionellosis in buildings
- <https://www.building.govt.nz/managing-buildings/managing-your-bwof/legionellosis/>

DISCLAIMER

The steps outlined in the Credit Criteria and Compliance Requirements have been developed to ensure that the risk of Legionella is eliminated as far as is reasonably practicable. Achieving this point does not guarantee that the risk of Legionella has been entirely eliminated from the water-based heat rejection system(s). Eliminating these risks requires constant operational maintenance. The award of points under this credit, confirms only that the system meets the requirements of this credit.

DOCUMENTATION REQUIREMENTS

Please refer to the *'How Documentation is Described in the Submission Guidelines'* section within the *Introduction* for further guidance on Documentation Requirements for project submissions.

Design Review submissions are optional.

Project teams must submit documentation supporting credit compliance. A list of recommended supporting evidence is provided in the following section, which can be used to demonstrate compliance. Alternate documentation to that listed below can also be used by project teams to demonstrate compliance.

The key requirement is that evidence is provided to support each claim made within the Submission Template.

SUBMISSION CONTENT

Project teams must submit the following documentation:

- Submission Template
- Evidence to support claims made in the Submission Template

Recommended Supporting Evidence

Drawings indicating the type and location of all components containing refrigerants and their heat rejection methods.

Legionella Risk Management Plan demonstrating compliance with AS/NZS 3666.2:2011 or AS/NZ 3666.3:2011 and the Building Act 2004; showing the inspection and maintenance periods; and outlining the requirements for flushing and cleaning when the system(s) are not in operation.

Extract(s) from the Commissioning Report demonstrating that the air-conditioning system(s) has been commissioned and found to operate as intended by the design. Where the refrigeration equipment does not use a water based heat rejection system to demonstrate compliance with the Legionella criterion.

REVISIONS AND AMENDMENTS

Revision No.	Date of Release	Description
NZv1.0	11/04/2019	Initial release.

REFRIGERANT IMPACTS

Credit 28

Points available: 1

AIM OF CREDIT

To encourage practices that minimise the environmental impacts of refrigeration and air conditioning equipment.

CREDIT CRITERIA

28 Refrigerant Impacts	<p>1 point is awarded where one of the following criteria is achieved:</p> <p>The calculated Total System Direct Environmental Impact (TSDEI) of the refrigerant systems in the building is less than 15; OR</p> <p>The calculated TSDEI of the refrigerant systems is between 15 and 35, AND a leak detection system with automated refrigerant recovery is in place; OR</p> <p>All refrigerants in the project have an ozone depletion potential of zero, and a global warming potential of 10 or less; OR</p> <p>Where there are no refrigerants employed within the building systems, this point is awarded.</p>
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COMPLIANCE REQUIREMENTS

This credit is applicable to refrigeration equipment that is installed as part of the project. *Any mechanical equipment utilised to air-condition a space is considered 'refrigeration equipment'* for the purposes of this credit. This includes any HVAC&R systems and cold/freezer rooms found in the premises. Refrigeration systems used to cool down data centres are also included under these requirements.

The credit criteria apply to all HVAC&R systems servicing the building, including any supplementary systems that are owned or operated by the building owner, regardless of size.

Refrigeration equipment required for industrial or manufacturing processes and temporary cold/freezer rooms are excluded from the requirements of this credit. Appliances are also excluded from the requirements of this credit.

One (1) point is awarded where project teams demonstrate that environmental impacts from refrigerants leaking into the atmosphere are minimised, in accordance with one of the following requirements:

The combined Total System Direct Environmental Impact (TSDEI) of the refrigerant systems serving the project, calculated in accordance with 28A, is less than 15; OR

The combined TSDEI of the refrigerant systems calculated in accordance with 28A is between 15 and 35; AND a leak detection system in accordance with 28.1B is in place; OR

All refrigerants in the project have an Ozone Depletion Potential (ODP) of zero and a Global Warming Potential (GWP) of 10 or less; OR

There are no refrigerants used in the project.

