



Department of  
**Environment and  
Heritage Protection**

QLD COMPETITION AUTHORITY

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25 JUN 2014

Mr Malcolm Roberts  
Chairman  
Queensland Competition Authority  
GPO Box 2257  
BRISBANE QLD 4001

Dear Mr Roberts

*Malcolm,*

Thank you for your letter dated 28 March 2014 concerning pricing principles for south east Queensland water retailers.

As an environmental regulator, the Department of Environment and Heritage Protection (EHP) has an interest in sewage treatment services, particularly the disposal of discharges. The pricing of externalities relating to releases from wastewater treatment plants can play a role in ensuring the protection of water quality standards in south east Queensland waterways and Moreton Bay.

However, as noted in the position paper, externalities can also be managed through regulation. This is the approach taken in Queensland with sewage treatment plants regulated as environmentally relevant activities under the Environmental Protection Regulation 2008. Licence conditions set the discharge limits for contaminants released to the environment and are an appropriate tool for limiting emissions.

The position paper also notes that other market mechanisms such as bubble licences and water quality trading can also be used to manage externalities. Draft recommendation 7.3 states that licences and market mechanisms (where practical) be considered by government.

For your information I have enclosed a copy of a document recently released by EHP: *Flexible Options for Managing Point Source Water Emissions: A voluntary market-based mechanism for nutrient management.*

The mechanism provides an alternative investment option for regulated point sources to meet their water emission discharge requirements while delivering an improvement in water quality in a cost effective manner. It applies to regulated point sources that hold an environmental authority under the *Environmental Protection Act 1994*.

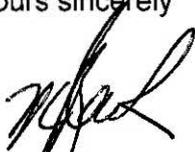
Alternative nutrient reduction actions can occur within and between regulated entities. If two or more point sources are managed by the same regulated entity through an amalgamated authority they may combine discharge limits to meet an overall reduced discharge limit - commonly referred to as a 'bubble licence'.

Two or more point sources that are not managed by the same regulated entity can also be included in a nutrient reduction action arrangement where one point source reduces its limit below that specified on the environmental authority, so that the other/s may increase their discharge load accordingly. The adjusted load limits would be reflected as a condition of the environmental authorities for each entity.

A point source operator may also use corresponding nutrient reduction actions from other rural or urban diffuse sources. Examples of management actions that may achieve alternative nutrient reductions include riparian area restoration and water sensitive urban design. The nutrient reduction action would be reflected as a condition of the environmental authority for the point source.

Should your staff have any further enquiries, please ask them to contact Dr Beth Clouston, Manager of the department on telephone 3330 5744.

Yours sincerely



Jonathan (Jon) PC Black  
**Director-General**

Enc. Flexible Options for Managing Point Source Water Emissions: A voluntary market-based mechanism for nutrient management.

*P.S.  
Malcolm,  
we are also developing ideas for longer-term  
market mechanisms to enable improved water  
quality outcomes through better catchment management.*

Flexible options for managing point source  
water emissions:  
A voluntary market-based mechanism  
for nutrient management

Prepared by: Reform and Innovation Unit, Department of Environment and Heritage Protection

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April 2014

# Contents

1	Introduction .....	1
2	Purpose .....	1
3	Objectives .....	2
4	Definitions .....	2
5	Who can use this mechanism.....	3
6	Types of nutrient reduction actions .....	3
7	Requirements .....	4
7.1	Location .....	4
7.2	Nutrient equivalency .....	4
7.3	Demonstrating water quality improvement for nutrient reduction actions at an alternative point source .....	4
7.4	Demonstrating water quality improvement for alternative nutrient reduction actions at a diffuse source .....	4
7.5	Determining delivery ratios .....	5
7.6	Timing .....	6
7.7	Duration .....	6
7.8	Establishing baselines for diffuse sources.....	6
7.9	Monitoring and reporting.....	6
7.10	Liability .....	6
8	Mechanism review.....	6

# 1 Introduction

This document presents a voluntary market-based mechanism for nutrient management (the mechanism)—outlining the requirements for using alternative nutrient reduction actions as an option for managing point source water emissions.

