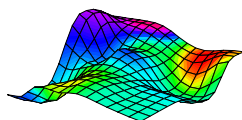


Prepared for the  
Swan River Trust

## A nutrient offset contributions scheme for the Swan-Canning catchment



14 July 2008



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## **Acknowledgements**

The Swan River Trust engaged BDA Group to advise on the potential for nutrient offsets to assist the management of water quality in the Swan-Canning catchment. The project has four stages:

- Stage 1 – Scoping of a conceptual framework and consultation with key stakeholders;
- Stage 2 – Preparation of a Discussion Paper identifying key design parameters;
- Stage 3 – Preparation of a draft nutrient offset policy for Swan Canning; and
- Stage 4 – Assessing the suitability nutrient offsets for the Geographe and Peel-Harvey catchments.

This report presents the findings and recommendations for Stage 3 of the project. In undertaking this study, BDA Group has collaborated with Ms Megan Dyson, and is grateful of the assistance and support provided by the SRT, state and local government agencies, and a range of stakeholder groups and individuals. Funding for this study has been provided by the Commonwealth Government under its Coastal Catchment Initiative.

Despite every effort to verify data and clarify issues raised, any remaining errors or omissions are the responsibility of the authors. Accordingly this report does not necessarily reflect the views of the Swan River Trust or the Government of Western Australia.

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## **EXECUTIVE SUMMARY**

The Swan River Trust is investigating the potential use of nutrient offsets in the Swan Canning catchment. This policy position paper presents a framework for the implementation of a nutrient offset contributions scheme.

The objective of the scheme is to offset 'residual' loads of nutrients from new developments entering the Swan Canning catchment so as to improve regional water quality outcomes. The residual load of nutrients will be defined as the load of nutrients entering waterways from a developed site over and above natural loads. Existing requirements for new development to avoid, minimise and treat nutrients on-site in the first instance will continue. In those cases where approved development is likely to result in residual nutrient discharges, the use of nutrient offset contributions will 'make good' potential impacts and protect water quality in the Swan and Canning catchments.

Under the proposed scheme developers of all subdivisions in the Swan Canning catchment will be required to make offset contributions in relation to residual loads of nitrogen and phosphorous through one-off developer charges. Modest legislative changes will be required to introduce the obligation for payment of contributions to an independent Nutrient Management Fund. The Nutrient Management Fund would be established as a ring-fenced unit within the Swan River Trust to invest in nutrient reductions to deliver nutrient reductions commensurate with the residual nutrient loads from new developments.

The initial contribution rates for nitrogen and phosphorus will be based on the capital, operating and maintenance costs of proven nutrient abatement works and will include margins for administration, monitoring and risk. The Nutrient Management Fund will adopt an investment portfolio approach to manage risk and allow investment in some higher risk programs and for research and trials. The Nutrient Management Fund will work with other agencies and programs to create synergies to improve regional nutrient management and maximise all environmental benefits of nutrient reduction activities. Over the first five years the level of contributions collected is broadly estimated to be \$6 - 7million.

The scheme would allow an adaptive management approach while still providing certainty to developers and avoiding protracted negotiations with regulatory authorities that would continue under case-by-case assessments of nutrient offsets.

Subject to its successful implementation, the scheme could readily evolve over time to incorporate broader nutrient sources, such as existing urban activities, commercial/industrial and/or agricultural, as well as making use of any funding from local, State or Commonwealth governments. In this way the scheme could move from one of ensuring a no net increase in nutrient loads from new development, to one that could deliver significant net reductions in overall loads and hence make a significant contribution to the Swan River Trust's goal of a 30% reduction in nutrient in priority catchments by 2015.

## 1 INTRODUCTION

The Swan Canning river system has shown symptoms of eutrophication, especially algal blooms and fish kills, over a number of years. In January 2000 a major toxic blue-green algal bloom occurred in the Swan-Canning Estuary, resulting in unprecedented closure of the whole estuary and its rivers to fishing and recreation for twelve days<sup>1</sup>.

In 2003 between April and June there were six fish kill events in the Swan-Canning resulting in around 300,000 dead fish from a wide range of fish species<sup>2</sup>. These events have highlighted vulnerability of the system to algal blooms and a range of other impacts of nutrients.



The Swan River Trust (SRT) has identified the greatest problems as a result of nutrients currently occur in the upper Swan and Canning Estuaries, which progressively lessen with proximity to the estuary mouth.

A reduction in nutrients entering the system is vital to the long term health of the waterway.

The SRT's draft action plan for improving water quality in the Swan Canning river system sets a goal of a 30% reduction in nutrient inputs to priority catchments by 2015<sup>3</sup>. As part of a suite of management programs to be implemented over the next five years, the SRT is investigating the potential use of nutrient offsets in the Swan Canning catchment.

This policy position paper presents a framework for the implementation of a nutrient offset contributions scheme for the Swan Canning. Further detail on scheme design and operation can be found in the Discussion Paper prepared under Stage 2 of the project. This paper will be used to garner support from key government agencies and stakeholders for the introduction of the scheme.

It is important to note however, that final scheme settings would be a matter for the Government of Western Australia, and the introduction of a nutrient offset contributions scheme for the Swan Canning will require legislative reforms and associated formal stakeholder consultation activities.

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<sup>1</sup> State of the Environment Report, Western Australia 2007

<sup>2</sup> Swan-Canning Cleanup Program, Action Plan Implementation, Swan River Trust, November 2003

<sup>3</sup> Draft Healthy Rivers Action Plan, Swan River Trust, 2006

## 2 NUTRIENT OFFSET CONTRIBUTIONS SCHEME FRAMEWORK

This section provides an outline of the key features of the proposed nutrient offset contributions scheme. It covers the scheme objectives, structure, contributors and basis for contributions.

### 2.1 Objectives

The objective of the scheme is to offset residual loads of nutrients from selected activities entering the Swan Canning catchment so as to improve regional water quality outcomes. The scheme will focus on offsetting both nitrogen and phosphorus loads separately.

Importantly, the scheme is not a substitute for existing planning and other regulations protecting local environmental amenity and seeking best management practice to minimise residual loads.

An offset is an action taken to compensate for a negative environmental impact that would otherwise arise from an approved activity or development. Approval requires that the Government's environmental standards are met in the first instance.

Offsets will not replace or diminish existing regulatory requirements to protect local environmental amenity.

In those cases where approved development is likely to result in residual nutrient discharges, the use of environmental offset contributions will 'make good' the potential degradation of **regional** water quality and protect waterway health in the Swan and Canning catchments.

*Existing requirements for new development to avoid, minimise, and treat nutrients on-site in the first instance will continue.*

### 2.2 Structure and principles

The nutrient offset contributions scheme will involve new urban developments paying financial contributions to an independent nutrient management fund. The fund will use the monies raised to invest in nutrient reductions to deliver better regional water quality outcomes.

The scope of the scheme will cover the entire Swan Canning catchment, however three separate regions will be established so that contributions collected in each region will be spent in that region. This will provide significant flexibility for the siting of cost-effective works while ensuring communities in each region share in water quality improvements.

As shown in Figure 2.1, offset contributions for new development located in the upper / middle Swan region will be spent on works within that region, while contributions collected in the upper / middle Canning region will be spent within that region. However due to limitations on feasible offset sites in the lower reaches of both rivers, and the fact that in many cases improvements in the upper catchments will flow through to the lower Swan, contributions collected in the lower river and estuary region may be spent on works anywhere within the Swan-Canning catchment.