28A Calculating TSDEI

Total System Direct Environmental Impact (TSDEI) is a weighted average calculation methodology which considers the leakage of refrigerants into the atmosphere. It considers the ozone depletion potential (ODP) and global warming potential (GWP) of the refrigerants used, as well as the type of refrigeration equipment used and the quantity of refrigerant.

The TSDEI is calculated by the *Green Star Refrigerant Impacts Calculator*.

Refrigerants Impacts Calculator

Refrigerant Weighted Average Direct Environmental Impact

This requirement utilises a weighted average impact, based on ozone depletion potential (ODP) and direct global warming potential (GWP) caused by the leakage of refrigerants into the atmosphere. It will be difficult to achieve points in this credit if the refrigerant used does not have an ODP of zero, see Guidance for further detail.

Data Collected for Each Piece of Refrigeration Equipment

To determine the total environmental impact of refrigerants, data shall be collected for each piece of refrigeration equipment, and entered into the *Refrigerant Impacts Calculator*, which will generate and calculate the results. The following must be collected for every piece of refrigeration equipment in the project:

ODP = Ozone Depletion Potential of Refrigerant

GWP = Global Warming Potential (100-year) relative to CO₂

m = Specific refrigerant charge (kg of refrigerant per kW_r cooling capacity)

Additional information regarding the calculation of the TSDEI can be found in the Guidance section.

28B Leak Detection Systems

Where the calculated TSDEI is between 15 and 35, any refrigeration equipment with a cooling capacity above 50kW_r shall be fitted with an automated leak detection system. Leak

detection system(s) must be designed in accordance with Section 4.8 and Appendix G of *AS/NZS 1677.2:1998, Refrigerating Systems - Safety Requirements for Fixed Applications*.

In addition, an automated refrigerant recovery system which is linked to the leak detection system shall be in place. The recovery system must be capable of recovering 95% (by weight) of the maximum refrigerant charge. Refrigerants are to be pumped to a dedicated refrigerant storage tank. It is not acceptable to pump refrigerant to other parts of the chiller or to portable storage cylinders.

The piece of equipment that is fitted with an automated leak detection system must be located in an appropriately designed enclosure that makes leak detection possible. Essentially the piece of equipment needs to be located in a space where the leaking refrigerant (which is typically heavier than air) can fall to the floor, pool and build to a detectible concentration. If refrigerant is lighter than air, then the opposite is needed (pooling on ceiling).

28C Low Impact Refrigerants

For this option, the point will be awarded where all refrigerants in the project have an ODP value of 0 and a GWP value of less than 10. At the time of publication, the refrigerants that are known to satisfy this requirement include: water, carbon dioxide, some hydrofluoroolefins (e.g. R-1234, R-514A, R-1234ze), R-1233ze, propane, pentane, butane, propylene, ethane or isopropane.

28D No Refrigeration Equipment

For this option, the point will be awarded where project teams demonstrate that there is no refrigeration equipment present in the project.

DEFINITIONS

Cooling Capacity

Refers to the ability of a refrigeration or air conditioning system to remove heat and is measured in thermal watts (W) or kW_r (kilowatts of refrigeration) defined at specific operating conditions.

Refrigerant GWP

Global Warming Potential (GWP) is the relative amount of degradation the refrigerant can cause to global warming.

The 100-year time horizon Global Warming Potential (GWP₁₀₀) relative to CO₂ is used by the UN Intergovernmental Panel on Climate Change (IPCC) as it provides a measure of potential impact on the global warming over a 100 year timescale compared to carbon dioxide.

Refrigerant ODP

Ozone Depletion Potential (ODP) is the relative amount of degradation the refrigerant can cause to the Ozone Layer. The ODP of all refrigerants is compared to the ODP of refrigerant R11 as a datum reference, and thus R11 has an ODP of 1.0. The lower the ODP, the lower the impact on the ozone layer.

GUIDANCE

Refrigerant Weighted Average Direct Environmental Impact

The intent of this requirement is to evaluate the total direct environmental impacts of refrigerants in relation to the refrigeration system, when normalised for leakage risks, size of refrigerant charge, efficiency, ODP, GWP, and year of operation. The evaluation of the effects of ozone depletion and global warming is based on the lifecycle ozone depletion factor (LCODF) and the lifecycle direct global warming factor (LCGWF), normalised for the specific charge rate (efficiency, kg/kWr) of the system, and per-year of equipment life.

