

# **Clean Streams : A Water Body Enhancement Strategy for Environment Waikato**

Prepared by:  
Alan Campbell et al

For:  
Environment Waikato  
PO Box 4010  
HAMILTON EAST

22 January 2002

Document #: 726767





# Table of Contents

<b>1</b>	<b>Purpose of document</b>	<b>1</b>
<b>2</b>	<b>Background</b>	<b>1</b>
<b>3</b>	<b>Purpose of Project</b>	<b>1</b>
<b>4</b>	<b>Issue</b>	<b>1</b>
<b>5</b>	<b>Objective</b>	<b>2</b>
<b>6</b>	<b>Priorities</b>	<b>2</b>
<b>7</b>	<b>Implementation</b>	<b>3</b>
	7.1 Promotion	3
	7.2 Education	4
	7.3 Service Delivery	4
	7.4 Project Management	5
	7.5 Planting and Fencing Materials	5
	7.6 Partnerships	5
<b>8</b>	<b>Assessment Criteria</b>	<b>5</b>
<b>9</b>	<b>Monitoring</b>	<b>6</b>
<b>10</b>	<b>Annual Programme</b>	<b>6</b>
<b>11</b>	<b>Links to other Environment Waikato Programmes</b>	<b>7</b>
	<b>Appendix 1: Legal Framework</b>	<b>9</b>
	<b>Appendix 2: Criteria for identifying the relative priority for riparian management of sites in pasture areas of the Waikato Region (see DOCS #707307 for details).</b>	<b>11</b>
	<b>Appendix 3: Clean Streams - Assessment Criteria</b>	<b>12</b>
	Profile / Educational /	12
	<b>Appendix 4: Clean Streams</b>	<b>13</b>



# 1 Purpose of document

This document sets out proposals for the operation of a project to support the protection of water body margins in the Waikato Region. It sets out the background to the project, its objectives and priorities, and focuses in particular on its implementation. It is intended as a guide to Environment Waikato staff and Councillors to ensure that the project is consistently managed and as effective as possible in achieving improvements in the management of water body margins.

## 2 Background

Under the Resource Management Act 1991 Environment Waikato has responsibility for controlling the use of land for the purpose of soil conservation and maintaining and enhancing water quality and controlling the discharge of contaminants into water. In executing these functions Council has prepared the Regional Policy Statement and the proposed Waikato Regional Plan which contain objectives, policies and methods that seek to improve water quality, improve aquatic habitats and maintain stable river and lake banks. Methods are included in these documents that enable Council to use economic incentives and contestable funds to provide fencing and planting of riparian areas. In addition, policies and methods in the Regional Coastal Plan, Regional Pest Management Strategy, district plans and National Coastal Policy Statement are also able to be used to assist in protecting water bodies from the adverse effects of land use (See Appendix1).

The Strategic Plan 2001 – 2011 and Annual Plan 2001 – 2002 establishes the riparian project fund. It will be a contestable fund available from 2002/03, reviewed annually with a limited life of 10 years. The purpose of the fund is to support people wanting to protect and enhance their river and stream banks, seeps, drains and wetlands, particularly by excluding livestock.

This strategy document has been prepared following consultation with a range of farmers, industry representatives, other agencies, and businesses.

## 3 Purpose of Project

The purpose of Council's Riparian Management approaches is to develop an environment in which stock access to water bodies is a rare exception that farmers consider unacceptable. It's envisaged that this will take a long time (20 – 30 years) because of the sheer scale of the task. The Clean Streams Project provides a "kick start" by offering assistance to farmers wanting to fence their water bodies.

## 4 Issue

Environment Waikato's Proposed Regional Plan as amended by decisions, October 2001, identifies the following issue in its section on River and Lake Beds Disturbances.

Livestock access to the banks and beds of rivers, lakes and wetlands can:

- a. damage aquatic habitat by browsing of desirable species, trampling and defecation
- b. create bank instability effects including sedimentation
- c. cause deposition of faecal material in a place where it can enter the water body causing adverse effects on water quality
- d. cause damage or loss of terrestrial habitats on the banks.

## 5 Objective

The Clean Streams Project will establish exclusion of livestock as a standard farming practice in the Waikato Region over a ten year period.

In achieving this objective it is expected that the following targets will be met:

- 4,000 km of water body margin protected under this project
- 2,000 farmers participating
- Key industry partners<sup>1</sup> actively promoting water body margin protection
- Business<sup>2</sup> and other agencies<sup>3</sup> actively supporting farmer initiatives to protect water body margins.
- Protection of water body margins continues after the completion of the Clean Streams Project.

## 6 Priorities

Different water bodies will respond differently to riparian management. In general, less-degraded areas near the headwaters of streams for example are more readily managed than are highly-degraded reaches in the lowlands. As community resources available for riparian management are limited, it is necessary to have a system for identifying the relative importance of water bodies in different parts of the Region for riparian management.