Figure 2.1: Offset regions in proposed scheme

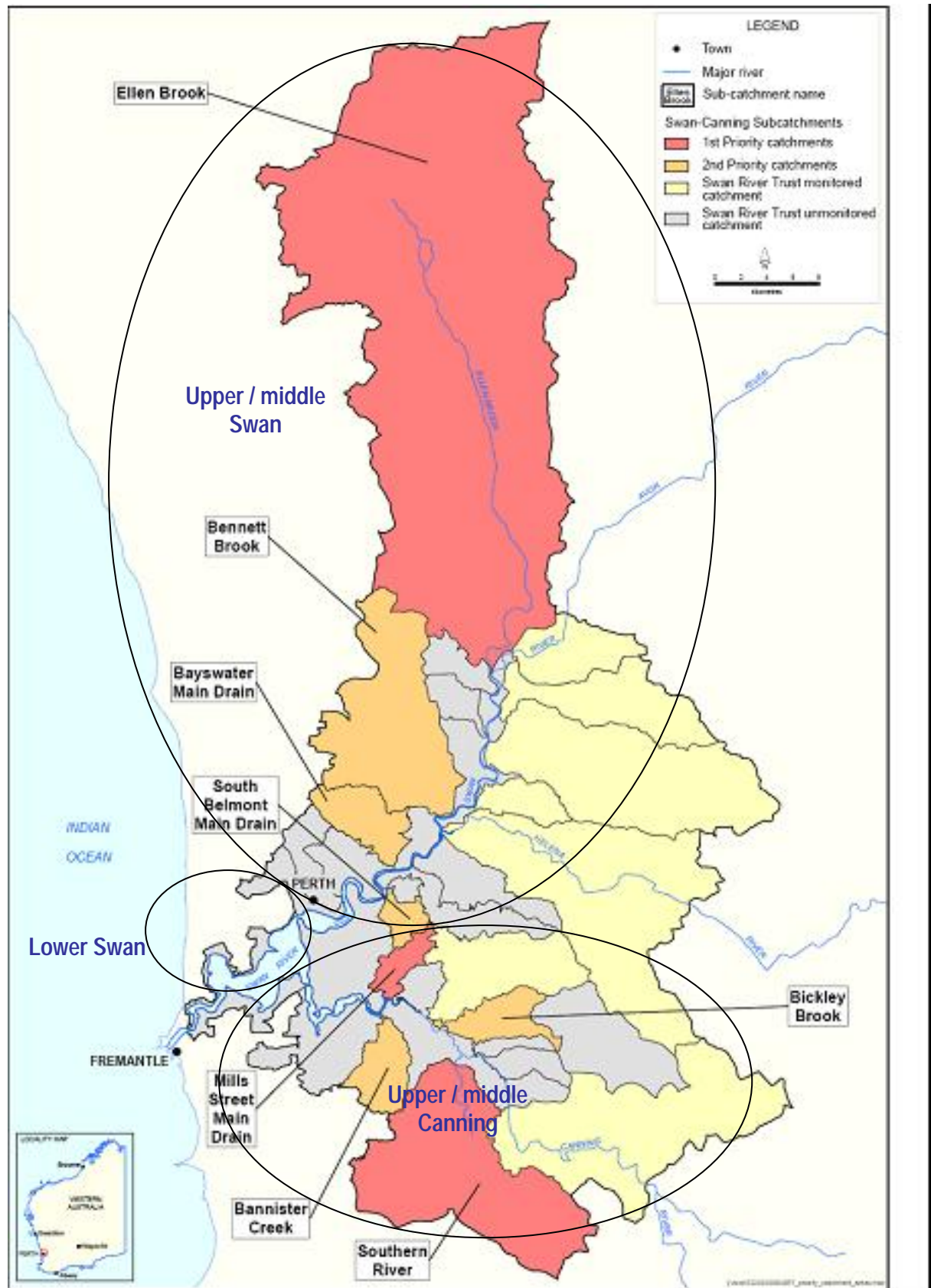
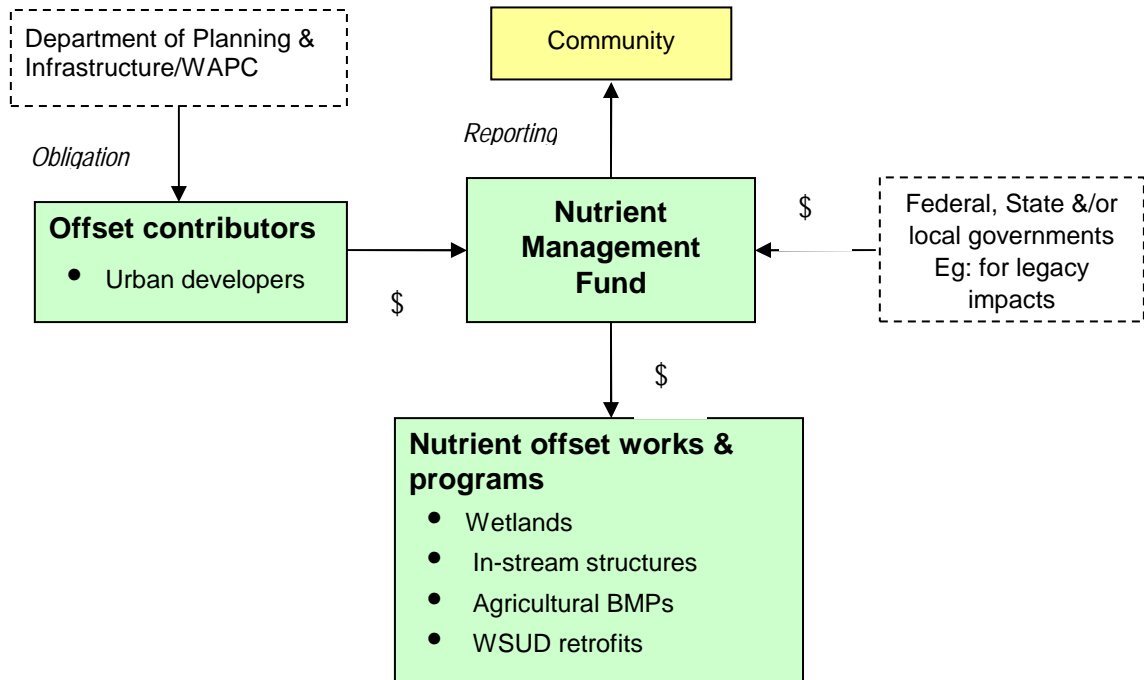


Figure 2.2 shows the key scheme participants.

Figure 2.2 Nutrient offset contribution scheme participants



The following principles underlie the proposed nutrient offset contributions scheme:

- Nutrient offset contributions must be expected to result in an equivalent or better regional water quality outcome, taking into account information uncertainties, management risks, compliance and enforcement provisions;
- All standard regulatory requirements must still be met by all parties; and
- The scheme should not reward poor environmental performance by prospective offset sellers (ie: those undertaking nutrient offset works and programs).

### 2.3 Contributions

Developers of all subdivisions in the Swan Canning catchment will be required to meet the costs of measures to offset nutrients equivalent to their residual loads through one-off developer charges. The requirement will apply to both greenfield and infill subdivisions and will be imposed by the Western Australian Planning Commission (WAPC), with payment made directly to the Nutrient Management Fund.

The contribution requirement would be similar to the requirement for other developer charges are similar to the approach being used by Melbourne Water under their *Stormwater Quality Offsets Program*. Section 3 discusses the legislative and policy reforms required to introduce these

*Developers of all subdivisions would pay contributions to cover the costs of nutrient offset works.*

charges. Appendix 1 provides a brief discussion of the other legislative options considered.

The proposed one-off charges for new developments will cover all capital, operating and maintenance costs associated with offset works for a period of 30 years.

It is not recommended that existing urban or agricultural areas in the Swan Canning catchment are included as contributors given that State-wide drainage reforms under consideration could lead to broadly applied drainage charges in future. It should be noted that the Government is already investing in regional works to address legacy impacts on water quality in the catchment through the Swan River Trust programs.

***The one-off contribution will cover the capital, operating and maintenance costs of offset works for 30 years.***

The metric for offset contributions will be total nitrogen and total phosphorus. However this would not prevent the relative merits of reducing different types of nitrogen and phosphorus being taken into account in the spending of funds for improving regional water quality under the scheme.

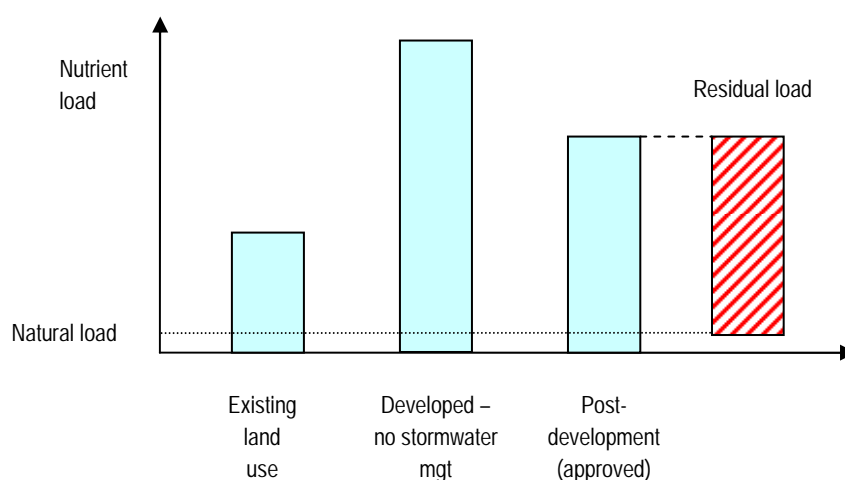
A financial contribution would be required from offset contributors for each tonne of estimated residual load of phosphorus and nitrogen. There would be a separate contributions rate (\$ per tonne) for phosphorus and nitrogen based on the estimated cost of off-site actions to reduce residual nutrient loads in lieu of on-site abatement.

Developers of both greenfield and infill subdivisions will be required to offset their residual loads of nutrients by making a developer contribution to cover the capital, operating and maintenance costs of offset works. The residual load of nutrients will be defined as the load of nutrients above the natural load. This approach is shown in Figure 2.3.

***The residual load is defined as the load of nutrients above natural background levels for the site.***

The scheme will rely on estimation methods and models that are currently used as part of development approvals for subdivisions for determining residual loads. For smaller subdivisions that are not currently required to determine residual loads, standard contribution rates will be set according to the type, density and location of development. The standard rates will take into account key characteristics across different locations such as rainfall and soil type. Section 4.4 provides examples of calculating contributions for new developments.

Figure 2.3 Definition of residual load



Offset contribution rates for nitrogen and phosphorus would be determined ahead of implementation based on estimated nutrient abatement costs identified in the Nutrient Management Fund's Business Plan. Contribution rates would include margins for risk, offset performance monitoring and reporting and for scheme administration. Section 4.3 discusses the business plan in more detail including the setting of contribution rates.

