Consultation draft

Environmental Protection Act 1994

Point Source Water Quality Offset Policy

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1 Introduction

This document outlines the requirements for adopting **water quality offsets**[1] as an option for managing point source discharges to Queensland waters.

This Point Source Water Quality Offset Policy (the policy) provides the basis for environmental authority (EA) holders, regulated under the *Environmental Protection Act 1994* (EP Act), to meet their point source water emission discharge requirements through an alternative investment option, while achieving improved water quality in the receiving environment.

The policy gives flexibility to operators to implement offset solutions to meet their environmental obligations for incremental upgrades to production, as opposed to proposed new environmentally relevant activities. The outcome-based approach in licencing environmentally regulated activities in this policy will be tested through pilot projects led by industry and local government. The outcome-based approach should provide a broader environmental benefit and align with whole-of-catchment investment priorities.

The policy seeks to guide the implementation of projects under various water quality offset scenarios. The policy delivers on the Department of Environment and Science priority strategy for avoiding, minimising or offsetting negative impacts on the environment through:

- regulating environmentally significant activities based on best practice outcomes, and
- maintaining programs to address impacts on coasts and catchments from urban and rural development

Water quality offsets for discharge management will allow cost-effective solutions for environmental authority holders to achieve **catchment**-based, waterway health outcomes in Queensland.

2 Purpose

The purpose of the policy is to provide guidance on how to determine an alternative investment option for approved point source operators (e.g. sewage treatment plants) to meet water emission discharge requirements under the EP Act while delivering an improvement in water quality in the receiving environment.

3 Objectives

The policy has five key objectives:

1. Deliver an overall improvement in the health of Queensland waterways by reducing total discharge loads.
2. Provide cost effective and flexible options for regulated point sources to meet environmental authority (EA) conditions for discharge loads.
3. Allow for further growth and development while improving waterway health in accordance with local[2] and national water quality standards[3].
4. Minimise transaction costs and regulatory burden.
5. Maximise an investment's benefits for waterway and catchment improvement priorities.

4 Who can use this policy

The policy applies to all approved point source operators that hold an EA under the EP Act.

The policy applies to the management of total nitrogen and total phosphorous discharging to waters. The policy also applies to total suspended solids discharging to waters. For all proposed offset, a point source operator must demonstrate a valid scientific approach for evaluating and monitoring the offset. Advice should be sought from the

[1] Throughout the document. Terms that appear in bold at first mention have been included in the definitions table at the start of the document.

[2] Refer Schedule 1 of the *Environmental Protection (Water) Policy 2009*

[3] 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.

department.

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

Water quality impacts at the **point of concern** must be avoided or minimised using contemporary best management approaches when considering the use of water quality offsets as part of a **proponent**'s overall total discharge management plan.

To use this policy a proponent must demonstrate that any proposed discharge increase at the point of concern, will be counterbalanced by water quality offsets and will create a broader benefit to receiving waters[4].

[4] To be determined by the department based on water quality objectives and environmental values under the *Environmental Protection (Water) Policy 2009*.

5 Definitions

The following definitions are adopted for the purposes of this policy.