Life cycle ozone depletion factor (LCODF)

$$LCODF = \frac{ODP \times m \times (L \times life + E)}{Life}$$

Life cycle direct global warming factor (LCGWF)

$$LCGWF = \frac{GWP \times m \times (L \times life + E)}{Life}$$

Where:

LCODF = life cycle ozone depletion factor [kg CFC-11/kWr.year]

LCGWF = life cycle global warming factory [kg CO₂ / kWr.year]

ODP = Ozone Depletion Potential of Refrigerant, 0 < ODP < 1

GWP = Global Warming Potential (100-year), 0 < GWP < 12,000 kg CO₂/kg

m = Specific refrigerant charge (kg of refrigerant per kWr cooling capacity), 0.1 < m < 2 kg/kWr

L = Refrigerant leak rate (% of refrigerant charge leaked per year), 2% or 7%

E = End of life loss, 0.1 (default 10%)

Life = Equipment service life, 10 < Life < 35 years

The specific refrigerant charge (kg/kWr) is a measure of the refrigerant mass a system requires to produce a specific amount of cooling capacity. The higher this number, the more charge-intensive the system, leading to a potentially higher risk of leakage.

The actual leakage of refrigerant from a system is difficult to measure on a live site. Recharging refrigerant back to the nominal and commissioned level is not only expensive,

but is generally only done when something goes wrong, or a leak is detected in the system. As such, it is difficult to quantify an annual leak rate from actual measurements specific to the site.

The refrigerant leak rate (L) directly impacts on both the LCODF and LCGWF factors, and as such, adoption of fixed leakage rates for both low and high-pressure refrigerant ensures consistency in the evaluation. This credit uses assumed leak rates sourced from ASHRAE at 2% and 7% per year for low and high-pressure refrigerants respectively. The leak rate adopted is mandated based on the refrigerant type selected in the calculator and will affect the overall direct environmental impacts of the refrigerant.

Total System Direct Environmental Impact (TSDEI) of Refrigerants

Following this methodology, a capacity-weighted average total direct environmental impact is used in this credit to evaluate multiple pieces of HVAC equipment of different sizes, types of refrigerants, and types of building systems. This forms a practical evaluation method that accounts for the possible variations in the number of systems (and system types) in a building.

Average Weighted Direct Environmental Impact (DEI) of a single unit

$$(A \times LCODF) + (B \times LCGWF) = DEI$$

Total System Direct Environmental Impact (TSDEI) for all systems in a building

$$\frac{\sum\{(A \times LCODF + B \times LCGWF) \times Q_i\}}{Q_t} = TSDEI$$

Where:

A = 100,000

B = 1

Q_i = cooling capacity of rated equipment (kW_r)

Q_t = sum of cooling capacity of all rated equipment included in the building (kW_r)

ADDITIONAL INFORMATION

The following Standards and Guidelines are referred to in this credit:

AIRAH Refrigerant Selection Guide 2003

AS/NZS 1677.2:1998, Refrigerating Systems – Safety Requirements for Fixed Applications

AS/NZS 3666:2011, Air-Handling & Water Systems of Buildings – Microbial Control Parts 1 to 4

HB40.1: 2001: The Australian Refrigeration and Air-conditioning Code of Good Practice (Appendices 3 and 4).

Australia and New Zealand Refrigerant Handling Code of Practice (2007) – Parts 1 to 3

DOCUMENTATION REQUIREMENTS

Please refer to the '*How Documentation is Described in the Submission Guidelines*' section within the *Introduction* for further guidance on Documentation Requirements for project submissions.

Design Review submissions are optional.

Project teams must submit documentation supporting credit compliance. A list of recommended supporting evidence is provided in the following section, which can be used to demonstrate compliance. Alternate documentation to that listed below can also be used by project teams to demonstrate compliance.

The key requirement is that evidence is provided to support each claim made within the Submission Template.