## 2.4 Nutrient Management Fund

The Nutrient Management Fund would be established as a ring-fenced unit within the Swan River Trust. The Nutrient Management Fund would adopt an investment planning and adaptive management approach with oversight from the Swan River Trust.

The role of the fund is to reduce loads of nutrients entering the Swan Canning catchment to improve regional water quality outcomes. The fund will make strategic investments to maximise regional water quality benefits taking into account:

- Any constraints on the location of offset measures associated with funds collected;
- Equivalence ratios established by the Fund to assess the relative effectiveness of different nutrient abatement options taking into account the location, type of nutrients, timing of discharge and uncertainties (both over the measurement of loads and performance of actions).

*The Nutrient Management Fund would be established as a ring-fenced unit within the Swan River Trust.*

The Fund will also establish a minimum level of nutrient management performance for offset sellers in the Swan Canning before they are allowed to sell nutrient abatement services to the Nutrient Management Fund.

The key types of works and programs for reducing nutrients include:

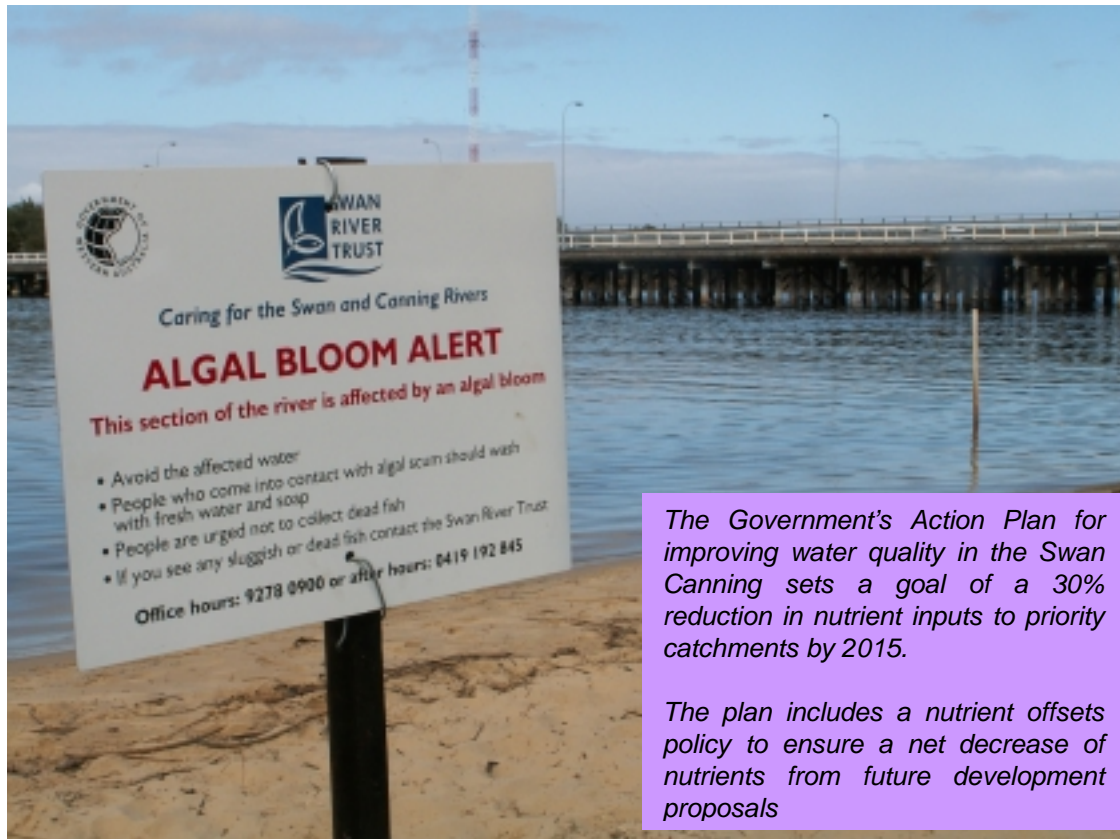
- Drainage intervention - from construction of wetlands to a number of in-stream structures which trap sediment including in-stream filters.
- Better agricultural management practices - such as improved waste management from dairies, piggeries, feedlots and poultry farms, improved fertiliser and irrigation management, adoption of perennial pastures and riparian fencing.
- Retrofitting of water sensitive urban design - technologies include the use of greater infiltration on-site, rainwater tanks, vegetated conveyance systems and constructed wetlands.

It is not proposed that the Nutrient Management Fund take ownership of the assets invested in to deliver nutrient reductions. Rather the Fund would be contracting with offset providers – such as Water Corporation, Local Government or private businesses – to manage their assets so as to generate the negotiated nutrient reductions. It would be up to offset providers to ensure that the negotiated fee was sufficient for them to develop and maintain the offset works or management strategies for the agreed contract period, taking into account other objectives that the works or strategies may be contributing to and any residual uses and / or costs associated with the assets at the end of the period. For example, dedicated nutrient reduction works such as wetlands, could with some maintenance expenditure, provide ongoing nutrient reductions beyond the period contracted by the Nutrient Management Fund. The scope for ongoing funding of such works, including with the potential revenue support from any new drainage charges that may be introduced in the State (see Section 3.3) would be a matter for the offset provider.

Offset contracts of different duration would be entered into taking into account the nature of the measure, ongoing maintenance commitments, preferences of negotiating parties and associated risks. The potential role of offset tender mechanisms will also be considered by the Nutrient Management Fund in order to maximise nutrient reductions given available contributions.

The Nutrient Management Fund will adopt an investment portfolio approach to manage risk and allow investment in some higher risk programs and for research and trials. The nutrient management fund would work with other agencies and programs to create synergies to improve regional nutrient management and maximise all environmental benefits of nutrient reduction activities. The Fund would need to forge close partnerships with other government agencies, local councils, catchment groups, service providers, land managers etc. This may include pursuing synergies with projects by the Department of Agriculture and Food and Water Corporation aimed at increasing the uptake of best management practices at rural landholdings as well as drainage management initiatives of the Department of Water and councils.

Section 4.3 provides more discussion on the key components of the Nutrient Management Fund's business plan.



### **3 INSTITUTIONAL AND LEGISLATIVE REFORMS**

This section examines the institutional responsibilities and legislative reforms required to implement the nutrient offset contribution scheme. The scheme needs enabling legislation to establish the obligation for offset contributors to pay a contribution as well as establishing a 'home' for the money and the authority to spend it.

#### **3.1 Legal obligation and payment of offset contributions**

The most straightforward way to impose conditions on all subdivisions for a nutrient offset contribution is through the WAPC. The WAPC's power to impose conditions on subdivisions derives from the Planning and Development Act 2005. This Act presently allows for 'payment-in-lieu' in respect of open space contributions, but not for contribution payments in lieu of providing offsets for water quality impacts.

Contributions to an offset scheme (the Nutrient Management Fund) in respect of residual nutrient loads for subdivisions in the Swan Canning catchment would therefore require an amendment to the Planning and Development Act 2005. The required amendment would state that the contribution be paid directly to the Nutrient Management Fund (within the Swan River Trust). The administrative process for requiring contributions is discussed in section 4.1.

#### **3.2 Use of contributions to fund nutrient offset works**

As the contributions are to be paid to a statutory entity (the Swan River Trust), the statute governing the entity needs to provide for the receipt of monies to, and expenditure from, its accounts. The SCRM Act currently requires that any monies which are by law required to be paid to the SRT must be credited to the Swan River Trust Account established under that Act. Therefore no amendment to the Act would be needed to enable nutrient offset contributions required from developers under an amendment to the Planning Act to be paid to the Trust.

The Fund (and relevant monies in the Trust Account) would be managed by the SRT, including the holding of contributions paid and investments in relevant offsets to improve regional water quality. The SCRM Act requires that the Trust Account is to be expended for the purposes of the functions of the Trust.

The functions of the Trust currently include "to carry out works and provide facilities for the purposes of protecting and enhancing the ecological and community benefits and amenity of the Riverpark". Presumably this definition is wide enough to encompass water quality improvement work in the wider Swan Canning catchment (eg. as is currently done through the drainage nutrient intervention program). Therefore, subject to any applicable rules imposed under the Financial Administration and Audit Act 1985, the SRT could ensure management of the hypothecated contributions for the purposes of the Nutrient Management Fund under current legislation.

However, if statutory amendments are to be made to enable the imposition of the contribution under planning legislation it would be desirable to include amendments to the SCRM Act to strengthen governance arrangements to:

- specify that the SRT is to separately manage and account for the nutrient offset contribution in accordance with a Business Plan prepared by the SRT for that purpose; and
- specify that the Trust has the function of undertaking works or *securing the performance of works or other activities by other persons*, for the purposes of improving water quality in the Riverpark.

### **3.3 Integration with drainage reform**

The Water Corporation and local governments currently collect developer charges to manage the additional hydraulic loadings and resulting offsite impacts associated with new developments. The nutrient offset contributions scheme extends the same logic as is currently in place for hydraulic impacts to nutrient impacts because of its priority in the Swan Canning catchment.