Term	Meaning
Best practice environmental management	In the EP act it is defined as the management of the activity to achieve an on-going minimisation of the activity's environmental harm through cost effective measures assessed against the measures currently used nationally and internationally for the activity. Section 21 (2) lists measures to be used to determine the best practice environmental management of an activity. These include, but are not limited to, strategic planning, systems and training, product and process design, public consultation, waste prevention/treatment and disposal. Please refer to the EP Act Guideline for application requirements for activities with impacts to water (link).
Bubble licence	An environmental authority for multiple activities for which a single load limit is required.
Catchment	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 or termination point.
Delivery ratio	A multiplicative factor that takes into account the distance and unique water type features (e.g. hydrological conditions) between the offset location and the point of concern. This is to account for uncertainty in delivering an improvement in the receiving waters
Diffuse source pollution	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 stormwater or overland flow. Common non-point sources are agriculture, forestry, urban areas, and historical mining sites.
Dry weather day	Means a day which is less than an agreed value for mm of rainfall which is recorded at any rainfall measuring station recognised by the Commonwealth Bureau of Meteorology within the area of the point source location, or if no such measuring station exists, at the nearest such station to the point source. The term also excludes days during which recorded rainfall over the preceding agreed number of days exceeding a cumulative rainfall of an agreed value for mm of rainfall based on catchment characteristics.
Flood management	Actions and methods used to reduce or prevent the detrimental effect of flood waters or high water levels. This includes consideration of total flood risk and requires and integrated and whole of catchment approach.
Equivalency	Refers to equivalence between the water quality gains resulting from offset solution and the losses due to increased point source pollution.
Evidence-based	Refers to any concept or strategy that is derived from or informed by objective evidence.
Mixing zone (or initial mixing zone)	Defined in EPP Water as an area where residual water pollutant mixes rapidly with surface water due to the momentum of buoyancy of the water pollutant and turbulence of the surface water. Within the initial mixing zone dilution of the water pollutants takes place.
NRM region	There are 14 natural resource management (NRM) regions in Queensland that correspond to 14 NRM organizations acting as delivery agents under the regional stream of the National Landcare Programme. Refer to http://www.nrm.gov.au/regional/regional-nrm-organisations for list of NRM regions. An **adjacent NRM region** is defined as when two NRM regions share a boundary.

Uncertainty ratio	An amount in excess of the mass of pollutants that provides a buffer to account for the uncertainty in pollutant removal efficiencies of the offset.
Point of concern	The point of concern is the area in a waterway adjacent to a point source discharge pipe (outfall) outlet and may be referred to as a “mixing zone”. The point of concern will be determined on a case-by-case basis depending on the sensitivity of the receiving environment.
Point source entity	The holder of an EA that allows the discharge of treated effluent into waterways at a point of concern.
Point source pollution	Pollutants discharged to a waterway by a point source entity at a point of concern.
Prescribed contaminants	Refers to contaminants listed within Schedule 9 of the *Environmental Protection Regulation 2008.*
Proponent	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 *Environmental Protection Act 1994*.
Receiving environment	An ecosystem and its constituent parts that is likely to come in contact with an environmentally relevant activity being released to the environment.
River Basin	Under the Queensland Water Quality Guidelines 2009 as amended, river basins are defined according to where water flows and drains across the landscape. Refer to Figure 2.3.2 for a map of defined river basin divisions across all of Queensland. An **adjacent river basin** is defined as when two river basins share a boundary.
Toxicity	The health effects which living organisms suffer as a result of contaminants in aquatic ecosystems.
Water Body	Any significant accumulation or mass of water having definite hydrological, physical, chemical and biological characteristics.
Water quality offset	An action taken to counter-balance point source pollution discharged at a point of concern.
Water type	A water body type under the Queensland Water Quality Guidelines 2009, within which water quality (or biological condition) is sufficiently consistent that a single guideline value can be applied to all waters within each type. Examples of water types include; upland freshwater, lowland freshwater, lakes, wetlands (palustrine), estuaries and marine – inshore and offshore (refer to https://www.ehp.qld.gov.au/water/guidelines/)
Wet weather day	A day that is not considered a dry weather day (see definition above).
Whole of catchment management	Planning and implementation of management practices or actions within a river basin, catchment or sub-catchment, that takes into account land uses and threats to water quality and environmental values, water quantity, water quality and water security and the impacts of climatic events.

6 Types of water quality offsets

The policy provides for corresponding water quality offsets between:

a) Two or more point sources

Water quality offsets can occur within and between regulated entities.

If two or more points of concern are managed by the same regulated point source entity through an amalgamated authority under section 243 of the EP Act, they may combine discharge limits to meet an overall reduced discharge limit—commonly referred to as a '**bubble licence**'.

Two or more point of concern that are not managed by the same regulated entity can also enter into a water quality offset arrangement—where one regulated entity 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 entity may also use corresponding diffuse source water quality offsets from rural, urban or other diffuse sources. The type of management actions that may provide a water quality offsets include:

- riparian streambank area restoration
- constructed or remediated wetlands
- water bioremediation
- improved fertiliser application management above any required minimum standards
- improved grazing land management practices above any required minimum standards
- water sensitive urban design (beyond meeting the design objectives under the State Planning Policy State Interest Water Quality.

