

METHOD FOR ACCOUNTING REDUCTION IN NUTRIENT RUN-OFF
THROUGH MANAGED FERTILISER APPLICATION – VERSION 1.0

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1 PROJECT DESCRIPTION

1.1 GOVERNING DOCUMENTS

Reef Credit Standard

Reef Credit Guide

1.2 REFERENCES

This methodology references the following documents and tools

- Reef 2050 Long Term Sustainability Plan
- Reef 2050 Water Quality Improvement Plan 2017-2022
- Paddock to Reef Integrated Monitoring, Modelling and Reporting Program
- Paddock to Reef Program Water Quality Risk Frameworks
- Reef Trust Repeated Tenders - Wet Tropics and Burdekin Project

1.3 SUMMARY DESCRIPTION OF METHODOLOGY

This methodology quantifies the reduction in Dissolved Inorganic Nitrogen (DIN) lost from agricultural land through improved soil and nutrient management practices within the catchments of the Great Barrier Reef World Heritage Area (GBRWHA).

The core methodological components are as follows:

- Determine Eligibility: Sets the criteria for eligibility of projects under the methodology and the Reef Credit Standard;
- Establish Project Boundaries and Scope: Provides guidelines for defining the geographical and temporal boundaries of the project, scope of activities and pollutant pools to be accounted for in the project;
- Quantify Baseline DIN Loss: Provides guidelines for determining average DIN loss for the baseline period;
- Quantify Project DIN Loss: Provides guidelines for determining project DIN loss for the monitoring period;
- Quantify DIN Reduction: Details how to determine the DIN reductions resulting from project activities at end of catchment for the monitoring period;
- Quantify Reef Credit Units: Outlines the steps to determine the number of reef credits based on calculated pollutant reductions;
- Project Monitoring: Provides guidelines for the implementation of a monitoring plan and identifies monitored parameters to assess soil and nutrient management strategy;
- Project Reporting and Credit Issuance: Outlines requirements for reporting project abatement to the Reef Credit Secretariat and the application process for the issuance of Reef Credits.

1.4 PROJECT ACTIVITIES

The scope of this methodology includes reducing DIN loss through more efficient soil and nutrient management practices from agricultural enterprises including (but not limited to) sugarcane, bananas, grains and fodder. The methodology allows for a range of practice changes, including land use change, that lead to a reduction in DIN loss across the project area.

There are a number of ways a farmer may reduce DIN loss within the project area. For example:

- Matching nitrogen application rate to expected crop yields at farm or paddock scale;
- Reducing nitrogen fertiliser application rate;
- Increasing areas under fallow;
- Improving fertiliser delivery practices; or
- Conversion to land use with a lower or zero nitrogen surplus.

This methodology is not limited to the above management practices but the project must provide a **Land management plan** that describes the proposed land management activities for the project duration.

1.5 DEFINITIONS

Bare fallow – in rotational cropping, a period where no crop is grown between crop cycles

Baseline period – the 7 years immediately prior to project start date

Crediting period – As defined in the Reef Credit Standard

DIN – As defined in the Reef Credit Standard

Green fallow– in rotational cropping, cultivation of an alternative crop between crop cycles

Land Management Plan – documented proposal for implementing project activities for the duration of the project period

Monitoring period - As defined in the Reef Credit Standard

Nitrogen application rate – the quantity of nitrogen applied over an area expressed in kilograms per hectare

Project application – As defined in the Reef Credit Standard

Project application date – the date on which the project proponent submits the project application for a Reef Credit project

Project area – the area on which project activities are being undertaken

Project start date – As defined in the Reef Credit Standard

Project end date – As defined in the Reef Credit Standard

Reef Credit – As defined in the Reef Credit Standard

Reef Credit Accounting Zones (RCAZ) – spatially explicit area delineated according to section 3 of this methodology in which project activities occur and are accounted.

1.6 DOCUMENTATION REQUIREMENTS

This section outlines the documentation required for project application and for issuance of Reef Credits.