The Department of Water is currently coordinating a project examining urban drainage management and funding arrangements in Western Australia. Any new water quality drainage charges that may be implemented in the state should take into account the nutrient management performance of new developments relative to older developments. In addition, contributions made by new developments to fund nutrient offset works should also be factored into water quality drainage charges, including that contributions are designed to offset residual discharges for only a finite period.

Further, if new water quality drainage charges are introduced, the Government may consider the merits of hypothecating part of the funds collected within the Swan Canning catchment to the Nutrient Management Fund.

## **4 IMPLEMENTATION**

### **4.1 Administration of contribution**

The WAPC is responsible for the determination of all subdivision applications in WA. Under the current approval process an application for subdivision is lodged with the Department for Planning and Infrastructure. The Department refers the application for comment and recommended conditions to relevant local government and government agencies and then submits a report and recommendation to the WAPC. The WAPC takes into account any regional or local planning scheme provisions, relevant policies of the WAPC and the particular circumstances of the application in making its decision.

Proponents of larger subdivision developments are currently required to prepare an urban water management strategy and meet certain design objectives relating to water quality management. These include nutrient management for at least 60% reduction in total phosphorus and at least 45% reduction in total nitrogen compared to a development that does not actively manage stormwater quality. In demonstrating that these objectives are met, an estimation of the loads of nutrients leaving the site once the development is complete is made. Under the nutrient offset contribution scheme this information would form the basis of the estimation of residual loads and calculation of the total nutrient offset contribution payable.

The validity of the load estimates used to demonstrate compliance with the design objectives above are currently considered by the Department of Planning and Infrastructure and relevant agencies in providing their advice to WAPC. There are some potential difficulties with the use of the current estimates of residual load and this barrier to implementation and potential solutions are discussed further in section 6. Some additional guidance material on acceptable techniques for the estimation of residual load is likely to be needed to support smooth implementation of the scheme. The Department of Planning and Infrastructure would review the adequacy of the estimation of residual loads (in light of the guidance material) and/or seek input from other agencies where necessary.

The nutrient offset contribution would be imposed through conditions on subdivisions and could be administered in a similar manner to other developer charges for infrastructure. The WAPC's Planning Bulletin no. 18: Developer Contributions for Infrastructure (1997) provides the Commission's policy on developer contributions and guidelines on the scope and method for estimating contributions. WAPC has recently released a draft policy to replace this - the State Planning Policy 3.6 Development Contributions for Infrastructure (Draft) May 2008. This policy could be amended to include a requirement for subdivision developments in the Swan Canning catchment to pay a nutrient offset contribution. This would be a monetary contribution required as one of the standard development contribution requirements applicable to all subdivisions located in the Swan Canning catchment. And the payment of nutrient offset contributions should be staged similar to the payment of headworks charges to manage the hydraulic loading of stormwater from new developments. The policy would refer to the latest version of the Nutrient

Management Fund's Business Plan for the actual nutrient contribution rates payable (\$ per kilogram).

The subdivision condition imposed by WAPC relating to the nutrient offset contribution would require payment of a one-off contribution to the Swan River Trust based on the residual load estimation in the proponent's urban water management strategy and the contribution rates published in the Nutrient Management Fund Business Plan. For developments where residual loads are not required to be estimated the condition would require payment based on a standard per hectare contribution rate published in the Nutrient Management Fund Business Plan.

*The contribution would be based on the proponent's estimates of residual load or standard per hectare contribution rates.*

The standard contribution rates per hectare would vary for different development types and location. The rates would be developed by the Nutrient Management Fund to take into account key characteristics in different locations such as rainfall and soil type. Rates could be developed for each local government area or to a more detailed level (eg. suburb) depending on availability of data and expected variability between different locations. The standard rates would be conservative estimates reflecting likely residual loads resulting from the minimum on-site nutrient management required by development approval processes. Proponents with better performance would have the option of providing their own estimates of residual loads as part of the development process.

Section 4.4 provides examples of calculating contributions for new developments.

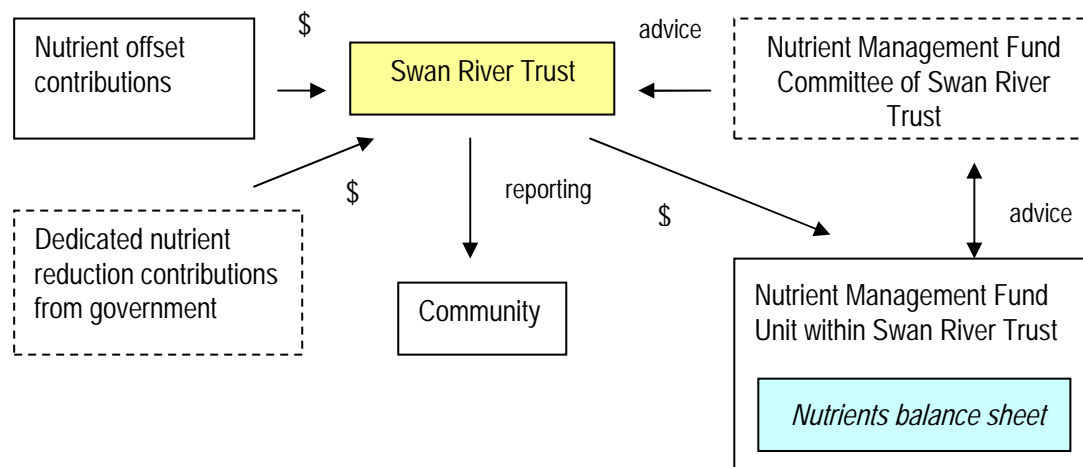
## 4.2 Administration and governance for use of funds

The Swan River Trust is currently empowered to establish committees (which may include persons who are not members of the board), to which it may delegate any of its functions except its regulatory functions. The Trust may also delegate functions to a member of the Trust or member of a committee. Therefore the SRT could delegate powers to a committee to manage the Nutrient Management Fund if desired.

Figure 4.1 shows the proposed governance structure for the Nutrient Management Fund.

The Board of the SRT includes representatives from key agencies involved in nutrient management as well as community representatives. Broader representation could be included on a Nutrient Management Fund Committee if the SRT chose to delegate its powers for this task.

Figure 4.1 Governance structure for Nutrient Management Fund



The Nutrient Management Fund will meet the following key governance criteria considered important for the operation of the scheme:

- The Fund will have the authority to receive and spend contributions under the legislative proposals outlined in section 3;
- The Fund will have the power to enter into contracts;
- The Fund will be bound by the rules of the scheme as set out in the Business Plan (for example relating to the limitations on the location of nutrient offsets, and not purchasing offsets below minimum performance standards);
- the Fund will be separate from competing or possibly competing interests in the nutrient offset market;
- purchasing nutrient offsets will be a core business of the Fund;
- the entity will possess the skills required to carry out the function; and
- the entity will be accountable for the use of the funds through standard requirements including financial and management reporting and auditing requirements.

### 4.3 Nutrient Management Fund Business Plan

The Nutrient Management Fund would be required to develop an annual business plan for the approval in the first instance by the Board of the SRT, and subsequently by the Minister for the Environment through the budget process. The Business Plan would outline target nutrient reduction activities based on the potential for these activities to contribute to improvements in regional water quality taking into account:

- the current state of knowledge on the likely effectiveness and costs of the measures;

- the environmental equivalence of different types, location and timing of nutrient reduction actions;
- the potential for strategic alliances to maximise benefits of offset actions;
- risk and uncertainties that benefits may be diminished by other influences outside the control of the Fund;
- the need for new trialling of new measures that may have potential in the long term;
- operational constraints;

This section explores the management approach of the Nutrient Management Fund, the setting of contribution rates and environmental equivalences ratios, and auditing and reporting requirements.

#### **4.3.1 Management approach**

The Nutrient Management Fund would operate its nutrient reduction activities like an investment portfolio, managing risks and maximising returns. In the short to medium term the Fund may take a conservative approach focusing on proven measures (such as wetland construction). This early period would focus on establishing baselines, developing suitable contracts and administrative systems and monitoring. In this timeframe only a small part of their effort may be dedicated to more innovative approaches that may *potentially* provide lower cost nutrient abatement. The Fund would manage the risks associated with the trials and innovations through carrying surplus nutrient reductions on its balance sheet.

As the more innovative nutrient reduction activities would become proven, they may make up a larger part of the portfolio. The Fund could support targeted research and new trials of potentially lower cost solutions. There are parallels between the Fund's targeted research and the concept of contributing offsets outlined in the WA EPA's guidance on environmental offsets. Contributing offsets do not achieve a 'no net loss' outcome but add materially to environmental knowledge, research, management and protection.

***The Fund would operate a nutrient investment portfolio - managing risks, minimising offset costs and ensuring nutrient reductions were delivered***

An important aspect of the Fund's operations would be strategic monitoring programs to assess the effectiveness of different nutrient abatement measures. The Fund would also conduct regular program reviews to assess overall effectiveness and efficiency in delivering nutrient abatement. These program reviews would be considered by the committee of the Swan River Trust and made available to the public. The fund would also adopt an adaptive management approach.