SUBMISSION CONTENT

Project teams must submit the following documentation:

- **Submission Template**
- **Evidence** to support claims made in the Submission Template

Recommended Supporting Evidence

28A CALCULATING TDSEI

Completed *Refrigerant Impacts Calculator* including evidence supporting all claims and calculations.

Refrigeration System Data Sheets outlining system attributes including refrigeration type, capacity, charge rate and other data required for the *Refrigerant Impacts Calculator*.

Mechanical drawings showing distance between evaporator and condenser (for split systems and VRF/VRV and multi-head units), along with calculations of the additional refrigerant in this pipework, and identification of 2, 3 or 4 pipe systems.

28B LEAK DETECTION SYSTEMS

Completed *Refrigerant Impacts Calculator* including evidence supporting all claims and calculations.

Refrigeration System Data Sheets outlining system attributes including refrigeration type, capacity, charge rate and other data required for the *Refrigerant Impacts Calculator*.

Extract(s) from the Commissioning Report demonstrating that leak detection systems have been provided and perform as outlined in 28B. The relevant sections must be highlighted.

28C LOW-IMPACT REFRIGERANTS

Refrigeration System Data Sheets outlining refrigerant used

28D NO REFRIGERATION EQUIPMENT

Confirmation Letter stating that no refrigeration equipment is present in the project.

REVISIONS AND AMENDMENTS

Revision No.	Date of Release	Description
NZv1.0	11/04/2019	Initial release.

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INNOVATION

The *Green Star – Design & As Built* 'Innovation' category aims to recognise the implementation of innovative practices, processes and strategies that promote sustainability in the built environment.

The 'Innovation' category also rewards projects that can demonstrate that sustainability principles have been incorporated not at a project level, but also in a broader sense. This may include, for instance, collaboration between building owners and tenants, disclosure of the financial impacts of sustainability or delivering sustainable education content to site workers.

The 'Innovation' category rewards projects that achieve the following outcomes:

- Meeting the aims of an existing credit using a technology or process that is considered innovative.
- Implementing a sustainability initiative that substantially contributes to the broader market transformation towards sustainable development.
- Delivering a substantial improvement on the benchmark required to achieve full points;
- Addressing an Innovation Challenge.
- Addressing a 'global sustainability' issue as covered by other international sustainability rating systems.

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INNOVATION

Credit 29

Points available: 10

AIM OF CREDIT

To recognise and encourage pioneering initiatives in sustainable design, process or advocacy.

CREDIT CRITERIA

Up to **10 points** may be awarded where it has been demonstrated that an innovative sustainability design, process or advocacy initiative has been implemented under any of the following criteria. Unless indicated elsewhere, each initiative will be awarded one point.

29.1 Innovative Technology or Process	The project meets the aims of an existing credit using a technology or process that is considered innovative in New Zealand or the world.
29.2 Market Transformation	The project has undertaken a sustainability initiative that substantially contributes to the broader market transformation towards sustainable development in New Zealand or in the world.
29.3 Improving on Green Star benchmarks	<p>The project has achieved full points in a Green Star credit and demonstrates a substantial improvement on the benchmark required to achieve full points.</p> <p>For credits where this Innovation criterion is applicable, improved benchmarks are included in the 'Innovation' section of the credit.</p>
29.4 Innovation Challenge	<p>The project can target any of the current Innovation Challenges that are published on the NZGBC website.</p> <p>Alternatively, where the project addresses a sustainability issue not included within any of the credits in the existing Green Star rating tools, projects may propose a new Innovation Challenge.</p>
29.5 Global Sustainability	Project teams may adopt an approved credit from a Global Green Building Rating tool that addresses a sustainability issue that is currently outside the scope of this Green Star rating tool.

COMPLIANCE REQUIREMENTS

29.1 Innovative Technology or Process

To claim this Innovation criterion, the project team must show that an initiative is innovative by demonstrating that the technology or process is not commonly used in the state where the project is located; within New Zealand's building industry; or globally, depending on the context of the Innovation claimed.

Innovation points are more likely to be awarded for projects that:

- Employ strategies that achieve Green Star outcomes through passive systems.
- Employ technologies or strategies that achieve an outcome in Green Star through significant improvement or gains when compared against best practice technologies.
- Employ technologies or strategies that are new or adopted from other industries that achieve the relevant Green Star outcome.