1.6.1 PROJECT APPLICATION

When applying for a project the project documentation must include a **Project Summary**. The Project Summary must include:

- a. Names of project proponents and names of any individual or entity with interest in the land parcel or enterprise;
- b. Project location;
- c. Description of project including:
 - i. Project area spatial files highlighting project implementation zones;
 - ii. Estimate of average Baseline DIN Loss;
 - iii. Estimate of abatement potential over the crediting period.

The project application must also include a **Project Eligibility Report** describing how the project complies with the Reef Credit Standard and the methodology eligibility requirements, and a **Land Management Plan**.

1.6.2 PROJECT CREDITING

When applying for issuance of Reef Credits, project documentation must include:

1. Project Description;
2. Project Eligibility Report;
3. Project Spatial Report;
4. Land Management Plan;
5. Project Abatement Report;
6. Monitoring Report;
7. Evidentiary Documents.

In addition to the requirements outlined in this methodology, the project must address how the project complies with all Reef Credit Standard rules when applying this methodology (e.g. documentary evidence of land ownership or rights to land management over the project area).

2 ELIGIBILITY

This section outlines the project eligibility criteria to be eligible to implement this methodology under the Reef Credit Standard. For each of the eligibility criteria, credible evidence in the form of analysis, documentation and/or third-party expert reports is required as part of the project application.

2.1 LOCATION

The proposed project area must be located within the boundaries of one of the following Great Barrier Reef NRM Regions:

1. Cape York (eastern draining catchments only);
2. Wet Tropics;
3. Burdekin;
4. Mackay-Whitsunday;
5. Fitzroy;
6. Burnett-Mary.

2.2 PROJECT LAND CHARACTERISTICS

The project area must include land that:

1. has been under cultivation during the baseline period; and
2. has been treated with Nitrogen based fertiliser during the baseline period; and
3. the project proponent has the legal right to manage and undertake the implementation of project activities.

2.3 PROJECT ACTIVITIES

Project activities must:

1. reduce the application of nitrogen fertilizer relative to the baseline period;
2. ensure that fertiliser application rates must comply with any applicable government regulations;
3. demonstrate Best Management Practice (must be at least minimum standard under the **Reef Plan Water Quality Risk Framework or equivalent framework in place at time of project application**) across the property for the duration of the crediting period; and
4. be consistent with the local NRM Plan, or otherwise provide a justification as to why the NRM Plan should be over-ridden; and
5. be compliant with all federal, state and local regulations.

If the project involved reducing nitrogen application on sugarcane in the Wet Tropics or Burdekin NRM Regions, the project activity must meet the minimum standards of management practice as defined in Appendix 3 of the 'Reef Trust Repeated Tenders—Wet Tropics and Burdekin Applicant Guidelines Round Two (Commonwealth of Australia 2017).

2.4 LAND USE CHANGE

If the project involves a change in land use, the project proponent must have obtained any necessary permits to demonstrate that the project will not have a significant negative impact on catchment water quality.

2.5 ADDITIONALITY

Project proponents must demonstrate additionality by applying the tool for the demonstration and assessment of additionality in VCS agriculture, forestry and other land use (AFOLU) project activities VT0001 version 3.0. When applying the tool project proponents shall consider any activity eligible under this method as an “eligible AFOLU activity”. Further project proponents should substitute “pollutant reductions” for “GHG emissions” and “Reef Credits” for “GHG Credits” and where appropriate “Reef Credit Standard” for “VCS”.

2.6 CONSULTATION PROCESS

This method was developed in consultation with the Reef Credit Methodology Technical Working Group. Members of the working group include representatives from Industry, Qld Government, CSIRO, JCU, Griffith University, advocacy groups, NRM groups and subject matter experts. The method approach arose from discussion at two workshops, the first in September 2017 and the second in March 2018.

2.7 LEAKAGE

Leakage may be considered to occur if there is an increase in fertiliser application or a move to higher risk land management practices on areas outside the project RCAZ but under the management of the same land manager that is responsible for implementation of project activities as a result of the implementation of the project.

Project proponents must complete steps under 2.6.1 at the time of project application to determine if there is a risk of project leakage and if so the appropriate procedure to account for it.

2.7.1 DETERMINE IF THE PROJECT MAY BE AT RISK OF LEAKAGE

Step 1. Determine if the land manager is responsible for the management of other crops outside the project RCAZ.