The development of the mechanism was originally proposed by water service providers in South East Queensland to address increasing sewage treatment costs linked to regional population expansion. Over the past 10 years, state and local governments in Queensland have invested over \$700 million in sewage treatment plant upgrades<sup>1</sup>. However, sewage treatment plant upgrades and other hard engineering options to further reduce pollution are usually very expensive and may not always deliver the best solution, from a triple bottom line viewpoint. In the case of sewage treatment plant upgrades, utility customers bear the cost.

This mechanism provides an alternative investment option for operators of point sources regulated under the *Environmental Protection Act 1994* to meet their water emission discharge requirements, while delivering an improvement in water quality in the receiving environment.

The mechanism is in keeping with the Department of Environment and Heritage Protection's Regulatory Strategy which recognises that:

- the department's role is to set the limits on what an authority holder can do
- business and industry are best-placed to work out how to stay within those limits
- the responsibility for managing the risk from an activity sits with the person carrying out the activity and not the department.

One of the key actions of the Regulatory Strategy is the introduction of market-based incentives, such as this mechanism for nutrient management, which aims to provide operators with greater flexibility to meet their environmental obligations.

This outcome-based approach to licensing regulated activities, where adequate management of environmental impacts is demonstrated, is a key strategy for 'avoiding, minimising or mitigating impacts to the environment' in the Environment and Heritage Protection Strategic Plan 2012–2016.

This voluntary market-based mechanism for nutrient management is an important first step in the application of market-based instruments to allow cost-effective solutions for licence holders and achieve catchment based, waterway health outcomes in Queensland. The mechanism is intended to guide the implementation of projects under various nutrient reduction action scenarios, which will in turn improve scientific evidence and confidence to inform any future market-based approaches.

The environmental equivalency of undertaking nutrient reduction actions needs to be demonstrated in practice and outcomes will be monitored as projects progress. It is intended that the key elements of the mechanism be incorporated into a departmental technical assessment guideline to provide more detail for prospective clients and assessing officers. The mechanism will be reviewed within five years to ensure ongoing relevance and effectiveness.

## 2 Purpose

The purpose of the mechanism is to provide an alternative investment option for licensed point source operators to meet their water emission discharge requirements under the *Environmental Protection Act 1994*, while delivering an improvement in water quality in the receiving environment.

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<sup>1</sup> Healthy Waterways 2014, Healthy Waterways Strategic Plan 2012–2022 (PDF), viewed 13 February 2014. Available at [www.healthywaterways.org](http://www.healthywaterways.org)

### 3 Objectives

The mechanism has four key objectives:

1. Deliver an overall improvement in the health of Queensland waterways by reducing total nutrient loads.
2. Provide cost effective and flexible options for regulated point sources to meet licence conditions for nutrient loads.
3. Allow for further growth and development while improving waterway health in accordance with local and national water quality standards<sup>2</sup>.
4. Minimise transaction costs and green tape burden.