#### 4.3.2 Setting contribution rates

The contribution rates for nitrogen and phosphorus would need to be set by the Nutrient Management Fund manager, the Swan River Trust, prior to the introduction of the scheme taking into account:

- the costs of nutrient abatement works over a 30 year period;
- a margin for risk and uncertainty;
- a margin for monitoring, administration and enforcement.

There are a range of different types of programs that could be pursued for reducing nutrients including the drainage interventions currently being implemented by the Swan River Trust (eg: constructed wetlands and in-stream structures), better agricultural management practices and retrofitting of water sensitive urban design technologies in existing urban areas (eg: rainwater tanks, vegetated conveyance systems). There are differing degrees of experience and therefore confidence with these measures.

It is recommended that the initial contribution rate is set based on the costs of proven practices like the drainage intervention projects – rather than measures that are still being developed (such as changing agricultural management practices). However, it is also recommended that the portfolio of measures funded by the Nutrient Management Fund include a small proportion of higher risk programs with potentially lower costs and which could be increasingly employed if proven successful.

*The initial contribution rates would be set based on proven nutrient abatement works.*

The costs and effectiveness of recent nutrient intervention works and those under design or investigation by the Swan River Trust have been examined to provide an **indicative analysis** of contribution rates that may be required to offset residual loads.

Table 4.1 summarises the costs and effectiveness of a range of measures.

**Table 4.1 Indicative cost-effectiveness of nutrient intervention works**

Type of intervention	Location	\$/kg TP/yr	\$/kg TN/yr
Constructed wetlands	Liege Street	\$4,800 - 14,400	\$1,800 - 5,500
	Wharf Street	\$82,300 - 141,200	\$17,100 - 29,400
Compensating basin	Manley Street	\$6,300 - 25,300	\$1,700 - 6,800
Sedimentation wetland + nutrient filter	Main stem Ellen Brook	\$2,000	\$17,400
Aquatic vegetation bed + sedimentation pond + nutrient filter	Major tributaries Ellen Brook	\$2,500	\$13,400
Nutrient filter	Major tributaries Ellen Brook	\$23,400	\$514,000
In-stream treatment weir + nutrient filter	Major tributaries Ellen Brook	\$28,300	\$623,000
Constructed wetland + nutrient filter	Minor tributaries Ellen Brook	\$5,100	\$310,400
Sedimentation wetland + nutrient filter	Minor tributaries Ellen Brook	\$3,400	\$21,800
		\$3,900	\$25,900

Source: Swan River Trust Drainage Nutrient Intervention Program, Ellen Brook data adapted from GHD 2007<sup>4</sup>, BDA Group analysis

Notes:

1. Cost-effectiveness has been calculated as the present value of total costs over 30 years at a discount rate of 7% divided by the annual reduction in TP and TN in kg/yr. The costs are comprised of capital costs (including any in-kind contributions), annual operating costs and maintenance costs. They do not include monitoring costs.
2. The range for cost-effectiveness for the measures at Liege St, Wharf St and Manley St reflect different estimates of performance. Estimated load reductions for actual/expected performance are only available for part of the year – the lower bound cost reflects an assumption of similar performance for the rest of the year, the higher bound cost reflects an assumption of zero load reduction for the rest of the year.

The potential for nutrient intervention works outlined in Table 4.1 to be implemented in the Ellen Brook catchment has recently been investigated. The costs and effectiveness of the in-stream nutrient reduction measures at different sites has been compiled to form a cost curve for reducing both phosphorus and nitrogen. These curves are shown in Figures 4.2 and 4.3.

<sup>4</sup> GHD 2007, Report for Selection of Drainage Improvement Sites and Nutrient Interventions in the Lower Ellen Brook Catchment.

Figure 4.2 Cost curve for interventions reducing phosphorus in Ellen Brook

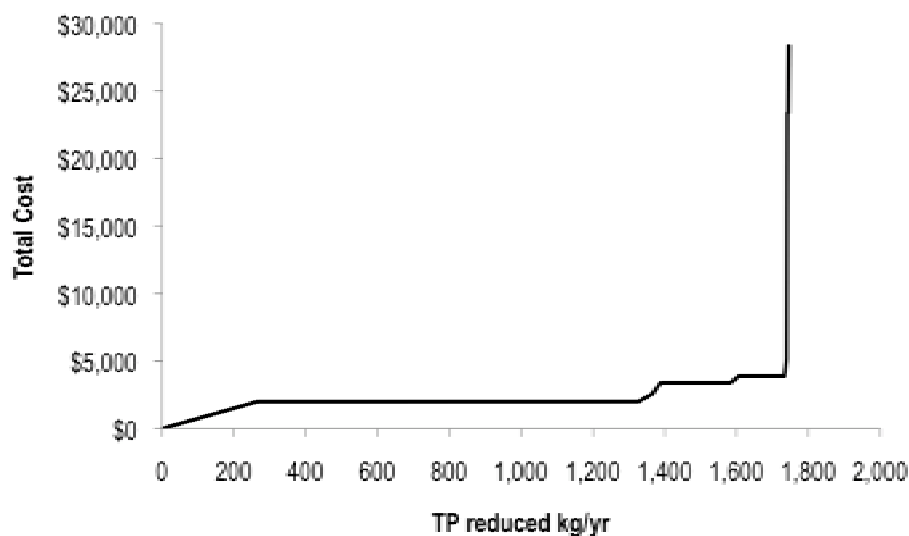
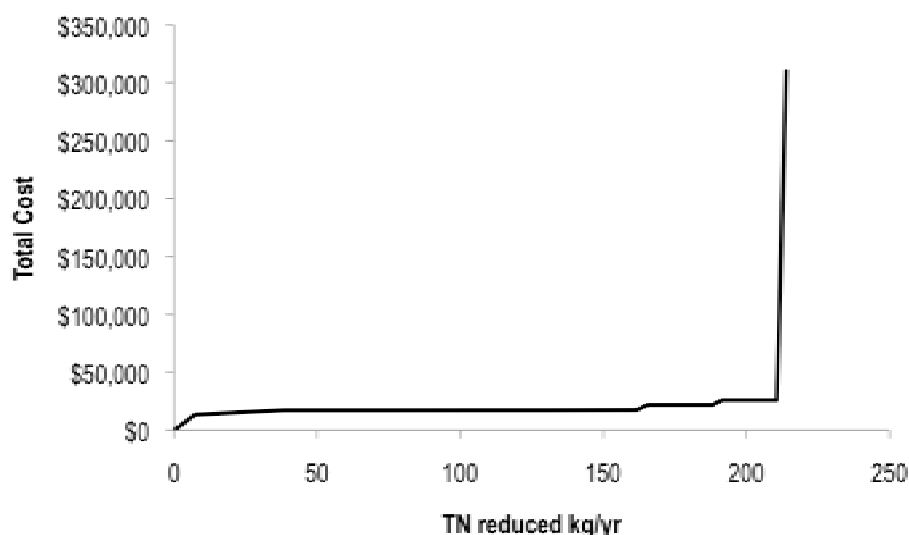


Figure 4.3 Cost curve for interventions reducing nitrogen in Ellen Brook



From the limited information available it appears that there would be significant scope in the Ellen Brook catchment to use sedimentation wetlands and nutrient filters to reduce phosphorus at a cost of around \$2,000 per kilogram. The measures investigated for the Ellen Brook catchment are much more expensive for reducing nitrogen (with the cheapest in-stream measure at around \$13,000 per kilogram). However, the constructed wetlands introduced at Liege Street and planned for Wharf Street and the compensating basin planned for Manley Street suggest other types of measures across the catchment may be cheaper for reducing nitrogen (possibly around \$1,700 per kilogram).

The data in the figures relate specifically to in-stream nutrient reduction measures in the Ellen Brook catchment. A similar exercise would need to be undertaken by the Nutrient Management Fund for the wider catchment area and a wider set of nutrient abatement activities. The greater

search for measures prompted by this scheme is likely to lead to new opportunities and a flattening out of the marginal cost curves above. In particular, trials with agricultural based offsets have the potential to substantially shift the marginal cost curves downward and reduce the cost of nutrient offsets. It is therefore unclear whether the marginal costs curves will increase or decrease over time. Nevertheless, periodic reviews of marginal costs and contribution rates will be needed.

The assessment above is also simplistic and the wider review of measures would need to take into account other factors influencing the effectiveness of the measures for improving regional water quality such as the location of measures, the individual species of nutrients reduced by each measure and relative importance of those species, and the timing of the nutrient reductions. These factors all influence the environmental equivalence of different offset measures, discussed further in section 4.3.3.

There are two other important factors that would need to be incorporated into the contribution rates. The first is a margin for risk including risks involved with the science of estimating residual loads and assessing their equivalence in terms of impacts on water quality as well as offset compliance risks such as failure of an offset measure to perform. The other factor is a margin for administration to cover the costs involved for the nutrient management fund in investigating management options, co-ordinating the design of works, arranging contracts and overseeing implementation, performance monitoring and enforcement. Monitoring required to ensure the efficacy of nutrient abatement works would also be paid for by the offset contributor through the margin for administration. Under their *Stormwater Quality Offsets Program*, Melbourne Water charges a fee of 8.9% of the contribution to cover the administration associated with the offset works. However, this is a standard application charge to cover administrative processing and does not cover all administrative costs.