If the answer is no, then the risk of project leakage is considered to be zero and the project proponent should proceed to section 3. If answer is yes, then proceed to Step 2.

Step 2. The project proponent must determine the area of **land subject to leakage** under the control of the land manager that is not a part of the project RCAZ. This would include, for example, areas of land that would be under the same kind of agricultural enterprise as the areas within the RCAZ. Project proponents should follow the same procedures for mapping land subject to leakage as described in Section 3. Project Mapping.

Step 3. Once the area of land has been identified the project proponent must determine the **credible risk** of the **land subject to leakage** shifting to a management scenario as a result of the project where either a) the fertiliser application rate is higher than that calculated in the baseline period or b) a higher risk level of management practice is undertaken as defined in the **Reef Plan Water Quality Risk Framework or equivalent framework in place at time of project application date**.

Credible risk should be qualified as either likely or unlikely. If the risk is considered to be likely the area must be monitored and reported on at the end of each monitoring period and project proponents must complete Step 4 at the end of each monitoring period.

Step 4. At the end of each monitoring period if it is found that either scenario a) or b) described in Step 3 has occurred, then the change must be accounted for following the same procedures described in Section 5. Project Accounting and deducted from the final RC volume.

3 PROJECT MAPPING

The project area boundaries must be delineated in accordance to the requirements of this section.

For the purposes of stratification of the project area into RCAZ, the project proponent must use remotely-sensed imagery.

3.1 GEOSPATIAL CAPTURE

A project proponent may use any of the following sources of data to delineate the boundaries of project zones:

- a) UAV (drone) derived photogrammetry
- b) Air-photo photogrammetry
- c) ortho-rectified aerial photographs
- d) ortho-rectified satellite imagery
- e) cadastral database

3.2 FITNESS FOR PURPOSE

Prior to using a dataset, project proponents should assess the appropriateness of the dataset for the intended use, or its fitness for purpose against criteria that include:

- Age
- Scale
- Resolution
- Accuracy
- Classification, aggregation, generalisation systems (for example, smoothing)
- Integrity of dataset

3.3 ACCURACY

For all projects under this method, the minimum requirement for spatial data is a horizontal accuracy of at least 10 metres at 95 per cent threshold.

3.4 REEF CREDIT ACCOUNTING ZONES

The project area must be stratified into RCAZ according to uniform:

- a. crop;
- b. soil type;
- c. climate zone; and
- d. proposed land management;

for each year of the baseline period and for each year of the monitoring period such that each zone has a single land-use and/or crop and a uniform nitrogen application rate across the entirety of the zone for each crop cycle.

Each RCAZ may correspond to a 'block' land management unit as referenced in farm records if each of the above criteria are met. RCAZ boundaries may change from year to year to reflect variations in land management but the project area extent must remain fixed for the duration of the baseline and project crediting period. Any changes to land management within a project RCAZ resulting in crop or applied nitrogen heterogeneity across the entirety of the RCAZ must be re-stratified in accordance to this section.

For example, Bruce has implemented nutrient run-off reduction Reef Credit project on his 100ha cane farm. In the first year of his project he applied fertiliser to four 20ha blocks (RCAZ 1-4) of sugarcane and left 20ha (RCAZ 5) under fallow with no N fertiliser added. In the second year of his project Bruce subdivided the four blocks to which he applied N fertiliser in the previous year and put half of each under fallow (RCAZ 1-4), increasing his fallow area to 40ha. He applied N fertiliser to the remaining 60ha with one 20ha block of plant cane (RCAZ 5) and four 10ha blocks of ratoon cane (RCAZ 5-9). Although, Bruce's cane farm was managed as 5 blocks (RCAZ 1-5) in year 1 and 9 blocks (RCAZ 1-9) in year 2, the overall project area of 100ha and boundary remained the same.

The geographic boundary of the project area must be identified on a geospatial map consistent with the requirements of this section and submitted at the time of project application.

In addition, evidence that the entire project area was under cultivation for the duration of the baseline period is required at the time of project application.