The water quality offset would be reflected as a condition of the EA for the point source entity. The policy does not allow for water quality offsets in the form of a direct financial contribution to an entity.

7 Requirements

To ensure that the water quality offset generates a water quality improvement and provides a broader environmental benefit, the proponent will need to meet the following requirements:

- The water quality offset must not be designed to meet other legislative or policy requirements (e.g. putting a water quality offset in place to meet stormwater management design objectives under the State Planning Policy State Interest Water Quality). However, DES encourages water quality offsets that do more than simply meet minimum legislative requirements.
- For water quality offsets, proponents need to show that the selected actions will generate water quality improvements that would have otherwise not taken place. Water quality offsets 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. Where possible, preference should be given to providers currently using recommended **best practice environmental management**.
- The proposed water quality offset should be designed to ensure no unintended consequences such as increased downstream flooding impacts occur.
- Proposed increases in point source discharge should be avoided in areas that have been identified as water resource catchments and water supply buffer areas.
- DES also encourages water quality offset proposals that consider multiple ecological benefits or co-benefits (e.g. biodiversity or carbon benefits).

For actions that do not have well established best practice environmental management guidelines, the proponent should seek advice from the department. To build knowledge, DES encourages evidence-based pilot projects, with preliminary proposals submitted to the department. The proponent must demonstrate the impact and benefit of a water quality offset in a proposed location.

7.1 Catchment and Total Water Cycle Management

Water quality offsets under this policy should align with any whole-of-catchment and total water cycle management

planning. Examples of these include; catchment management action plans, water quality improvement plans, local government total water cycle management and urban stormwater water quality management plans. For example, where key priority areas have been identified for on ground restoration works, water quality offset locations should coincide with these priority locations.

7.2 Location

The proponent should describe the water quality offset location options considered prior to proposing the final location. This includes a feasibility evaluation of water quality offset locations available in relation to the point source discharge – upstream, downstream, same **river basin**, adjacent river basin, non-adjacent river basin, same **NRM region**, adjacent NRM region and non-adjacent NRM region (see Table 1). For example, if the proposed offset location is not located within the same river basin or upstream of the point source, then nearer locations must be assessed and the proponent must clearly articulate reasons for proposing a water quality offset location that is not upstream, not within the same river basin or not within the same NRM region as the point source discharge. For all proposed water quality offset locations, the proponent must show an equivalency in discharge reduction in receiving waters (refer to section 7.3). A downstream water quality offset on **wet weather day**s may be considered favourable if it occurs within the same **water type** as the point of concern.

For a water quality offsets not located within the same river basin as the point source (including locations within adjacent or non-adjacent river basins or NRM regions), the proponent must evaluate the local impact caused at the point of concern. Such evaluations must be undertaken against the objectives of meeting water quality objectives and assessing whether prescribed contaminants are potentially toxic at the point of concern, as set per EA conditions and risk assessment requirements in EA proposals. The proponent will need to identify the environmental values being protected as well as the discharge equivalency in receiving waters (e.g. Moreton Bay) of the point of concern.

A **delivery ratio** represents a factor that takes into account the uncertainty about delivering an equivalent discharge reduction in the receiving environment due to the distance between the point of concern and the water quality offset. This will influence the applicable uncertainty ratio (refer to Table 1). The delivery ratio will take into account pollutant losses/attenuation during transport in the river basin and will be applied to both point and non-**point source pollution** reductions, as the distance between the point of concern and water quality offset increases. It also takes into account the potential impact of the point source discharge increase on the receiving environment. Generally, the further the distance between two point sources or the point of concern and the water quality offset site, the higher the delivery ratio may be, if deemed applicable. The delivery ratio will be determined based on the proposal demonstrating equivalency in discharge reduction in receiving waters and based on best available science.