The following technologies or processes are considered innovative and will be automatically awarded one (1) point. See the relevant credit for additional information.

Credit	Technology or Process	Description or Benchmark
Thermal Comfort	Individual Comfort Control	One (1) point is available for providing individual comfort control in all primary spaces.
Greenhouse Gas Emissions	Onsite Renewable Energy	Up to two (2) points may be awarded for installing onsite renewable energy sources.
Greenhouse Gas Emissions	Building Integrated Photovoltaics	One (1) point is available where Building Integrated Photovoltaic (BIPV) systems contribute to the reduction of greenhouse gas emissions by at least 15%. This point can be awarded in addition to the 'Onsite Renewable Energy' points highlighted above.
Potable Water	Heat rejection systems in equipment requiring process cooling	One (1) point is available where potable water use from heat rejection in process cooling is reduced.
Potable Water	Passive Design	Projects that use of passive water treatment systems (such as vegetation to treat water passively) to achieve at least one point in the <i>Potable Water Calculator</i> .

Credit	Technology or Process	Description or Benchmark
Microbial Control	Microbial control in warm water systems	Warm water systems have been designed to manage the risk of microbial control.

Technologies or processes which are, in common practice, ineligible for Innovation points can be found in the 'Appendix: Non-Innovation Claims' section of this credit.

29.2 Market Transformation

To claim this Innovation criterion, the project team must show that the initiative substantially contributes to the broader market transformation towards sustainable development in New Zealand or the world. It must be shown that the initiative is not only being used in the building as a one-off solution but that the initiative has led to market transformation or to increased adoption of the solution.

Innovation points are more likely to be awarded for projects that:

- Increase the knowledge and capacity of the building industry.
- Increase the knowledge of sustainable building practices in regional areas.
- Change the regulatory environment.
- Use technologies or strategies which, if adopted widely, would lead to a significant reduction of impacts in the built environment.

The following initiatives will be automatically awarded an Innovation point, under the Market Transformation criteria. See the relevant credit for additional information.

Credit	Technology or process	Description or benchmark
Commissioning and Tuning	Soft Landings	The building is designed, built, commissioned, and tuned by adopting a 'Soft Landings' approach.
Greenhouse Gas Emissions	Passive Design	Projects that achieve more than 15 points through passive design or without energy generation or the purchase of offsets in the 'Greenhouse Gas Emissions' credit can claim an Innovation point.
Life Cycle Impacts - Concrete	Sustainable sourcing of Concrete Aggregates	Project teams who demonstrate the use of concrete aggregates that have chain of custody, or come from a responsible source can claim an Innovation Category point.

29.3 Improving on Green Star Benchmarks

To claim this Innovation credit criterion the project must demonstrate a substantial improvement to a specific benchmark (environment, social, economic), addressed by an existing Green Star credit which the project is targeting.

Credits eligible for improvements on benchmarks are identified in the table below. A maximum of two (2) points may be claimed for each 'Improving on Green Star Benchmarks' initiative. See the relevant credit for additional information.

Credit	Criterion	Benchmark
Commissioning and Tuning	Supplementary or tenancy fitout systems review	One (1) additional point may be awarded where project teams and building owners carry out a comprehensive services and maintainability review of supplementary or tenancy fitout systems, in addition to all nominated base building systems as outlined in the credit.
Indoor Pollutants	Ultra low VOC paints	One (1) additional point may be awarded where over 50% of paints (by volume or cost) specified in the building have a maximum TVOC content of 5g/L. This must be verified by one of the approved paint test methods.
Greenhouse Gas Emissions	Reference Building Pathway	On-site energy renewable systems produce 5% more energy than what is required by the building. Energy must be exported or stored on site. One (1) point is available for a 5% improvement, with a maximum of two (2) points available for a 10% improvement.
Sustainable Transport	No new car parks on site	One (1) point will be awarded where no new car parking is provided on-site. This applies regardless of who operates the car parking, even if it's operated by an external party.
Potable Water	Discharge to sewer	One (1) Innovation category point can be claimed for a 90% or greater reduction in flow to sewer as determined by the <i>Potable Water Calculator</i> .
Life Cycle Impacts	Comparative Life Cycle Assessment	One (1) Innovation point is awarded where the cumulative impact reduction as defined within the credit is increased by 20% to a total of 150%. An additional 20% improvement is rewarded with a second point.