### 4 Definitions

Term	Meaning
<b>Bubble licence</b>	A single licence and load limit that includes multiple operations.
<b>Catchment</b>	An area of land bounded by natural features such as hills, from which drainage flows to a common point, usually ending in a river or creek and eventually the sea.
<b>Delivery ratio</b>	A ratio that adjusts for the environmental impact of a pollutant discharge being moved from one part of a catchment to another.
<b>Diffuse source pollution</b>	Non-point pollutant sources (i.e. without a single point of origin or not introduced into a receiving stream from a specific outlet). The pollutants are generally carried off the land by storm water. Common non-point sources are agriculture, forestry, urban areas, and historical mining sites.
<b>Nutrient reduction action</b>	An action taken to counter-balance a point source nutrient increase.
<b>Nutrient reduction action ratio</b>	A ratio that accounts for the variability in nutrient removal efficiencies.
<b>Point of concern</b>	The point of concern will be determined on a case-by-case basis depending on the sensitivity of the receiving environment. Usually the point of concern will be located at the point source discharge site that requires a nutrient reduction action.
<b>Point source pollution</b>	Any discernible confined and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, discrete fissure, or other discrete source where pollutants are or may be discharged. For example a sewage treatment plant is a point source pollutant.
<b>Proponent</b>	A holder, or a prospective holder, of an environmental authority wishing to undertake a voluntary nutrient reduction action/s to meet water emission discharge requirements under the <i>Environmental Protection Act 1994</i> .
<b>Sub-catchment</b>	Part of a catchment i.e. a basin or reservoir, used for collecting or draining water. Sub-catchments are generally bound by lower hills and ridges and drained by smaller creeks or gullies.

<sup>2</sup> National standards include those set by the Australian and New Zealand Environment and Conservation Council (ANZECC) and the National Health and Medical Research Council, or locally derived water objectives developed under the Queensland Water Quality Guideline and other relevant regional plans and strategies.

## 5 Who can use this mechanism

The mechanism applies to licensed point source operators that hold an environmental authority under the *Environmental Protection Act 1994* (EP Act).

The mechanism applies to the management of total nitrogen and total phosphorous only.

Other water quality parameters such as salinity, pathogens and biological oxygen demand are outside the scope of the mechanism. Treatment of these water emission pollutants must be managed to a level that protects environmental values.

Point source water quality impacts must be avoided and mitigated using contemporary best management approaches when considering the use of nutrient reduction actions as part of a proponent's overall total nutrient management plan.

To use this mechanism a proponent must be able to demonstrate that any proposed nutrient increases at the point source, to be counterbalanced by alternative nutrient reduction actions, will not create an unacceptable impact to receiving waters<sup>3</sup>.

Nutrient reduction actions provide a voluntary option for regulated point sources to meet their total nutrient load requirements and environmental obligations.

## 6 Types of nutrient reduction actions

The mechanism provides for corresponding nutrient reduction actions between:

### a) Two or more point sources

Alternative nutrient reduction actions can occur within and between regulated entities.

If two or more point sources are managed by the same regulated entity through an amalgamated authority under section 243 of *Environmental Protection Act 1994* they may combine discharge limits to meet an overall reduced discharge limit—commonly referred to as a '**bubble licence**'<sup>4</sup>.

Two or more point sources that are not managed by the same regulated entity can also enter into a nutrient reduction action arrangement—where one point source reduces its limit below that specified on the environmental authority, so that the other/s may increase their discharge load accordingly. The adjusted load limits would be reflected as a condition of the environmental authorities for each entity.

### b) A point source and diffuse source provider

A point source may also use corresponding diffuse source nutrient reduction actions from rural, urban or other diffuse sources. Example management actions that may achieve nutrient reductions include:

- riparian area restoration
- constructed wetlands
- fertiliser application management
- grazing land management practices
- water sensitive urban design.

The nutrient reduction action would be reflected as a condition of the environmental authority for the point source.

The mechanism does not allow nutrient reduction actions in the form of a financial contribution.

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<sup>3</sup> To be determined by the regulator based on local and national water quality standards.

<sup>4</sup> Throughout this document, terms that appear in bold have been included in the definitions table at the start of the document.

## 7 Requirements

To ensure that the nutrient reduction action generates a water quality improvement the **proponent** will need to meet the following requirements.

### 7.1 Location

Nutrient reduction actions must occur within the same **catchment**, and preferably the same **sub-catchment**, to ensure that actions affect the same water body or stream segments and water quality standards are maintained or achieved.

Nutrient reduction actions should be located upstream from the nominated **point of concern** so that there is not a decline in water quality in the stream segment between the nutrient reduction site and the point of concern. However for tidal waters, the nutrient reduction site may be located downstream in the near field, considering near tidal velocities.

