Waterway Protection

Nature

Credit: 39

Points: 4

Outcome

Local waterways are protected, and the impacts of flooding and drought are reduced.

Criteria

Credit Achievement	**2 points**	• The project demonstrates that the post-development peak Average Recurrence Interval (ARI) event (2, 5, and 10 year) discharge from the site does not exceed 80% of the pre-development peak ARI event (2, 5, and 10 year) discharge. • Specified pollution reduction targets are met.
Exceptional Performance	**2 points**	In conjunction with the *Credit Achievement*: • The project demonstrates that the post-development peak Average Recurrence Interval (ARI) event (2, 5, and 10 year) discharge from the site does not exceed the peak ARI event (2, 5, and 10 year) discharge that would be generated by a greenfield site (assuming grassed or forested site coverage). • Specified additional pollution reduction targets are met.

Additional information

Stage implementation

Strategy | Brief | **Concept** | **Design** | Tender | **Construction** | **Handover** | Use

Synergies with other credits

- Nature Connectivity
- Biodiversity Enhancement
- Water Use
- Climate Change Resilience
- Operations Resilience

Sustainable Development Goals

- Goal 13 (Climate Action)
- Goal 14 (Life Below Water)

Relevant reporting initiatives

- GRESB

Requirements

Credit Achievement

The project must comply with **both** of the following criteria:

- Stormwater Volume
- Pollution Reduction Targets

Stormwater Volume

Credit achievement 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 80% of the pre-development peak event stormwater discharge, using the 2 year, 5 year and 10 year Average Recurrence Intervals (ARI). The effect of climate change on rainfall can be obtained from the HIRDS v4 database (NIWA, 2019).

Climate Change Scenarios

If the project is targeting the 'Climate Change Resilience' credit (16), 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 'Climate Change Resilience' credit (16), the project may refer to local territorial authority (TA) climate change adjustment requirements, or if no local TA requirements, refer NIWA HIRDS RCP 8.5, 2081-2100.

Where the pre-development site may contribute groundwater recharge for streams, rivers, lakes or other sensitive waters, the project must demonstrate recharge equivalent to pre-development rates.

Pollution Reduction Targets

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). 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.

All stormwater discharged from site meets specified pollution reduction targets listed in the table below when compared to untreated runoff over the simulation period.

Pollutant	Reduction Target (% of the post development annual average load)
Total Suspended Solids (TSS)[1]	85%
Gross Pollutants	90%
Total Nitrogen (TN)[2]	45%
Total Phosphorus (TP)[2]	65%
Total Copper	60%
Total Zinc	60%

Pollutant	Reduction Target (% of the post development annual average load)
Environmental Management	Minimise the risk of chemical pollutants and other toxicants entering the stormwater system, including by, but not limited to: • Chemical storage, loading, refuelling or work areas must install bunding, with any spills draining to trade waste or appropriate treatment devices. These areas must have an awning or roofing to separately divert rainfall into the stormwater system. • If a site has more than 200m² of uncovered areas where vehicles are likely to transit and/or park, then hydrocarbon treatment devices must be installed, specified to remove at least 98% of hydrocarbons, sized to treat a 1-in-3 month ARI (4EY) flow. Electric vehicle only parking areas do not count towards the total.

**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.

***Load includes particulate and dissolved fraction.

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).

Copper and Zinc removal rates may be determined using median removal rates for treatment devices found in the International Stormwater BMP Database, most recent edition.

Exceptional Performance

In conjunction with the *Credit Achievement*, the project must comply with **both** of the following criteria:

- Stormwater Volume
- Pollution Reduction Targets

Stormwater Volume

The project demonstrates that the post-development peak Average Recurrence Interval (ARI) event (2, 5, and 10 year) discharge from the site does not exceed the peak ARI event (2, 5, and 10 year) discharge that would be generated by a greenfield site (assuming grassed or forested site coverage)

See *Credit Achievement* requirements for further information.

Pollution Reduction Targets

All stormwater discharged from site meets specified pollution reduction targets listed in the table below.

Pollutant	Reduction Target (% of the post development annual average load)
Total Suspended Solids (TSS)**	90%
Gross Pollutants	95%
Total Nitrogen (TN)***	60%
Total Phosphorus (TP)***	70%

Pollutant	Reduction Target (% of the post development annual average load)
Total Copper	80%
Total Zinc	80%
Environmental Management	See *Credit Achievement* requirements for further information.