For the purpose of the indicative analysis in this paper, capital, operating and maintenance costs for nutrient reduction works of around \$2,000 per kilogram of phosphorus and \$1,700 per kilogram of nitrogen have been assumed. The following indicative margins have also be assumed:

- 15% for administration and monitoring; and
- 5% margin for risk and uncertainty.

*For the indicative analysis in this paper we assume initial contribution rates of \$2,400 per kg of P and \$2,000 per kg of N.*

The indicative contribution rates assumed for this analysis are therefore \$2,400 per kilogram of phosphorus and \$2,000 per kilogram of nitrogen.

The costs of administration are discussed further in Section 4.5.

### 4.3.3 Environmental equivalence ratios

The Swan River Trust would need to establish 'equivalence' ratios between different sources and abatement measures of nutrients, publish them in The Nutrient Management Fund Business Plan, use them in their planning and reporting and revise them over time with adaptive management. The equivalence ratios should account for three main elements:

- Environmental impacts – different impacts from different sources taking into account their location, chemical form and timing of discharge;
- Uncertainty in estimating current loads of nutrients, and load reductions from measures to reduce nutrient discharges; and
- The risk that an offset measure underperforms.

The Fund would need to determine the key abatement measures likely to be pursued and develop appropriate equivalence ratios that would provide them with confidence that overall their programs will achieve an equivalent or better environmental outcome.

The limitations on the location of offset actions for the Swan Canning (discussed in section 2) reflect the fact that reducing impacts in another river system is not considered equivalent. The Swan River Trust will need to ensure that funds collected in the:

- Upper/Middle Swan must be spent on offset actions to address regional priorities within that zone.
- Upper/Middle Canning must be spent on offset actions to address regional priorities within that zone.
- Lower Swan can be spent on regional priorities anywhere in the entire catchment (due to limitations on feasible offset sites in the lower reaches of both rivers and the fact that in many cases improvements in the upper catchments will flow through to the lower Swan).

In seeking the best abatement options within these locational constraints the Swan River Trust will need to establish environmental equivalence ratios taking into account the level of confidence in different abatement measures, the nature of the different sources of nutrients, and regional priorities for water quality improvement. In locating abatement measures they will need to take into account the proximity to problem areas, for example as there is nutrient removal during transport the closer the measure to the algal bloom hot spots the more effective the load reduction.

It will also be important to take into account river flows, for example locating measures higher in a catchment would provide local as well as downstream benefits but only if it flows all year round. The *type* of nutrient reduction will also need to be taken into account – for example phosphorus may be considered to be limiting in some parts of the catchment and nitrogen in others. The importance of soluble and particulate forms of nutrients is also important, with soluble nutrients more readily available for algal uptake.

Table 4.2 provides an illustrative example of a set of equivalence ratios. The environmental equivalence ratio is lowest for the catchment based drainage intervention structures where there is a relatively high level of confidence in the performance of the measures and the ability to address soluble forms of nutrients. The environmental equivalence ratio is highest for agricultural management practices requiring behavioural changes due to the uncertainty over the performance of this type of measure and the nature of the impacts.

**Table 4.2 Example equivalence ratios**

Source / abatement measure	Ratio	Key factors influencing impact
Catchment based drainage intervention structures (eg. wetlands, nutrient filters)	1:1	Relatively high level of confidence in nutrient reduction outcomes Treatment trains can address both soluble and particulate forms of nutrients Nutrient reduction primarily during low flow
On-farm drainage intervention structures (eg. farm scale wetlands, buffer strips)	1:2.5	Medium level of confidence in nutrient reduction outcomes Nutrient transport/delivery differs across sites varying impact of farm loads on waterways Can only address particulate forms of nutrients
Agricultural management practice improvements (eg. fertiliser management)	1:5	Relatively low level of confidence in nutrient reduction outcomes Nutrient transport/delivery differs across sites varying impact of farm loads on waterways Can only address particulate forms of nutrients

Under the Coastal Catchments Initiative a water quality model for the Swan Canning catchment is being developed that will provide detailed information on the type and location of nutrient inputs across the catchment, the influence of soils and rainfall, and the effect of attenuation or distance of the drainage system on nutrient loadings. This modeling exercise will be valuable for the development of the environmental equivalence ratios by the Swan River Trust.

#### **4.3.4 Auditing and Reporting**

Overall the Swan River Trust would use a balance sheet approach, and be accountable to the community to deliver a certain amount of nutrient reduction over time commensurate with contributions collected and safety margins embedded in them.

Table 4.3 provides a stylized illustration of a balance sheet. Separate balances would need to be recorded for each sub-region and for each nutrient. In the example shown in Table 4.3 for nitrogen in the Upper/Middle Swan, residual loads to be offset from new development (debits) increase over time, with each new development bringing an offset liability for a 30 year period.

Table 4.3 Example balance sheet for Nutrient Management Fund

Region	Upper / Middle Swan			Nutrient		Total Nitrogen (kg)			Date of record			30 June 2015					
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018		2035	2036	2037	2038	2039	2040
<b>Debits</b>																	
Subdivision A	85	85	85	85	85	85	85	85	85	85	.....	85	85	85	85	85	
Subdivision B				150	150	150	150	150	150	150	.....	150	150	150	150	150	150
Subdivision C						102	102	102	102	102	.....	102	102	102	102	102	102
Infill development (2009)	15	15	15	15	15	15	15	15	15	15	.....	15	15	15	15	15	
Infill development (2010)		10	10	10	10	10	10	10	10	10	.....	10	10	10	10	10	10
Infill development (2011)			22	22	22	22	22	22	22	22	.....	22	22	22	22	22	22
Infill development (2012)				27	27	27	27	27	27	27	.....	27	27	27	27	27	27
Infill development (2013)					35	35	35	35	35	35	.....	35	35	35	35	35	35
Infill development (2014)						42	42	42	42	42	.....	42	42	42	42	42	42
Infill development (2015)							50	50	50	50	.....	50	50	50	50	50	50
<b>Total debits</b>	<b>100</b>	<b>110</b>	<b>130</b>	<b>309</b>	<b>344</b>	<b>446</b>	<b>496</b>	496	496	496	.....	496	496	496	496	496	396
<b>Credits</b>																	
Sedimentation wetland/nutrient filters	110	150	185	185	185	185	185	185	185	185	.....	145	140	135	130	125	
Agricultural BMP demonstration projects		15	15	15	15						.....						
Constructed wetland		40	60	80	135	160	180	180	180	180	.....						
Compensating basin			110	110	110	110	110	110	110	110	.....	110	110	110	110	110	110
Agricultural BMP					52	52	52	52	52	52							
<b>Total credits</b>	<b>110</b>	<b>205</b>	<b>370</b>	<b>390</b>	<b>497</b>	<b>507</b>	<b>527</b>	527	527	527	.....	255	250	245	240	235	110
<b>Net balance</b>	<b>10</b>	<b>95</b>	<b>240</b>	<b>81</b>	<b>153</b>	<b>61</b>	<b>31</b>	31	31	31	.....	(241)	(246)	(251)	(256)	(261)	(286)

Total debits at the example date of the record (the end of the 2014/15 financial year) stands at 496 kg.

Offset works and programs initiated with contributions revenue need to provide a profile over time of nitrogen reductions commensurate with the nutrient debits from new development. The 'equivalent' credits reported would take into account the identified equivalence ratios discussed in Section 4.3.3. Consideration also needs to be given to the profile of credits that may be yielded by an offset measure as its performance in reducing nutrient discharges to waterways may ramp up initially and also decay later in its life (and subject to maintenance that may be undertaken).

As shown in Table 4.3, investments in credits need to run ahead of the required timing of debits, and run in surplus to ensure residual loads are actually offset and to provide a risk 'buffer' for the potential failure of a measure(s). The need to have a holding of credits in advance indicates the value of some initial seed funding from government. Given that any surplus credits held would represent cost-effective reductions in nutrients and are unlikely to run in excess of the Government's targeted 30% reduction for the Swan Canning, this should be seen as a sound investment by the State.

#### 4.4 Example contribution for individual development

Two examples of the calculation of a nutrient offset contribution for hypothetical developments are provided below. The first example is for a greenfield development that has estimated residual loads as part of the development approval process and the second is for a smaller infill development where estimation of residual loads is not required. The contribution rates provided are for illustrative purposes only.

##### *Example 1: Contribution based on proponent's estimate of residual load*

A residential subdivision of 200 lots is approved within the Swan Canning catchment. The total area of the subdivision is estimated at around 10 hectares. The proponent has prepared an urban water management plan as part of the approval process including estimation of nutrient export rates expected post-development.

The total contribution = nitrogen contribution + phosphorus contribution

where:

nitrogen contribution = residual load of total nitrogen (kg/yr) X nitrogen contribution rate (\$ per kg)

phosphorus contribution = residual load of phosphorus (kg/yr) X phosphorus contribution rate (\$ per kg).

residual load = estimated nutrient export loads (with water sensitive urban design) less estimated natural nutrient loads (kg/yr).

contribution rates are set in the Nutrient Management Fund Business Plan (\$ per kg).