### 7.2 Nutrient equivalency

The nutrient reduction action must address the same pollutant as the water quality parameter being licensed. The mechanism only applies for total nitrogen and total phosphorous. Therefore, total phosphorous emissions must be counterbalanced by total phosphorous reductions and total nitrogen emissions with total nitrogen reductions.

It may be possible to reduce nutrients by undertaking actions that reduce sediment, such as through riparian restoration, as long as equivalent nutrient reductions are achieved.

### 7.3 Demonstrating water quality improvement for nutrient reduction actions at an alternative point source

A ratio of 1.5:1 will be applied to ensure that a nutrient reduction action at one point, corresponding with discharges at another point source, generates a water quality improvement. For example, if a sewage treatment plant was exceeding its nutrient discharge limit it could pay another sewage treatment plant with lower treatment costs to reduce their discharge by 1.5 times. This would result in a net reduction in the nutrient discharge to the waterway.

**Table 1: Examples of diffuse source management actions**

Example	Details
1. Bank stabilisation	Bank stabilisation, by structural or vegetative means, presents an opportunity for reducing the amount of nutrients (contained in sediment) being transferred into a waterway.
2. Improved nutrient management (fertiliser application)	Improved nutrient management practices for agricultural land help to ensure that there are minimal nutrient run-off effects to surrounding lands and waters, while maintaining high agricultural yields.
3. Constructed wetlands	Constructed wetlands act as nutrient assimilation and filtering devices to clean polluted water before it enters the local waterway.

### 7.4 Demonstrating water quality improvement for alternative nutrient reduction actions at a diffuse source

Point source load reductions and increases can be easily quantified at the point source, whereas it is more difficult to quantify the load reduction from diffuse sources. There are a range of management actions that have the potential to reduce nutrients, such as those described in Table 1. However, the efficacy of actions is not always known for individual sites.

In order to assess the proposed load reduction the proponent will be required to demonstrate the efficacy of the nutrient reduction action. This may include using appropriate catchment and receiving water quality models. Methodology is likely to differ depending on the management action that is selected. For instance, the scientific approach used for demonstrating nutrient reduction through bank stabilisation (sediment removal) will differ from the approach for demonstrating nutrient reduction through improved fertiliser application. An example approach used for calculating nutrient reductions delivered by bank stabilisation is outlined in the case study below.

A **nutrient reduction action ratio** or buffer of 1.5:1 will then be applied for diffuse nutrient reduction actions to account for uncertainties. For example, to counterbalance the impact of an additional six tonnes of total nitrogen from the point source, the rural diffuse nutrient reduction action must remove nine tonnes of total nitrogen.

As more nutrient reduction actions are undertaken and more science becomes available to determine efficacy it may be possible to reduce the nutrient reduction action ratio or apply a generic efficacy measure for certain actions.

#### **Case study: Determining nutrient reductions delivered by bank stabilisation activities—Beaudesert Pilot Project**

A pilot project is currently underway in the Logan River to manage additional nitrogen discharges from the Beaudesert Sewage Treatment Plant as a result of local population growth. The pilot commenced in January 2014.

Almost \$1 million has been invested by Queensland Urban Utilities to repair around 500 metres of eroded riparian corridors located close to the sewage treatment plant. The works include structural bank stabilisation and riparian planting.

A modelling approach was used to determine the scale of works required to offset five tonnes of total nitrogen (TN) from entering the river each year. Put simply, historical erosion rates and bank erosion models were used to calculate the average sediment erosion during high flow events, and soil samples were taken to determine the percentage of TN contained in the sediment. This produced an estimate of the sediment erosion avoided and the nutrient load avoided by bank stabilisation activities.

The nitrogen savings made through the riparian works will be used to counterbalance any potential increases in nitrogen discharge from the sewage treatment plant that may occur during wet weather events.

These nitrogen savings will allow the Beaudesert Treatment Plant to continue safely at its current capacity in the short-term without undertaking expensive upgrades. This means that about \$7 million in savings can be invested elsewhere in the sewage network.