**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.

***Load includes particulate and dissolved fraction.

Submission content

Submissions for this credit must contain:

- **Submission form**
- **Evidence** to support claims made in the submission

Recommended evidence:

Stormwater volume

- Calculation/Modelling Report by a suitably qualified professional. The report should describe:
  - Civil and Landscape drawings showing the stormwater collection, storage and treatment facilities and detailing their functional elements
  - Hydraulics drawings showing all the capture, storage, re-use 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)

Pollution Reduction Targets

- Civil/Hydraulics/Landscape drawings showing the stormwater collection, storage, infiltration, and treatment facilities and detailing their functional elements
- Independently verified performance certification for each manufactured stormwater treatment device, proving its ability to achieve the pollution reduction targets.

Alternate documentation can also be used by project teams to demonstrate compliance.

The recommended evidence listed above is applicable to the as built submission. See the Design Assessment section in the Introduction for more information on submitting evidence for the Design assessment.

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

Guidance

On-site detention (OSD) and flood control

This credit focuses on protecting downstream ecosystems. The aim of the peak flow reduction is to reduce hydrologic and flooding impacts on downstream ecosystems.

The drainage system design must also consider flood control considerations including minor (nuisance) and major (catastrophic overland flow) systems.

For some sites, local drainage authorities may require limitation of post-development peak event discharge from the site. This is commonly called On Site Detention (OSD). OSD is not an integrated water management solution for Green Star purposes, but relevant local requirements should also be integrated and included in the design and submission documentation for consistency and buildability.

Typical urban annual load

Typical urban annual load reductions can be estimated using continuous simulation modelling software such as MUSIC, SWMM, XPSWMM, or InSite. Where available, relevant guideline values for pollutant concentrations for the catchment land use and surface type should be used. In areas where there are no specific guidelines, reference can be made to sources such as Australian Runoff Quality (ARQ, 2006).

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. This is also sometimes called Integrated Water Management (IWM).

Pre-determined infrastructure

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. Some sites may also be ‘not applicable’ for the volume control target if for example they are in an area of downstream stormwater harvesting and wish to maximise stormwater from the site. If this is the case the project team should submit a Technical Question to have this approach approved.

Climate scenarios

If the project is targeting the *Climate Change Resilience* credit, the Risk Assessment included in this credit submission should be used to determine the appropriate climate change scenario. If the project is not targeting the Climate change resilience credit, the project may refer to local TA climate change adjustment requirements, or if no local TA requirements, refer NIWA HIRDS RCP 8.5, 2081-2100.

Modelling

Pollutant export modelling using computer programs such as MUSIC, STORM etc. predict the discharge pollutant loads for the total site area. The results of the simulation must show a comparison against the relevant reduction targets for offsite reductions.

Reduction in average annual stormwater discharge

A reduction in average annual stormwater discharge refers to the average annual reduction in stormwater volume discharged from the development, with treatment, compared with the stormwater volume that would be discharged without treatment.

The volume reduction must be achieved through a combination of evaporation, transpiration, harvesting and retention, pervious paving, and other Water Sensitive Urban Design practices.

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.

Supporting information

The following resource(s) are referenced in this credit:

- Australian Rainfall & Runoff, Engineers Australia (2019), Commonwealth of Australia (Geoscience Australia) 2019
- Australian Runoff Quality (ARQ, 2006)
- Model for Urban Stormwater Improvement Conceptualisation (MUSIC) model (CRCCH, 2005)
- STORM computer modelling program
- WSUD Engineering Procedures – Stormwater (CSIRO, 2005)
- EPA Victoria: Draft urban stormwater management guidance (Publication 1739, October 2020)
- Auckland Council - GD01, GD04, TP108
- International BMP Database
- NIWA – CliFlo Database
- NIWA – River Flood Stats App
- Christchurch City Council – Waterways, Wetlands, and Drainage Guide
- Wellington Water Regional Standard for 3 Waters
- Wellington Water Reference Guide for Design Storm Hydrology
- US EPA - Storm Water Management Model (SWMM)
- US Army Corps of Engineers - HEC-HMS
- AutoDesk Storm & Sanitary Analysis