Emi-5 Stormwater

POINTS AVAILABLE 3

AIM OF CREDIT

To encourage and recognise the minimisation of peak stormwater flows and the protection of receiving waters from pollutants.

CREDIT CRITERIA

Up to three points are available. Points are awarded where the post-development peak 1.5 year Average Recurrence Interval (ARI) event discharge from the site does not exceed the pre-development peak 1.5 year ARI event discharge;

AND

- For one point, stormwater leaving the site meets the Pollution Reduction Targets in Column A of Table Emi-5.1;
- For two points, stormwater discharge meets the Pollution Reduction Targets in Column B of Table Emi-5.1;
- For three points, stormwater discharge meets the Pollution Reduction Targets in Column C of Table Emi-5.1.

COMPLIANCE REQUIREMENTS

Note that the following documentation, required in the General section of the Green Star submission forms part of the compliance requirements for this credit:

- Scaled site plans (or scaled aerial site photographs) with land types indicated and quantified, generated at or prior to site purchase.

Where the site has been owned by the current owner for more than 10 years, the documentation above may be substituted with:

- Evidence depicting the state of the site at least 10 years prior to the start of the current site works. This evidence must show whether the site was a greenfield or brownfield site, and whether it contained any buildings; and
- Site documentation such as scaled site plans OR aerial photographs generated prior to the start of the current site works:
  - showing the proposed built area for the new development indicated and quantified;
  - where the site contains any existing buildings, showing the footprint area of the existing buildings and the area of the new buildings;
  - identifying the land types present on site in accordance with Eco-4 Change of Ecological Value Calculator; and
  - showing, and identifying the areas in a radius no less than 100 metres around the site.

Currently, the use of biological treatment systems is generally considered the only method of achieving compliance with the Pollution Reduction Targets contained in column C of Table Emi- 5.1. Where a treatment train that does not contain biological treatment is being used to achieve the Pollution Reduction Targets in column C of Table Emi-5.1, independently verified performance certification is required to show that the equipment is capable of achieving those targets.

Table Emi-5.1: – Pollution Reduction Targets.

Pollutant	**Reduction Target** (% of the typical urban annual load).		
	A	B	C
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 Hydrocarbons[3]	60%	90%	90%
Free Oils[3]	90%	90%	98%

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 200m^2 of uncovered areas where vehicles are likely to transit and/or park e.g. roads, loading docks, refuelling bays, car parking etc.

DOCUMENTATION: DESIGN RATING

Submit all the evidence and ensure it readily confirms compliance.

☐ Short report

☐ Tender drawings

Where manufactured stormwater treatment equipment is being used:

☐ Verification of performance

Where a treatment train does not contain biological treatment and is being used to achieve the Pollution Reduction Targets in Table Emi-5.1 Column C, the following additional information is equired:

☐ Independently verified performance certification

Short report prepared by a suitably qualified professional that describes how the Credit Criteria have been met by:

- Describing the site and stating the methodology used to calculate treatment train performance. Where applicable, the short report should clearly describe and justify the:
  - software or calculation methods used;
  - pollutant export modelling results; and
  - data sets and tables that were applied.

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- Stating the post-development peak 1.5 year Average Recurrence Interval (ARI) event discharge, and pre-development peak 1.5 year ARI event discharge, and showing that it is not exceeded by:
  - Referencing the scaled site plans (or scaled aerial site photographs) with land types indicated and quantified, generated at or prior to site development (contained in the General section of the Green Star submission);
  - Describing the conditions of the site prior to any works commenced as part of the rated project; and
  - Providing the date that the project achieved DA approval (or equivalent).
- Describing the pre-development site usage and any changes to the impervious areas of the site;
- Describing the proposed strategy for addressing the stormwater. Where applicable, the short report should clearly state the:
  - quantity of stormwater captured and used on site (annually);
  - water balance and total storage capacity of any systems that use stormwater on site;
  - quantity of stormwater discharge to be addressed by each stormwater treatment system (annually);
  - sizing of all stormwater treatment systems installed.
- Summarising how the Pollution Reduction Targets are achieved by comparing the results of the pollutant export modelling/calculations with the Pollution Reduction Targets in the relevant column of Table Emi-5.1.
- Summarising how hydrocarbons and free oils have been addressed (where applicable).