The pilot study will run for five years including detailed monitoring and assessment.

## **7.5 Determining delivery ratios**

A **delivery ratio** represents the level of nutrient reduction achieved at the alternative nutrient reduction site compared with the level of reduction evident at the point of concern. It accounts for pollutant losses/attenuation during transport in the watershed and will be applied to both point and non-point source pollutant reductions. The importance of setting a delivery ratio is to ensure that there is an equivalent environmental outcome in terms of water quality at the **point of concern**, which may be some distance from the alternative nutrient reduction site. Generally, the further the distance between the point of concern and the alternative nutrient reduction site, the higher the ratio.

It will be the responsibility of the proponent to propose and demonstrate the delivery ratio using appropriate catchment and receiving water quality models. This approach is consistent with the department's outcome-based approach to permitting regulated activities.

An example of an approved water quality metric and method is outlined in the document 'Development of a Water Quality Metric, for Nutrient Offsets for Moreton Bay, Queensland'<sup>5</sup>. This work was undertaken by Arup consultants in 2007 to develop a water quality metric for nutrient offsets for Moreton Bay. The water quality metric was tested using hypothetical scenarios in the Logan Catchment and was reviewed and accepted by the Scientific Expert Panel at the Healthy Waterways Partnership in 2007. While it is not mandatory that this method be used, the proponent may wish to refer to this work.

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<sup>5</sup> This document is available via the Queensland Government library catalogue: <http://www.qld.gov.au/environment/library/>, search using the document title.

## 7.6 Timing

Nutrient reduction actions must be provided in advance or concurrently with impacts that are occurring so that the nutrient reduction action provides the benefit at the time of additional nutrient release.

## 7.7 Duration

The duration of the nutrient reduction action will be negotiated on a case-by-case basis to align with the performance specifications and lifespan of the point source infrastructure (maximum of 20 years). Alternative nutrient reduction arrangements only remain in place for the period of time stated.

## 7.8 Establishing baselines for diffuse sources

For diffuse source nutrient reduction actions proponents are required to demonstrate that the selected actions will generate additional water quality improvements that would not otherwise have taken place. Nutrient reduction actions must be additional to what is already required, determined by compliance with the general environmental duty, law or planning regulations or agreed to under other schemes or programs. Best practice guidelines should be used where available, and it is expected that nutrient reduction action providers are already meeting current recommended practice before undertaking the additional nutrient reduction action.

For actions that do not have well established best practice guidelines, the proponent should seek advice from the regulator.

## 7.9 Monitoring and reporting

The proponent is responsible for monitoring and reporting water quality effects at the point source location and other relevant locations specified in the proponent's environmental authority in order to demonstrate the efficacy of the nutrient reduction actions. The type of monitoring that is required will depend on the nutrient reduction action selected.

The costs of all monitoring and reporting activities are to be met by the proponent and are not the responsibility of the department.

The department is responsible for reviewing reports and conducting regular compliance checks.

## 7.10 Liability

The proponent is responsible for ensuring that the nutrient reduction action is implemented diligently and is also maintained. The proponent may contract management actions to a third party (e.g. land owner, manager, broker), but the legal responsibility for the nutrient reduction action will remain with the proponent as a requirement of the proponent's environmental authority.

The environmental authority conditions may also include requirements for when and how the nutrient reduction action will be replaced in the event it is destroyed or damaged in circumstances such as an extreme weather event.

If the nutrient reduction action fails to achieve the agreed outcome, and the proponent is unable to demonstrate that the nutrient reduction action has been appropriately implemented and maintained, then this will be a breach of the environmental authority and the department will consider its enforcement options.

## 8 Mechanism review

This mechanism will be reviewed within five years of commencement in order to ensure ongoing relevance and effectiveness in achieving objectives. The review process will incorporate, but is not limited to, review of requirements in light of scientific information and third party submissions.