4 LAND MANAGEMENT PLAN

A Land Management Plan for the property must be prepared outlining soil and nutrient management strategies. The Land Management Plan must include:

- 1) Maps of project area at project commencement;
- 2) Description of Baseline soil and nutrient management activities including Nitrogen application rates and fertiliser types in accordance with the relevant Paddock to Reef Program Water Quality Risk Framework;
- 3) Maps of project area and RCAZs for each monitoring period;

- 4) Description of soil and nutrient management activities in each monitoring period including N application rates and fertiliser types
- 5) Proposed soil and nutrient management activities for the remainder of the crediting period.

5 PROJECT ACCOUNTING

This section outlines the steps which must be followed to determine project DIN loss reductions as a result of project activities.

5.1 RELEVANT NITROGEN POOLS

For the purpose of this section, relevant nitrogen pools are limited to mineral nitrogen fertilisers applied to crops. The relevant volumes must reflect the actual nitrogen content (kg N/year) of the fertiliser, not the total amount of fertiliser applied. When the project proponent has or will apply mill by-products, including mill mud, boiler ash, or mud ash mixes to sugarcane crops, the Nitrogen application rate must be quantified in accordance with “Farming in Reef Catchments: the method for calculating the optimum amount of nitrogen and phosphorus to be applied to sugarcane properties regulated under the *Environmental Protection Act 1994*”.

5.2 BASELINE SCENARIO

This section outlines the procedure to calculate average annual DIN loss in the baseline scenario based on historical Nitrogen fertiliser application rates. Proponents must include a summary of the baseline scenario and provide an explanation of why the baseline was chosen including an assessment of the barriers to implementation of the proposed project activities.

5.2.1 BASELINE PERIOD NITROGEN APPLICATION CALCULATIONS

Project proponents must provide evidence of the historical Nitrogen fertiliser application during the baseline period. Evidence may include agricultural ERA records, Nitrogen application rate determinations, tax receipts, spray diaries, chemical inventories, consultant records, etc.

5.2.1.1 NITROGEN APPLICATION FOR EACH RCAZ IN EACH YEAR OF BASELINE PERIOD

The total Nitrogen applied to each RCAZ for each year of the baseline period must be calculated by applying the following equation:

$$N_{i,j} = Nb_{i,j} * A_{i,j}$$

EQUATION 1

where:

$N_{i,j}$ is the total nitrogen applied to each RCAZ, i , in year, j , of each year of the baseline period;

$Nb_{i,j}$ is the nitrogen application rate, in kg ha⁻¹, in RCAZ, i , in year, j , of the baseline period;
and

$A_{i,j}$ is the area, in ha, of RCAZ, i , in year, j , of the baseline period.

If a Reef Credit Accounting Zone is under bare fallow or green fallow any year during the baseline period, the Nitrogen application rate must be set to zero in the absence of evidence for Nitrogen application in the fallow period.

The application of mill mud or mud/ash as a fertiliser to any Reef Credit Accounting Zone must be included in baseline Nitrogen application rate if application rates exceed 100 wet tonnes per hectare. Nitrogen must be quantified in accordance with “Farming in Reef Catchments: the method for calculating the optimum amount of nitrogen and phosphorus to be applied to sugarcane properties regulated under the *Environmental Protection Act 1994*”.

5.2.1.2 TOTAL NITROGEN APPLICATION RATE FOR EACH YEAR OF THE BASELINE

To determine the Nitrogen application rate in the project area for each year of the baseline period must be calculated by applying the following equation:

$$Nbr_j = \frac{\sum N_{i,j}}{\sum A_{i,j}}$$

EQUATION 2

where:

Nbr_j is the Nitrogen application rate in the project area in year, j , of the baseline period;

$N_{i,j}$ is the total Nitrogen applied, in kg, in RCAZ, i , in year, j , of the baseline period; and

$A_{i,j}$ is the area, in ha, of RCAZ, i , in year, j , of the baseline period.

If a Reef Credit Accounting Zone is under bare fallow or green fallow any year during the baseline period, the Nitrogen application rate must be set to zero in the absence of evidence for Nitrogen application in the fallow period.