Tender drawings:

- Showing the stormwater collection, storage and treatment facilities and detailing their functional elements;
- Where stormwater is being captured and used on site, highlighted hydraulic drawings showing all the capture, storage, piping and discharge routes; and
- Showing the total areas of uncovered areas where vehicles are likely to transit and/or park e.g. roads, loading docks, refuelling bays, car parking etc.

Verification of performance for each manufactured stormwater treatment device showing its ability to achieve the nominated Pollution Reduction Targets. This verification must be publically available and specific to the treatment device(s) being used.

Independently verified performance certification for each manufactured stormwater treatment device, proving its ability to achieve the Pollution Reduction Targets nominated in Table Emi-5.1 Column C.

DOCUMENTATION: AS BUILT RATING

Submit all the evidence and ensure it readily confirms compliance.

☐ Short report

☐ As-built drawings

Where manufactured stormwater treatment equipment is being used:

☐ Verification of performance

Where a treatment train does not contain biological treatment and is being used to achieve the Pollution Reduction Targets in Table Emi-5.1 Column C, the following additional information is required:

☐ Independently verified performance certification

Short report: prepared by a suitably qualified professional that describes how the Credit Criteria have been met by:

- Describing the site and stating the methodology used to calculate treatment train performance. Where applicable, the short report should clearly describe and justify the:
  - software or calculation methods used;
  - pollutant export modelling results; and
  - the data sets and tables that were applied.
- Stating the post-development peak 1.5 year Average Recurrence Interval (ARI) event discharge, and pre-development peak 1.5 year ARI event discharge, and showing that it is not exceeded by:
  - Referencing the scaled site plans (or scaled aerial site photographs) with land types indicated and quantified, generated at or prior to site development (contained in the General section of the Green Star submission);
  - Describing the conditions of the site prior to any works commenced as part of the rated project; and
  - Providing the date that the project achieved DA approval (or equivalent).
- Describing the pre-development site usage and any changes to the impervious areas of the site.
- Describing the proposed strategy for addressing the stormwater. Where applicable, the short report should clearly state the:
  - quantity of stormwater captured and used on site (annually);
  - water balance and total storage capacity of any systems that use stormwater on site;
  - quantity of stormwater discharge to be addressed by each stormwater treatment system (annually);
  - sizing of all stormwater treatment systems installed.

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- Summarising how the Pollution Reduction Targets are achieved by comparing the results of the pollutant export modelling/calculations with the Pollution Reduction Targets in the relevant column of Table Emi-5.1.
- Summarising how hydrocarbons and free oils have been addressed (where applicable).

As-built drawings:

- Showing the stormwater collection, storage and treatment facilities and detailing their functional elements;
- Where stormwater is being captured and used on site, highlighted hydraulic drawings showing all the capture, storage, piping and discharge routes; and
- 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.

Verification of performance for each manufactured stormwater treatment device showing its ability to achieve the nominated Pollution Reduction Targets. This verification must be publically available and specific to the treatment device(s) being used.

Independently verified performance certification for each manufactured stormwater treatment device, proving its ability to achieve the Pollution Reduction Targets nominated in Table Emi-5.1 Column C.

ADDITIONAL GUIDANCE

In order to achieve the points in this credit, a combination of detention, treatment, and use on site may be employed. However, any stormwater discharged from site, must be treated to achieve the relevant Pollution Reduction Targets prior to discharge. In all cases where discharge occurs, the post-development peak 1.5 year Average Recurrence Interval (ARI) event discharge from the site must not exceed the pre-development peak 1.5 year ARI event discharge.