Table 4.4 provides an indicative example of the calculation of a contribution for the development.

**Table 4.4 Hypothetical nutrient offset contribution payable for new subdivision**

	Units	Total Nitrogen	Total Phosphorus
Estimated nutrient export rate (with WSUD)	kg/ha/yr	1.12	0.25
Natural nutrient export rate	kg/ha/yr	0.40	0.01
Estimated residual load	kg/ha/yr	0.72	0.24
Total Residual Load	kg/yr	7.2	2.4
Contribution rates	\$/kg	\$2,000	\$2,400
Contribution for each nutrient	\$	\$14,400	\$5,760
Total Contribution	\$	~ \$20,160	

Notes: The estimates of nutrient export rates are based on average residual nutrient loads from nutrient budget modelling undertaken for the Wungong Precinct development<sup>5</sup>. The estimates for "natural" nutrient export rates are averages for the nature conservation land use class for the Ellen Brook catchment<sup>6</sup>.

**Example 2: Contribution based on standard per hectare contribution rates**

A residential subdivision of 10 lots is approved within the Swan Canning catchment. The total area of the subdivision is estimated to be 0.5 hectares. The proponent has not been required to estimate residual loads as part of the approval process.

The total contribution = area of subdivision (ha) X standard nutrient contribution rate for development type and location (\$ per ha)

where:

standard nutrient contribution rate is set in Nutrient Management Fund business plan (\$ per ha).

Table 4.5 shows a hypothetical schedule for standard contribution rates per hectare for different development types and location where the proponent is not required to estimate residual loads as part of the approval process.

<sup>5</sup> JDA Consultant Hydrologists, Urban Water Management Strategy, Southern River / Forrestdale / Brookdale / Wungong Structure Plan, Volume 2 Technical Appendices, Technical Appendix F Nutrient Budget Modelling, Prepared for Waters and Rivers Commission, April 2002

<sup>6</sup> Kelsey 2001, Nutrient export in surface and groundwaters under various land uses, in *Land Development Areas of High Water Table Forum Proceedings*, Institution of engineers in association with Urban Development Institute of Australia

Table 4.5 Hypothetical schedule of standard contribution rates for nutrients

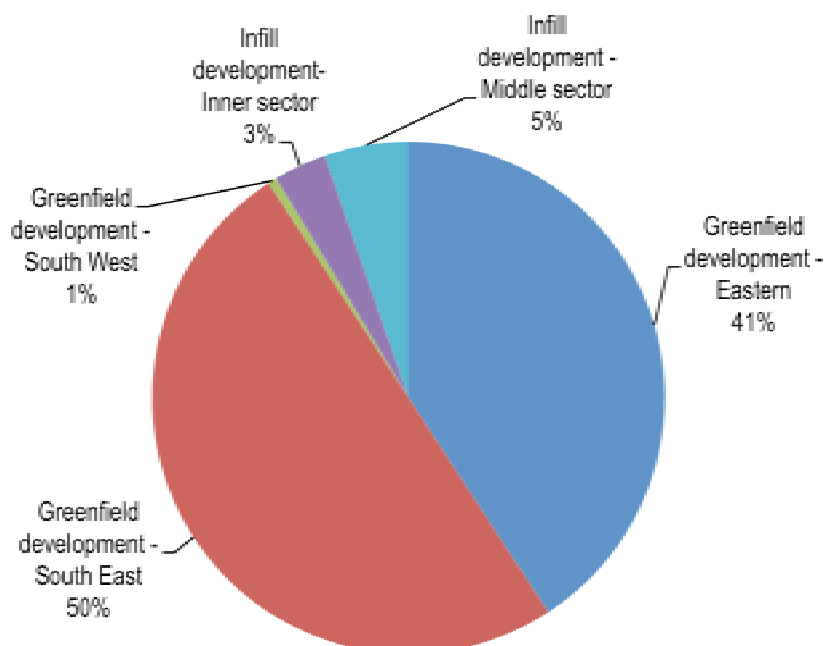
	Locality	Low density residential	Standard residential density	High density residential	Retirement Village	Commercial or industrial
		\$ per hectare nutrient contribution				
Localities with lower rainfall / better soils ↗	City/Shire 1	\$725	\$1,000	\$1,275	\$1,275	\$1,500
	City/Shire 2	\$1,088	\$1,500	\$1,913	\$1,913	\$2,250
	City/Shire 3	\$1,450	\$2,000	\$2,550	\$2,550	\$3,000
	City/Shire 4	\$1,813	\$2,500	\$3,188	\$3,188	\$3,750
	City/Shire 5	\$2,175	\$3,000	\$3,825	\$3,825	\$4,500

If the example development was located in City/Shire 3 as shown in Table 4.5 and was considered standard residential density the nutrient offset contribution payable would be \$1,000 (0.5 ha X \$2,000 per ha).

#### 4.5 Resources required

Investigating the number of developments likely to be required to comply with the scheme is important for estimating the level of resources required for implementation. In the Swan Canning catchment over the next five years over 300 subdivision applications are expected to progress through the planning system resulting in an additional 20,200 lots. The majority of the lots will be in greenfield urban areas in the South East and Eastern sectors as shown in Figure 4.4.

Figure 4.4 Estimated share of new lot release in Swan Canning catchment next over five years



Source: Department for Planning and Infrastructure, MDP database 2008

The residual nutrient loads will vary for different subdivision developments depending on the location, soil types and on-site stormwater management measures proposed.

The main resource requirements to implement the scheme are:

- Set up costs of the legislative amendments, revisions to policy and administrative process, preparation of guidance documents, and preparation of the initial Nutrient Management Fund business plan setting initial contribution rates;
- Additional resources required for development of estimates of residual loads by developers;
- Ongoing additional resources required for review of estimation of residual loads by the Department of Infrastructure and Planning and/or relevant referral agencies;
- Ongoing acceptance of contributions by the Swan River Trust; and
- Ongoing managerial, project management and technical resources needed for the Nutrient Management Fund and oversight by a committee of the Trust.

The legislative amendments required to set up the scheme are not major changes – an extension of the existing concept of developer contributions to nutrient offsets and minor changes to the legislation governing the Swan River Trust to ensure the Nutrient Management Fund can carry out its purpose. However, the process for legislative change does require formal

consultation, preparation of drafting instructions and relevant Cabinet processes. The other significant tasks would be the preparation of guidance on acceptable methods for the estimation of residual loads and the development of the initial business plan.

The development of the initial Business Plan will be able to draw on the projects being progressed under the development of the Water Quality Improvement Plan for the Swan Canning catchment. In particular, the predictive model of water quality and hydrology for the catchment and estuarine systems and the analysis of agricultural best management practices and decision support tool. It is anticipated that these setup costs will require a dedicated project officer for eighteen months at a one-off cost of around \$150,000.

There would also be some extra administrative resources required for the Department of Planning and Infrastructure and WAPC in preparing and reviewing additional developer conditions relating to the nutrient offset contribution. Although the load estimates used to demonstrate compliance with the stormwater management design objectives are currently considered by the Department of Planning and Infrastructure and/or relevant agencies in providing their advice to WAPC, there may be some additional resources required for reviewing load estimates used as the basis of a contribution in the early years of implementing the scheme. Guidance on acceptable methods for estimating residual loads would be developed to minimise the extra review effort required. On average an additional half day of staff time may be required for review of estimates and drafting of the consent condition at a cost of around \$220 per application<sup>7</sup>.

Developers already prepare estimates of nutrient loads to demonstrate compliance with stormwater management design objectives. However, there may be some extra effort required for developers to ensure they comply with the guidance on acceptable methods for estimating residual loads under the scheme. The time required for developers is likely to be similar to the agencies with an extra half day of staff time required.

Another area of additional resources would be the ongoing acceptance of nutrient offset contributions by the Swan River Trust. There would be some extra administrative cost to the Trust, however it would be limited to checking that the payments into the Nutrient Management Fund account correspond with the conditions placed on the developments by the WAPC. This may require one hour of paperwork for around 60 development projects per year over the first five years.

The greatest resource requirement would be the ongoing managerial, project management and technical resources needed for the operation of the Nutrient Management Fund. The level of resources required to manage the Fund depends on the scale of works required. Under their *Stormwater Quality Offsets Program*, Melbourne Water charges a fee of 8.9% of the contribution to cover the administration associated with the offset works.

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<sup>7</sup> Cost of time has been estimated based on an average annual salary of \$80,000, 30% on costs and a 240 working day year.

An indicative analysis of the likely scope of works of the Nutrient Management Fund is summarised in Table 4.6. The scope of works will depend on the residual loads from new development (which in turn depends on the characteristics of the sites where new development is located and the extent to which nutrient loads can be reduced on-site) as well as any additional contributions for example in the form of seed funding from government. The example in Table 4.6 examines the possible order of magnitude of the load reductions required to offset the impacts of new development over the initial five year period.