The application of mill mud or mud/ash as a fertiliser to any Reef Credit Accounting Zone must be included in baseline Nitrogen application rate if application rates exceed 100 wet tonnes per hectare. Nitrogen must be quantified in accordance with “Farming in Reef Catchments: the method for calculating the optimum amount of nitrogen and phosphorus to be applied to sugarcane properties regulated under the *Environmental Protection Act 1994*”.

5.2.1.3 OPTIMUM NITROGEN APPLICATION RATE FOR EACH YEAR OF BASELINE PERIOD TEST

The Nitrogen application rate for each year of the baseline period must not exceed the optimum Nitrogen application rate calculated in accordance with the *Environmental Protection Act 1994*.

Project proponents must calculate the optimum Nitrogen application rate for each year of the baseline period in accordance with the *Environmental Protection Act 1994*. For example, a cane farmer may calculate the N application rate using the method outlined in “Farming in Reef Catchments: the method for calculating the optimum amount of nitrogen and phosphorus to be applied to sugarcane properties regulated under the *Environmental Protection Act 1994*”

Evidence for calculated optimum Nitrogen application rates must be provided with the first crediting application.

If the Nitrogen application rate (Nbr_j) during any year of the baseline period, as determined by Equation 2, exceeds the optimum rate, then the baseline rate must be defined as the optimum rate for each RCAZ for that year.

For projects registered prior to 1 January 2020, the Nitrogen application rate for the first three years of the baseline period ($j=1, j=2, j=3$) may be set to the optimum Nitrogen application rate calculated for that year.

5.2.2 BASELINE PERIOD DIN LOSS CALCULATIONS

Project proponents must provide evidence of the historical soil and nutrient management practices during the baseline period. Evidence may include agricultural ERA records, nitrogen application rate determinations, tax receipts, spray diaries, chemical inventories, consultant records, etc.

5.2.2.1 DIN LOSS FOR EACH YEAR OF THE BASELINE PERIOD

To determine the volume of applied Nitrogen lost as DIN runoff for each year of the baseline period utilise the Queensland Government Paddock to Reef Projector or equivalent data set, e.g. peer review publication, government report). If a dataset other than the Paddock to Reef Projector is used the project proponent must include a justification for its use and provide evidence of the accuracy and integrity of the dataset.

The total DIN loss, in kg, from each RCAZ in each year of the baseline period, must be calculated by applying the following equation:

$$DINb_{i,j} = N_{i,j} * DLRb_{i,j}$$

EQUATION 3

where:

$DINb_{i,j}$ is the total DIN loss, in kg, from each RCAZ, i , in each year, j , of the baseline period;

$N_{i,j}$ is the Nitrogen applied, in kg, to RCAZ, i , in year, j , of the baseline period determined in equation 1 and in accordance with section 5.2.1.3; and

$DLRb_{i,j}$ is the percentage of applied Nitrogen lost as DIN, from RCAZ, i , in year, j , of the baseline period as determined by the Queensland Government Paddock to Reef Projector or equivalent.

The total DIN loss, in kg, in each year of the baseline period, must be calculated by applying the following equation:

$$DINb_j = \sum DINb_{i,j}$$

EQUATION 4

where:

$DINb_j$ is the total DIN loss, in kg, from the project area in each year, j , of the baseline period;
 $DINb_{i,j}$ is the total DIN loss, in kg, from each RCAZ, i , in each year, j , of the baseline period;

5.2.2.2 AVERAGE DIN LOSS FOR THE BASELINE PERIOD

The average DIN loss, in kg, for the baseline period, must be calculated by applying the following equation:

$$\overline{DINb} = \frac{\sum DINb_j}{t_b}$$

EQUATION 5

where:

\overline{DINb} is the average total per annum DIN loss in the project area during the baseline period;
 $DINb_j$ is the total DIN loss, in kg, from the project area in each year, j , of the baseline period;
 t is the number of years in the baseline period, b , equal to 7 years.

5.3 PROJECT MONITORING PERIOD CALCULATIONS

This section provides guidelines for quantifying project pollutant loss for the monitoring period.