Table 1 Management hierarchy for assessing offset locations available and ratio to be applied

Location ***Applicable to bubble licence and diffuse sources***	**Uncertainty ratio**
Same river basin – upstream	1.5:1
Same river basin - downstream	To be determined as part of the proposal, a delivery ratio may increase the 1.5:1 uncertainty ratio. This will depend on the proposal demonstrating equivalency in discharge reduction in receiving waters, which will take into account distance from point source and impact on the receiving environment.
Same river basin – different water type	
Adjacent river basin	
Non-adjacent river basin	
Same NRM region	
Adjacent NRM region	
Non-adjacent NRM region	

7.3 Offset equivalency

The water quality offset must address the same pollutant as the water quality parameter being licensed. The policy applies to total nitrogen, dissolved inorganic nitrogen, total phosphorous and total suspended solids. Therefore, total phosphorous emissions must be counterbalanced by total phosphorous reductions, total nitrogen emissions with total nitrogen reductions, dissolved inorganic nitrogen emissions with dissolved inorganic nitrogen emissions and total suspended solids with total suspended solids.

Evaluation of water quality offsets for total suspended solids may include a determination of bioavailability of particulate nutrients in sediments. Consideration may be given for geological versus biological sources of suspended solids. In some cases, geological sources may pose a single risk to the environment compared to the potential multiple risk from biological sources. The argument is that biological suspended solids will have a portion of bioavailable nutrients and therefore may add to the nutrient load. Geological suspended solids, on the other hand, are more likely to be inert, posing risks related only to sediment load (e.g. turbidity and sedimentation). A proposal for a water quality offset for total geological suspended solids may require less evidence for demonstrating water quality offset equivalency, as compared to proposals for offsetting biological suspended solids. As stated above, EHP encourages evidence-based pilot project submissions to build further knowledge.

The proposed offset must ensure that local increases in point source discharge adhere to release limits and monitoring conditions for **prescribed contaminants** set under the EA conditions. These contaminants include ammonia, BOD and heavy metals. Proposed offsets s will not be considered if they increase discharge of toxicants at the offset site at levels above water quality objectives. Water quality offsets that reduce release of toxicants as well as the targeted nutrients will be looked on favourably.

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. The proponent will need to use an appropriate methodology (e.g. modelling) to demonstrate nutrient reduction equivalency.

7.4 Uncertainty ratio (bubble licence)

The application of an uncertainty ratio is required for an amalgamated EA, which has a “bubble condition” that combines the individual load limits of point source entities into a single load limit that it less than the sum of the individual load limits .This is to ensure that there will be a broader benefit to the receiving environment in terms of water quality improvements.

An uncertainty ratio of 1.5:1 will be applied to ensure that a water quality offset at one point, corresponding with discharges at another point source, generates a water quality improvement in the receiving environment. For example, two sewage treatment plants each have a total nitrogen mass load limit of 20 T/year. Under a bubble licence the “bubble” total nitrogen mass load limit for both sewage treatment plants is 30 T/year. This would result in a net reduction in the discharge of nutrients to the receiving environment.

The uncertainty ratio of 1.5:1 will apply for water bubble licences that are located upstream in the same river basin and within the same water type. However, in tidal water types (e.g. estuaries) upstream or downstream locations in the near field, will be considered equal. For proposed bubble licences located downstream or outside of the same water type within the same river basin, or located in adjacent river basin, non-adjacent river basin, adjacent NRM region and non-adjacent NRM region – delivery ratio may increase the 1.5:1 ratio to ensure improved broader environmental water quality outcomes in the receiving environment. The application of the delivery ratio will depend on equivalency demonstration of the bubble condition by the proponent (Table 1) and based on best available science.

7.5 Uncertainty ratio (diffuse source)

Point source load reductions and increases can be 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 and sediments, such as those described in Table 2. However, the efficacy of these 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 water quality offset. This may include using appropriate catchment and receiving water quality models as well as flood 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 a water quality offset delivered by bank stabilisation is outlined in the case study below.