**Table 4.6 Indicative estimates of total residual loads from developments over five years**

	Units	Nitrogen	Phosphorus
Nutrient export without nutrient management (existing residential rates used as proxy)	kg/ha/yr	4	1.2
On-site nutrient reduction performance		45% TN	60% TP
Natural nutrient export rate	kg/ha/yr	0.0 - 0.4	0.00 - 0.01
Estimated residual load	kg/ha/yr	1.8 - 2.2	0.47 - 0.48
Total Residual Load Over 5 Years	kg/yr	2,300 - 2,900	610 - 630

Notes: There are around 20,200 residential and 800 rural residential lots expected over the next five years. The analysis assumes average lot sizes of around 500m<sup>2</sup> and 3,000m<sup>2</sup> respectively. The estimates of nutrient export rates for existing residential and "natural" nutrient export rates are based on the Ellen Brook catchment<sup>8</sup>.

Using the indicative estimates of offset costs developed in Section 4.3.2, and the estimated residual loads of nutrients from new developments shown in Table 4.6, the total value of works required to offset the impact of new subdivisions in the Swan Canning could be around \$5-6 million over 5 years, with the level of contributions being around \$6-7 million (which include margins for administration, monitoring and risk).

The Swan River Trust as the Nutrient Management Fund manager would require project management skills and technical skills in nutrient abatement techniques. The project costs would depend on the nature of the works implemented – for example a small number of large structural works may require less than that for many small contracts. If agricultural best management practices are pursued in future it may become important to access personnel who have the necessary technical skills and networks to engage with the agricultural sector. The use of competitive tenders would provide potential for lowering the cost of works but would require more effort upfront for the tender process. If tender mechanisms are used to engage agriculture offset providers, then experience with their use or an understanding of how they operate will be important. There would also be resources required for enforcement of contracts.

<sup>8</sup> Kelsey 2001 Nutrient export in surface and groundwaters under various land uses, in *Land Development Areas of High Water Table Forum Proceedings*, Institution of engineers in association with Urban Development Institute of Australia

Initially the Swan River Trust may require one full time Nutrient Management Fund manager at a cost of around \$100,000 per year. Some extra resources may also be required for if the Swan River Trust chose to delegate some functions to a Committee, with the committee members meeting on a quarterly basis to monitor progress with the program of works outlined in the business plan.

Seed funding could also be sought from Government to fund advance works to generate nutrient abatement from the outset of the scheme and to meet some of the administrative setup costs. For example, under the *South Creek Pilot Nutrient Offset Scheme* in Western Sydney, Sydney Water committed \$100,000 to trial nutrient reduction measures in the catchmen, while Landcom, a statutory corporation that plans and constructs new residential developments, also contributed \$50,000 towards the scheme.

The initial costs of implementation may be around \$150,000 for setup and around \$190,000 per annum thereafter. Table 4.7 summarises the components of the ongoing costs of implementation with indicative estimates provided. All of the ongoing costs (apart from the costs to developers) would be met through the margin for administration and monitoring included in the contribution rates.

**Table 4.7 Indicative estimates of ongoing costs of implementation**

Task	Cost
Nutrient Management Fund project management and contract enforcement	\$100,000
Nutrient Management Fund monitoring of works	\$55,000
Department for Planning and Infrastructure co-ordination of new conditions	\$13,000
Nutrient Management Fund Committee meetings	\$5,000
Developers cost of administering new conditions	\$13,000
Swan River Trust collection of contributions	\$4,000
<b>Total</b>	<b>\$190,000</b>

## **5 POTENTIAL BENEFITS OF SCHEME**

The proposed scheme would offset future residual loads of nutrients from developments in the Swan Canning catchment. Where approved subdivisions are likely to result in residual nutrient discharges contributing to the degradation of regional water quality, the use of environmental offset contributions will 'make good' this potential impact and protect water quality. The scheme will also provide a financial incentive to developers to minimise residual loads through on-site measures in order to reduce their contributions.

The scheme would provide a consolidated structure for investment in nutrient reduction works with the possibility of other contributors in future – for example as a result of the drainage reform project or additional government contributions. The scheme would also allow an adaptive management approach while still providing certainty to developers and avoiding protracted negotiations with regulatory authorities that would continue under case-by-case assessments of nutrient offsets.

The administrative burden of the scheme is low, primarily as it leverages off existing approvals processes for new development, without requiring new performance estimates or regulatory mechanisms. Further, the scheme would require only modest legislative change, primarily to extend the concept of developer contributions to nutrient offsets for subdivision developments in the Swan Canning catchment.

The administrative costs of the scheme are estimated at only around \$150,000 for initial setup and around \$190,000 per annum for ongoing administration and monitoring, mainly for the operation of the Nutrient Management Fund

The compliance burden of the scheme is also judged to be low relative to other possible policy initiatives, as it provides an incentive framework for low cost nutrient reductions to be secured. This will be enhanced through the use of an investment portfolio approach employing competitive tenders to further drive down compliance costs, improved risk management and the potential to develop contractual mechanisms to open-up low cost nutrient reduction opportunities with rural based offset providers.

The financial implications of the scheme to developers and new home buyers will also be modest. Based on the preliminary analysis in Section 4 of potential contributions, the average financial liability is estimated to be around \$300 per lot.

Subject to its successful implementation, the scheme could readily evolve over time to incorporate broader nutrient sources, such as existing urban activities, commercial and industrial and/or agricultural, as well as making use of any funding from local, State or Commonwealth governments. In this way the scheme could move from one of ensuring a no net increase in nutrient loads from new development, to one that could deliver significant net reductions in overall loads and hence make a significant contribution to the Swan River Trust's goal of a 30% reduction in nutrient in priority catchments by 2015.

## **6 OUTSTANDING ISSUES FOR SCHEME IMPLEMENTATION**

Much of the information required to further develop the scheme settings and business plan will be met through the projects being progressed under the development of the Water Quality Improvement Plan for the Swan Canning catchment. These include a predictive model of water quality and hydrology for the catchment and estuarine systems and an analysis of agricultural best management practices and development of a decision support tool.

A key information gap identified in section 4.1 is the estimation of residual load. The potential difficulties include:

- The validity of modelling tools currently used by developers to estimate nutrient loads (for example when dependent on behavioural change by subsequent residents);
- The estimates may not deal adequately with the interactions between groundwater and surface waters (for example the residual load may include nutrients conveyed through groundwater and/or on-site management measures may increase groundwater fed nutrients to rivers); and
- Ensuring consistency in estimation of natural nutrient levels (to subtract from the load estimates to calculate residual load).

These issues impede all policy instruments, current development approvals and the development more broadly of a Water Quality Improvement Plan for the Swan Canning catchment. Some of the new modelling noted above will be of assistance, and in section 4.1 it was recommended that specific guidance on the estimation of residual loads be developed prior to the introduction of the scheme.

Another outstanding issue is integration with the Department of Water project on drainage governance and funding. The potential linkages between the two projects were noted in Section 3.3, and new arrangements arising from that project will need to be considered during finalisation of the nutrient offset contributions scheme.

An important issue to address will be the perceived inequity in targeting developers and concern regarding the impact of the proposed scheme on housing affordability. After further development of the Business Plan, refinement of contribution rates and estimation of likely residual loads from new developments, more detailed analysis of impacts on house prices could be undertaken to inform the scheme consultation and approval process through government. In this regard, it will be important to set the scheme in the context of the broader action plan for improving water quality in the Swan Canning.

Some early stakeholder consultation has been undertaken as part of this project. Continued communication and involvement of key stakeholders throughout the further development of the scheme will clearly be important for its acceptability.

## **APPENDIX 1 OTHER LEGISLATIVE OPTIONS CONSIDERED**

The discussion paper on the nutrient offset contribution scheme released for comment in April 2008 proposed that the obligation for the contribution be introduced under the planning system, that the Water Corporation collect the contribution along with other developer charges (to streamline collection administration) and the funds be hypothecated to the Nutrient Management Fund.

The review of legislative requirements suggested that:

- the condition for an offset contribution from developments can be imposed by the WAPC through a relatively minor amendment to the Planning and Development Act - extending the concept of a monetary payment in lieu of a negative impact (in this case the impact of nutrients on water quality).
- the EPA presently has statutory power to require offset conditions as part of approval of applications for vegetation clearance. However it has no equivalent power to require nutrient offset conditions or payment-in-lieu, as conditions of subdivision. Amendments to the Environmental Protection Act would be required to allow the EPA to require that WAPC impose the payment of a nutrient offset contribution to the Nutrient Management Fund as a condition of all subdivisions.
- imposing the contribution as a headworks charge by the Water Corporation would be likely to give rise to a number of arguments and doubt over the ability to impose or collect the contribution under their current legislation without amendment to the Water Agencies (Powers) Act. Charges levied under that Act need to relate directly to Water Corporation services, may have to relate specifically to individual developments (not automatically to all developments of a certain type), and could only apply to Water Corporation main drainage areas, rather than areas where local government provides the drainage service. Collection by Water Corporation for the sole purpose of on-payment to the Nutrient Management Fund would be likely to require significant amendment to their Act and this may also preempt the outcomes of the Department of Water project on drainage reform.
- a more straightforward collection method would be payment straight to the Nutrient Management Fund. Earlier concerns regarding governance issues with the involvement of the Nutrient Management Fund in acceptance of funds would be managed by ensuring separation of the requirement for payment (under the planning system) with acceptance by the Swan River Trust into its Trust Account.