5.3.1 CALCULATION OF PROJECT NITROGEN APPLICATION RATES

Project proponents will need to be able to provide evidence of their nitrogen fertiliser application and land management practices for the duration of each monitoring period at the end of each monitoring period. Evidence may include agricultural ERA records, Nitrogen application rate determinations, tax receipts, spray diaries, chemical inventories, consultant records, etc.

For the purposes of accounting the monitoring period should span the same period as the baseline year, e.g. if nitrogen application rates determined in the baseline period are averaged from January to December then the monitoring period must also cover January to December.

5.3.1.1 NITROGEN APPLICATION FOR EACH RCAZ FOR PROJECT MONITORING PERIOD

The Nitrogen applied to each RCAZ for the monitoring period must be calculated by applying the following equation:

$$N_{i,r} = Np_{i,r} * A_{i,r}$$

EQUATION 6

where:

$N_{i,r}$ is the total Nitrogen applied to each RCAZ, i , for the monitoring period, r ;

$Np_{i,r}$ * is the nitrogen application rate, in kg ha⁻¹, in RCAZ, i , in current monitoring period, r ; and

$A_{i,r}$ is the area, in ha, of RCAZ, i , in year, r , of the baseline period.

If a Reef Credit Accounting Zone is under bare fallow or green fallow during the monitoring period, the Nitrogen application rate must be set to zero in the absence of evidence for Nitrogen application in the fallow period.

The application of mill mud or mud/ash as a fertiliser to any Reef Credit Accounting Zone must be included in the Nitrogen application rate if application rates exceed 100 wet tonnes per hectare. Nitrogen must be quantified in accordance with “Farming in Reef Catchments: the method for calculating the optimum amount of nitrogen and phosphorus to be applied to sugarcane properties regulated under the *Environmental Protection Act 1994*”.

5.3.1.2 TOTAL NITROGEN APPLICATION RATE FOR PROJECT MONITORING PERIOD

The Nitrogen application rate for the monitoring period must be calculated by applying the following equation:

$$Np_{i,r} = \frac{\sum N_{i,r}}{\sum A_{i,r}}$$

EQUATION 7

where:

$Np_{i,r}$ is the Nitrogen application rate in the project area current monitoring period r , of the baseline period;

$N_{i,r}$ is the total Nitrogen applied, in kg, in RCAZ, i , in current monitoring period, r ; and

$A_{i,r}$ is the area, in ha, of RCAZ, i , in current monitoring period, r .

Note: Nitrogen must not exceed the optimum amount calculated in accordance with the *Environmental Protection Act 1994*

If a Reef Credit Accounting Zone is under bare fallow or green fallow any year during the baseline period, the Nitrogen application rate must be set to zero in the absence of evidence for Nitrogen application in the fallow period.

The application of mill mud or mud/ash as a fertiliser to any Reef Credit Accounting Zone must be included in baseline Nitrogen application rate if application rates exceed 100 wet tonnes per hectare. Nitrogen must be quantified in accordance with “Farming in Reef Catchments: the method for calculating the optimum amount of nitrogen and phosphorus to be applied to sugarcane properties regulated under the *Environmental Protection Act 1994*”.

5.3.1.3 OPTIMUM NITROGEN APPLICATION RATE FOR PROJECT MONITORING PERIOD TEST

The average Nitrogen application rate for the project monitoring period must not exceed the optimum Nitrogen application rate calculated in accordance with the *Environmental Protection Act 1994*.

Project proponents must calculate the optimum Nitrogen application rate for the current project monitoring period in accordance with the *Environmental Protection Act 1994*. For example, a cane farmer may calculate the Nitrogen application rate using the method outlined in “Farming in Reef Catchments: the method for calculating the optimum amount of Nitrogen and phosphorus to be applied to sugarcane properties regulated under the *Environmental Protection Act 1994*”

Evidence for calculated optimum Nitrogen application rates must be provided with each crediting application.

If the average Nitrogen application rate during the project monitoring period, as determined by Equation 7, exceeds the optimum rate, the project must not generate any Reef Credits for that monitoring period.