Credit	Criterion	Benchmark
Sustainable Products	Product Transparency and Sustainability	One (1) Innovation point is awarded where the percentage of compliant products is increased by 3% to 12%. A further 3% improvement is rewarded with a second point.
Construction and Demolition Waste	Reduction of Construction and Demolition Waste	One (1) point is available where the construction and demolition waste going to landfill meets a fixed benchmark of 5kg of waste per square meter of gross floor area (GFA), or at least 90% of the waste generated during construction and demolition has been diverted from landfill..
Stormwater	Stormwater Pollution Targets	Up to two (2) additional points may be awarded where projects can demonstrate achieving Pollution Reduction Targets from column B (1 point) or C (2 points) as stated in Table 25.2.

Other Eligible Credits

It is possible to claim Innovation points for 'Improving on Green Star Benchmarks' of other credits not listed in the table above. When doing so, project teams must demonstrate how the improvement is significant. For example, within the 'Greenhouse Gas Emissions' credit, reducing emissions from lighting is recognised within the Prescriptive Pathway. The benchmark for lighting reduction is set at 30%. An improvement of 35% is unlikely to be awarded an Innovation point. However, an improvement of 50% would likely be awarded an Innovation point, as that is a significant reduction in lighting power density.

29.4 Innovation Challenge

To claim innovation under this criterion, projects must address an issue that is not included within the *Green Star – Design & As Built* rating tool. This may be done in two ways:

Current Innovation Challenge

The project team demonstrates compliance with any of the Innovation Challenges listed on the NZGBC website. These Innovation Challenges have been designed to challenge owners, developers, tenants and project teams to create even more sustainable projects.

Current Innovation Challenges applicable to *Green Star – Design & As Built* include:

- Powered by Renewables
- Responsible Carbon Impacts
- Carbon Positive New Buildings
- Affordable Housing
- Building Air-Tightness

- Community Benefits
- Culture, Heritage and Identity
- Design for Active Living
- Financial Transparency
- High Performance Site Offices
- Integrating Healthy Environments
- Local Procurement
- Marketing Excellence
- Social Return on Investment/TVA
- Universal Design
- Te Aranga Design

Please refer to the NZGBC website for the most up-to-date listing of Innovation Challenges and supporting information.

Projects are eligible to claim Innovation Challenges that were available at the time of project registration.

New Innovation Challenge

The project team may address an issue not included within any of the credits in the existing Green Star rating tools or an existing Innovation Challenge. Where this is the case, the project team may develop an Innovation Challenge with the NZGBC and demonstrate compliance with that Innovation Challenge, in order to claim an Innovation point. Innovation Challenges will be made public and available to other project teams to comply with in the future.

Please refer to the NZGBC website for additional information on applying for new Innovation Challenges.

29.5 Global Sustainability

To claim this Innovation criterion, the project team must demonstrate compliance with an approved credit from another World Green Building Council (WGBC) member rating tool that covers a sustainability topic that is not included in the *Green Star – Design & As Built* rating tool.

||Project teams are not required to have been awarded the pre-approved credits from other rating tools listed under the Global Sustainability credits in *Green Star - Design & As Built* when making claims under the Global Sustainability credit. These pre-approved credits may also be applied to other tools of *Green Star - Interiors* where appropriate.

The project team is required to outline and supply evidence to validate the claim in lieu of official WGBC member rating tool accreditation.