An uncertainty ratio or buffer of 1.5:1 will be applied for diffuse water quality offsets to account for the uncertainty in

accurately determining what the discharge reduction will be in the receiving environment. For example, to counterbalance the impact of an additional six tonnes of total nitrogen from the point source, the diffuse water quality offset must remove nine tonnes of total nitrogen. The uncertainty ratio of 1.5:1 will apply for water quality offsets that are located upstream in the same river basin and within the same water type as the point source discharge.

However, in tidal water types (e.g. estuaries) upstream or downstream locations in the near field will be considered equal. For offsets located downstream or outside of the same water type within the same river basin, or located in adjacent river basin, non-adjacent river basin, adjacent NRM region and non-adjacent NRM region, a delivery ratio may increase the uncertainty ratio to ensure an equivalent reduction in the receiving environment, taking into account that distance and unique water body features may affect the water pollutant fate.

For example, to counterbalance the impact of the same additional six tonnes of total nitrogen from the point source, a diffuse water quality offset located in an adjacent river basin, may need to remove 12 tonnes of total nitrogen. Here the delivery ratio would have taken into account the uncertainty in delivering a discharge reduction and a broader benefit for the receiving environment, due to the increased distance between the point of concern and the water quality offset location. The application of the delivery ratio will depend on equivalency demonstration of the offset by the proponent, based on best available science and the value given here is not indicative and only used for explanatory purposes (Table 1).

As stated above, evidence-based pilot project submissions to build further knowledge are encouraged. With future additional water quality offset projects resulting in more science becoming available to determine efficacy, it may be possible to apply a generic efficacy measure for certain actions.

Table 2: 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 above any required minimum standard for agricultural land help to ensure that there are minimal nutrient run-off effects to surrounding lands and waters, while maintaining agricultural yields.
3. Constructed wetlands	Constructed wetlands act as nutrient assimilation and filtering devices to clean polluted water before it enters the local waterway.

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

A pilot project is currently underway in the Logan River to manage additional nitrogen and phosphorus discharges from the Beaudesert Sewage Treatment Plant (STP) 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 bank located close to the sewage treatment plant. The works include structural bank stabilisation, pile fields and riparian planting.

A modelling approach was used to determine the scale of works required to offset 5 tonnes/year 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 in the sediment. This allowed the production of an estimate of the sediment erosion avoided over a period of time which is then turned into an annualized rate of erosion (11 200 tonnes/year) and the associated annualised total nitrogen load avoided (5 tonnes/year) by bank stabilisation activities.

The nitrogen and phosphorus 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 and after wet weather events, when recycled water demand reduces and streambank erosion risks are highest. The Beaudesert STP supplies recycled water to five local customers to minimise treated effluent releases to the Logan River during dry weather periods

These nitrogen savings allowed the Beaudesert STP 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 has been running for three of its five years test period including detailed monitoring and assessment.

7.6 Wet versus dry weather

Best practice environmental management should be addressed in all proposals. Proponents are encouraged to adopt total recycled/beneficial re-use of point source discharge under dry weather conditions and release only on wet weather days. The policy refers to wet weather days and **dry weather day**s as defined under standard conditions in an EA. Should an offset be proposed for discharge to waters on defined dry weather days, then the water quality offset must counterbalance point source discharge on dry weather days and a delivery ratio may apply (Figure 1). The application of the delivery ratio will depend on equivalency demonstration of the offset. For proposed discharges on wet weather days, the water quality offset must counterbalance total point source discharge on wet weather days. For example, the policy does not allow offsetting a discharge on dry weather days with an offset solution designed to offset discharge on wet weather days such as erosion control.