5.3.2 PROJECT MONITORING PERIOD DIN LOSS CALCULATIONS

Project proponents will need to be able to provide evidence of their soil and nutrient management practices during the project period. Evidence may include agricultural ERA records, nitrogen application rate determinations, tax receipts, spray diaries, chemical inventories, consultant records, etc.

5.3.2.1 DIN LOSS FOR PROJECT MONITORING PERIOD

To determine the proportion of applied Nitrogen lost as DIN runoff for the current project monitoring period utilise the Queensland Government Paddock to Reef Projector or equivalent data set (e.g. peer review publication, government report). If a dataset other than the Paddock to Reef Projector is used the project proponent must include a justification for its use and provide evidence of the accuracy and integrity of the dataset.

The DIN loss, in kg, from each RCAZ for the current project monitoring period must be calculated by applying the following equation:

$$DINp_{i,r} = N_{i,r} * DLRp_{i,r}$$

EQUATION 8

where:

$DINp_{i,r}$ is the total DIN loss, in kg, from each RCAZ, i , for the current project monitoring period, r ;

$N_{i,r}$ is the total Nitrogen applied, in kg, in RCAZ, i , in current monitoring period, r ; calculated in accordance with Equation 6; and

$DLRp_{i,r}$ is the percentage of applied Nitrogen lost as DIN from RCAZ, i , in current monitoring year, r , as determined by the Queensland Government Paddock to Reef Projector or equivalent dataset.

The total DIN loss in the project area, in kg, for the monitoring period, must be calculated by applying the following equation:

$$DINp_r = \sum DINp_{i,r}$$

EQUATION 9

where:

$DINp_r$ total DIN loss in the project area, in kg, for the monitoring period, r ;

$DINp_{i,r}$ is the DIN lost, in kg, from RCAZ, i , in current monitoring year, r , of the project period calculated in accordance with Equation 8.

5.4 CALCULATION OF CHANGE IN DIN LOSS

The difference in total DIN loss between the baseline period and the monitoring period must be calculated by applying the following equation:

$$\Delta DIN_r = \overline{DINb} - DINp_r$$

EQUATION 10

where:

ΔDIN_r is the difference in total DIN loss between the baseline period and monitoring period, r ;

\overline{DINb} is the average total per annum DIN loss in the project area during the baseline period as calculated in equation 5; and

$DINp_r$ total DIN loss in the project area, in kg, for the monitoring period, r as calculated in equation 9.

5.5 CALCULATION OF CHANGE IN DIN ENTERING THE GREAT BARRIER REEF

The reduction achieved during the monitoring period in DIN run-off transported to the end of catchment, must be calculated by applying the following equation:

$$DIN_r = \Delta DIN_r * DR$$

EQUATION 11

where:

DIN_r reduction in DIN run-off transported to the end of catchment during the monitoring period, r ;

ΔDIN_r is the difference in total DIN loss between the baseline period and monitoring period, r ;

DR is a delivery ratio to reflect the proportion of DIN that is transported to the GBR based on project location outlined in Appendix 1.

5.6 CALCULATION OF MONITORING PERIOD REEF CREDITS

To determine the quantity of Reef Credits generated by project activities during the monitoring year, apply the following equation:

$$RC_r = DIN$$

EQUATION 12

where:

RC_r is the number of RC created at the end of the monitoring period;

DIN_r reduction in DIN run-off transported to the end of catchment during the monitoring period, r;

If RC_r is zero then no credits are issued for the monitoring year.

6 MONITORING AND RECORD-KEEPING REQUIREMENTS

This section sets out monitoring and record-keeping requirements under this methodology for a registered Reef Credit project.

A Monitoring report must be submitted as a requirement for each monitoring period. The project proponent must monitor the RCAZs of the project for compliance with the project land management plan and document land management activities and any unplanned disturbances to project area.

The monitoring report must include documentary evidence of nitrogen application events during the monitoring period including, but not limited to:

- Photographic evidence of equipment calibration
- Records of date and rate of nitrogen application for each RCAZ
- Records of fertilizer receipts and/or spray diaries.

Records must be kept in relation to each of the requirements for remotely-sensed imagery set out in section 3.

APPENDICES

APPENDIX 1

See current Reef Credit Standard look up table for catchment DIN delivery ratios.