Project teams using all Green Star tools may also target other items not listed as pre-approved, provided they are considered outside of the scope of the Green Star rating tools. In this case, a free-of-charge technical question should be submitted to the NZGBC for approval. || R1.29.01

GREEN STAR

Green Star – Performance NZ

Green Cleaning
Procurement and Purchasing
Groundskeeping Practices
Site Maintenance Procedures

Green Star – Communities NZ

Community Investment
Incentive Programs

Green Star – Interiors NZ

Ergonomics
Quality of Amenities

BREEAM

New Construction (NC) 2016

Design for Durability and Resilience
Efficient Use of Land
Responsible Construction Practices

DGNB

Integration with Public Art
Building related Life-cycle costs
Value Retention suitability for third party use
Backup capacity of technical systems

LEED

LEED NC v4

Integrative Process
Design for Adaptability
Construction Activity
Social equity within the supply chain

LIVING BUILDING CHALLENGE 3.0

Habitat Exchange
Beauty

IWBI

WELL Building Standard

Please see 'Green Star to WELL Cross-walk' document.

<http://www.gbca.org.au/shop/reports/>

PASSIVE HOUSE

Criteria for the Passive House

Please see 'Green Star to Passive House Cross-walk' document.

<http://www.gbca.org.au/shop/reports/>

GUIDANCE

Up to ten initiatives can be documented and submitted to achieve the maximum total of 10 points in the Innovation category. Projects will be assessed against the Innovation guidance current at the time of the project's registration.

Assessing Innovation

Innovation points are assessed and awarded at the discretion of the Certified Assessor(s). In reviewing the submission, the Certified Assessor(s) will consider the relative benefits and improvement as compared to other Green Star credits. Project teams can submit a Technical Question to receive advice on whether an initiative may be considered a valid Innovation claim, however the award is ultimately at the discretion of the Certified Assessor(s).

An Innovation submission must be a concise report that clearly articulates the nature and magnitude of the benefit achieved by proposed initiative(s). The reports must distinctly justify (and quantify whenever relevant) the sustainability benefits of the initiative. Submissions that are purely qualitative and/or unsupported by documented data will not be awarded Innovation points.

DOCUMENTATION REQUIREMENTS

Please refer to the *'How Documentation is Described in the Submission Guidelines'* section within the *Introduction* for further guidance on Documentation Requirements for project submissions.

Design Review submissions are optional.

Project teams must submit documentation supporting credit compliance. A list of recommended supporting evidence is provided in the following section, which can be used to demonstrate compliance. Alternate documentation to that listed below can also be used by project teams to demonstrate compliance.

The key requirement is that evidence is provided to support each claim made within the Submission Template.

SUBMISSION CONTENT

Project teams must submit the following documentation:

- Submission Template
- Nominating which innovation categories are being targeted by the project
- A description of the initiatives that are to be considered under the innovation category
- Supporting Documentation

Project teams shall provide documentation supporting their innovation claims. This may be in the form of any of the NZGBC's accepted list of evidence and must demonstrate the benefits of the initiative and how it can be deemed innovative.

REVISIONS AND AMENDMENTS

Revision No.	Date of Release	Description
NZv1.0	11/04/2019	Initial release.
NZv1.1	04/2022	R1.29.01 II Clarifications added for 29.5 Global sustainability
NZV1.1.1	07/2023	Digital infrastructure is removed as it cannot be awarded as an innovation

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APPENDIX: NON-INNOVATION CLAIMS

The following list covers technologies or strategies which, in common practice, would be ineligible for Innovation points in Green Star.

29.1 Innovative Technology or Process

Category	Technology or Process	Description or Benchmark
Indoor Environment	Ventilation systems	Underfloor ventilation or displacement ventilation, and the use of ceiling (or any other) fans or task air systems. To achieve points, the project team would need to show how a certain technology differs from a comparable system, and how it provides superior comfort or ventilation. Merely showing an equivalent result will not result in project teams being awarded Innovation Category points.
Indoor Environment	Operational practices	The use of any operational policy to address VOC or formaldehyde levels in a space will not result in project teams being awarded Innovation Category points.
Indoor Environment	White noise systems	The use of white noise-generating equipment will not result in project teams being awarded Innovation Category points.
Indoor Environment	Daylight	Skylights, light tubes or atriums designed to bring daylight into a space will not generally result in project teams being awarded Innovation Category points. Instead, these methods are more likely to be recognised as a way to demonstrate compliance with the ' <i>Daylight and Views</i> ' credit.
Indoor Environment & Energy	Facade Systems	The combination of elements in a facade (blinds, shading devices, or 'active facades') will not generally result in project teams being awarded Innovation Category points for glare control or energy reduction. For active facades, the project team must demonstrate environmental benefits above and beyond daylight glare reduction. Quantifying a reduction in thermal gains in a way that that has already been recognised in the ' <i>Greenhouse Gas Emissions</i> ' credit will not generally result in project teams being awarded Innovation Category points either.