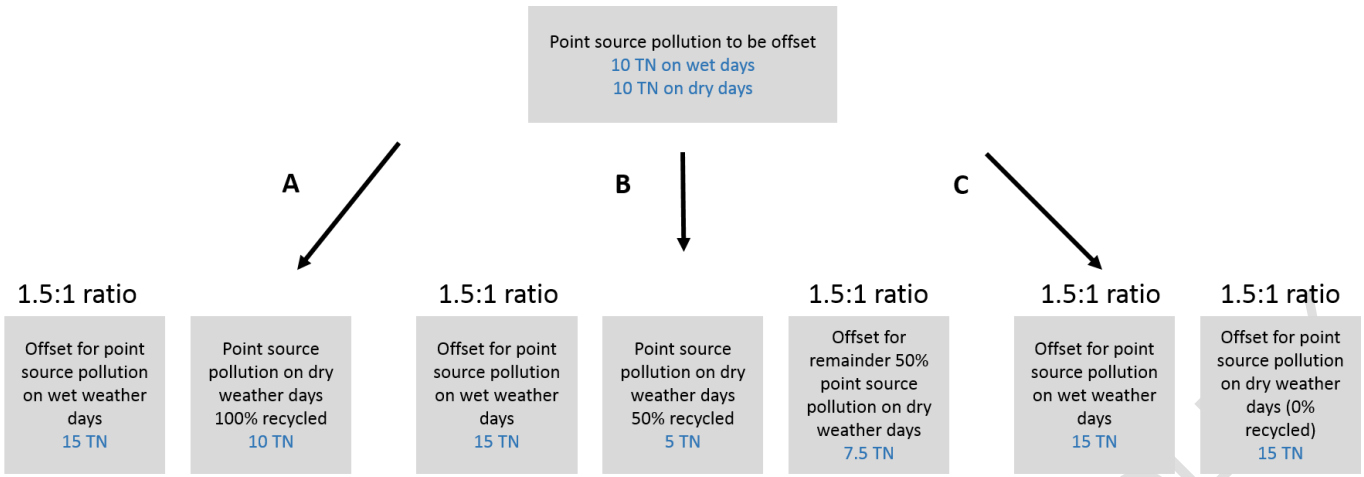

Figure 1. Diagram illustrating hypothetical options for offsetting point source pollution on wet and dry weather days as defined in EA conditions. Options A, B and C illustrate projects that would adopt 100%, 50% and 0% recycled/beneficial re-use on dry weather point source discharge respectively. TN represents tonnes Total Nitrogen and values in blue are hypothetical. Although not illustrated in the diagram, a delivery ratio may apply for point source pollution on dry weather days and this will depend on equivalency demonstration of the offset.

7.7 Timing

The water quality offset must be provided in advance or concurrently with impacts that are occurring so that the water quality offset provides the benefit at the time of additional point source discharge release. Timing will be considered on a case-by-case basis and will be applicable as stated in the EA. Examples of variations in timing will depend on the water quality offsets adopted, for instance:

- Bubble license – immediate
- Riparian and riverine restoration – time allowed for vegetation to establish.

Offsets on-ground works (e.g. riparian restoration) should commence as soon as possible, rather than wait for point source infrastructure to be operational before commencing works.

7.8 Duration

The duration of the water quality offset will be negotiated on a case-by-case basis to align with the performance specifications and lifespan of the point source infrastructure. Potential extension of the offset duration will be reviewed at the end of an offset tenure. The proponent must monitor and maintain the water quality offset throughout its lifespan. The water quality offset arrangements only remain in place for the period of time stated.

7.9 Monitoring and reporting

The proponent is responsible for monitoring and reporting water quality effects at the point source location, offset location and other relevant locations specified in the proponent's EA in order to demonstrate the efficacy of the water quality offset. The type of monitoring that is required will depend on the water quality offset 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 performance and monitoring reports. Monitoring must take place according to best available practice, the environmental authority conditions and in accordance with the Monitoring and Sampling Manual under the EPP.

7.10 Liability

The proponent is responsible for ensuring that the water quality offset is implemented diligently, is maintained, and meets the design criteria. The proponent may contract management actions to a third party (e.g. land owner, NRM body, manager, broker), but the legal responsibility for the source and delivery of the water quality offset 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 water quality offset will be replaced in the event it is destroyed or damaged in circumstances such as an extreme weather event.

If the water quality offset fails to achieve the agreed outcome, and the proponent is unable to demonstrate that the water quality offset 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 Policy review

This policy will be reviewed to keep up to date with continuous improvement in technology, management practices and experience. The review process will incorporate, but is not limited to, review of requirements in light of scientific information and third party submissions.