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 volume 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.

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. In order to demonstrate compliance with the credit criteria, techniques which have sufficient levels of resolution to take into account localised climatic sequences, waterbalances and treatment train operation must be used.

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. 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.

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 Bureau of Meteorology (BOM), or sources such as Australian Rainfall & Runoff, Engineers Australia (1999), National Committee for Water Engineering.
- Modelling: Pollutant export modelling using computer programs such as MUSIC, STORM etc. 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. As an alternative to computer modelling, calculations can be done manually, in accordance with methodologies outlined in procedural manuals such as WSUD Engineering Procedures – Stormwater, (CSIRO, 2005).
- Pre-development: The conditions of the site prior to any works commenced as part of the rated project.
- 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.

Aquifers

Discharging stormwater to groundwater systems (aquifer recharge) either directly or indirectly is a legitimate means of achieving compliance with the credit criteria, however it must be ensured that the stormwater being discharged meets the relevant Pollution Reduction T argets, and that pollutants are not contaminating groundwater supplies.

Default vales

Where direct measurement of pollutant loads is not possible, default values from sources such as WSUD Engineering Procedures – Stormwater, (CSIRO, 2005) may be used. Refer to values that are specific to the type of development being undertaken. Where these are used they must be referred to in short report and their use justified.

Multiple Buildings Single Rating guidance

This credit applies to the entire site. No further guidance required.

Rainfall Data for Modeling Programs Using Continuous Simulation

The following approach to rainfall simulation should be adopted:

- Continuous simulation of a minimum of 10 years; and
- A six (6) minute time step (intervals).

BACKGROUND

Urban stormwater is a significant source of pollution and an environmental issue of growing concern. The strategic use of small scale and on-site controls on urban stormwater are embraced under the management strategies known as 'low impact development' (LID), and 'water sensitive urban design' (WSUD). These strategies aim to reduce the adverse impacts of urban stormwater by reducing, detaining, infiltrating, treating or reusing stormwater at its source (Brodie and Dunn, 2008).

WSUD is a framework for managing urban stormwater both as a resource, and in a way that protects receiving aquatic ecosystems (CSIRO, 2005). The four main objectives of WSUD include; reducing potable water demand, minimising wastewater generation, reusing treated wastewater, and treating pollutants in urban stormwater to meet water quality objectives. To achieve Pollution Reduction Targets, it is often necessary to implement a "treatment train" of measures that can address a variety of pollutants having a wide range of particle sizes. It is widely acknowledged that there is no single device whether natural, constructed or manufactured that can achieve the highest Pollution Reduction Targets desired for urban stormwater (Humes, 2007).

Nitrogen (N) and phosphorus (P) are nutrients. These are essential to living organisms, but in excess levels they disrupt the natural balance of aquatic ecosystems. N and P can occur in dissolved or particulate form. In particulate form they attach to the fine fraction of Total Suspended Solids (TSS). Although total nitrogen (TN) concentrations are usually lower in urban areas then in rural areas, rainfall is a significant contributor of TN in urban stormwater runoff (Chiew, F.H.S. et al, 1997). Total phosphorus (TP) concentrations in urban catchments are typically two to ten times that those in forested catchments (Chiew, F.H.S. et al, 1997). Rivers and bays can be particularly sensitive to nitrogen and phosphorus runoff. For example eutrophication (algal blooms) in Melbourne's Port Phillip Bay is strongly controlled by nitrogen. Rivers and coral reefs are also very sensitive to nutrient levels.

Standard practice in stormwater treatment systems is to require some form of particle separation process. This results not only in significantly improved water clarity in receiving waters, but also reduces the levels of heavy metals and other contaminants being discharged. This is because heavy metals and other contaminants have an affinity for fine particles (TSS) i.e. they bond to them. By removing the TSS, heavy metals and other contaminants are also removed.

REFERENCES & FURTHER INFORMATION

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