Category	Technology or Process	Description or Benchmark																		
Energy	Offsets	The use of greenhouse gas emissions offsets of any kind, including carbon credits, will not result in project teams being awarded Innovation Category points.																		
Energy	Efficient energy systems or energy generation systems	<p>The use of the following systems will not result in project teams being awarded Innovation Category points. Should they be claimed as innovative for the purposes of Green Star, the project team must justify why these systems are innovative compared to those used elsewhere and how the benefits of these systems are not already rewarded in other existing Green Star credits. Simply installing them as part of a project is not sufficient.</p> <table> <tbody> <tr> <td>Wind turbines</td> <td>regenerative lift braking</td> </tr> <tr> <td>biodiesel procurement</td> <td>thermal storage</td> </tr> <tr> <td>cogeneration</td> <td>low-energy lifts</td> </tr> <tr> <td>solar hot water</td> <td>night purging</td> </tr> <tr> <td>thermal labyrinths</td> <td>building management and control systems</td> </tr> <tr> <td>tri-generation</td> <td>mixed use ventilation or natural ventilation</td> </tr> <tr> <td>gas-boosted hot water</td> <td>active facades</td> </tr> <tr> <td>fuel cells</td> <td>removal of building features (such as cooling towers)</td> </tr> <tr> <td>instant hot water systems</td> <td>Roof mounted or rack mounted solar panels</td> </tr> </tbody> </table>	Wind turbines	regenerative lift braking	biodiesel procurement	thermal storage	cogeneration	low-energy lifts	solar hot water	night purging	thermal labyrinths	building management and control systems	tri-generation	mixed use ventilation or natural ventilation	gas-boosted hot water	active facades	fuel cells	removal of building features (such as cooling towers)	instant hot water systems	Roof mounted or rack mounted solar panels
Wind turbines	regenerative lift braking																			
biodiesel procurement	thermal storage																			
cogeneration	low-energy lifts																			
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thermal labyrinths	building management and control systems																			
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gas-boosted hot water	active facades																			
fuel cells	removal of building features (such as cooling towers)																			
instant hot water systems	Roof mounted or rack mounted solar panels																			
Energy & Water	Minor efficiency improvements	The use of equipment, systems and fixtures that feature slight improvements in efficiency or efficacies, will not result in project teams being awarded Innovation Category points, as these benefits are addressed by the Greenhouse Gas Emissions credit or the Potable Water credit (or other relevant credits).																		

Category	Technology or Process	Description or Benchmark
Water	Efficient or reuse systems	<p>The use of the following systems will not result in project teams being awarded Innovation Category points. Should they be claimed as innovative for the purposes of Green Star, the project team must justify why these systems are innovative compared to those used elsewhere and how the benefits of these systems are not already rewarded in other existing Green Star credits. Simply installing them as part of a project is not sufficient.</p> <p>aquifer use</p> <p>rainwater tanks</p> <p>active greywater systems</p> <p>active blackwater tanks</p> <p>sewer mining systems</p> <p>the use of reticulated recycled water.</p> <p>river or lake heat rejection</p>
Transport	Private transport systems	<p>The use of buses or other methods of mass transport that circulate between a project and its closest public transport option will not result in project teams being awarded Innovation Category points. They can, however, form part of an appropriate strategy to achieve points in the <i>Sustainable Transport</i> credit.</p>

29.3 Improving on Green Star Benchmarks

Improving on the following benchmarks will not be rewarded with an Innovation point. This occurs where credits either don't allow for improvements, or offer negligible environmental benefits if they did.

- Green Star Accredited Professional
- Sustainable Transport: Reduced Car Parking Provision (unless no car parks are provided)