Several guiding principles were used to establish these priorities, as follows

- the term “water bodies” was interpreted broadly, and was deemed to include estuaries and wetlands as well as streams
- as noted above, it’s generally less cost-effective to attempt to manage highly-degraded water bodies, so the principle of “extend the best” was used, i.e. concentrate on less-degraded systems—which are often those in the upper part of a catchment, closer to less-disturbed areas of forest
- a provisional list of the Region’s “outstanding waterbodies” has been prepared (see DOCS #685771), following an objective in the Regional Policy Statement; special consideration was given to water bodies included in this list, and
- the benefits of establishing biological corridors extending downstream from less-disturbed upland forest areas were recognized.

A technical team from the Resource Information Group (RIG) has developed two separate systems for ranking different water bodies. The first of these is broad scale, breaking the Region as a whole into nine “riparian management zones”. The second works at a much finer scale, and identifies priorities for individual sites within a sub-catchment.

### Zone priorities

The Region was divided into nine broad zones, based on the water quality zones used by the RIG for State of the Environment (SoE) and indicator reporting (e.g. SoE Report, Fig. 43). Expert judgement was used to identify the relative importance of water bodies in pastoral areas of these zones for several desired environmental outcomes, namely aquatic biology, margin biodiversity, on-site water quality and downstream water quality. In each case we scored the zone’s importance on a high (= 3), medium (= 2) and low (= 1) scale. The final assessment was based on the combined scores for each zone. The following table shows the results of this assessment.

---

<sup>1</sup> Federated Farmers, Rural Women, Dexcel, Dairy Research Institute, Meat Industry Research Institute of NZ.

<sup>2</sup> Sponsorships may offer relevant local, regional or national business significant promotional opportunities

<sup>3</sup> District Councils, Department of Conservation, Fish and Game Societies, and others with an interest in the welfare of the Region’s water bodies.

**Table 1 : Provisional assessment of the relative importance of nine zones for riparian management (a combined score of 12 = most important; while 4 = least important). “tribs” = tributaries.**

	<b>Aquatic biology</b>	<b>Margin biodiversity</b>	<b>On-site water quality</b>	<b>Downstream water quality</b>	<b>Sum</b>
Coromandel	3	3	3	3	12
Hauraki—upper	2	2	3	3	10
Inflows to L Taupo	2	2	3	3	10
Waikato R tribs—upper	2	2	2	3	9
West Coast	2	3	2	2	9
Waipa	1	2	1	2	6
Waikato R tribs—middle	1	1	1	2	5
Waikato R tribs—lower	1	2	1	1	5
Hauraki—lower	1	1	1	1	4

### Site priorities

A set of technical criteria for identifying priority sites for riparian management in pasture areas of the Region has been developed (see DOCS #707307). A condensed version of the set is shown in Appendix 2 and includes a scoring system that can be used to rank sites in terms of their priority, from 2 (lowest) to 10 (highest). These criteria will be used in evaluating proposals to manage the riparian margin at particular sites.

## 7 Implementation

The Clean Streams Project will place primary emphasis on promotion, advice and encouragement to farmers to protect their water body margins and to give priority to this within farm budgets. The availability of financial support will assist with this where certain conditions are met.

In addition to the advisory and works support services above, provision will also be made for overall project management and the monitoring of progress against project objectives.

Project activities in any given year will therefore comprise a mix of advisory services, administration of the financial contributions for works, and project management. As indicated in Section 9 of this strategy document, it is expected that the mix of these components will shift over the life of the project. That is, greater emphasis will be given in the early stages to promotion and advice relative to financial contributions, the latter rising to a peak in year 6 and tapering off in the later stages.

Priorities for implementation will be primarily driven by:

- Zonal priorities (see Section 6)
- Catchment priorities
- Environmental impact
- Catchment basis (as compared to individual projects)
- Profile / Demonstration value.

### 7.1 Promotion

A promotion campaign will be implemented to raise awareness of the issues surrounding the management of water body margins on farmland, to show that solutions are available and achievable, to demonstrate the benefits, and to offer Environment Waikato support.

To assist in promotion, particularly in the early stages of the project, high priority will be given to supporting protection at locations that have high public profile and thus assist with promotion and education. The value of such sites will be reflected in the score given to an individual project as part of the assessment process. See Appendix 3.

Other promotional activities are expected to include:

- National Agricultural Fielddays
- Articles in the farming media – good news stories
- Local newspaper articles and mail drops in priority areas.

## 7.2 Education

It is intended that opportunities to educate and inform the regional community as to the benefits of riparian protection will be pursued through seminars, field days and the production of information materials, including riparian fact sheets. These approaches will support the advisory services described below and will aim to enable farmers to prepare and implement their own riparian protection plans to support applications for financial support. They will cover a range of topics including objective setting, appropriate solutions, where to fence, what to plant, and how to maintain riparian areas. Much of this activity is likely to occur in conjunction with the research agencies.

## 7.3 Service Delivery

Service delivery will involve three primary areas that are set out in the accompanying diagram;

- **Advisory Services**
- **Assessment Process**
- **Implementation - including Monitoring and Reporting**

An advisory service will be available throughout all stages of the Clean Streams Project. During the consultation this was seen as vital to the success of the project. Advice will be provided to property owners on the options for riparian protection, preferred tree species, fencing specifications, benefits expected, and funding provisions. Ongoing advice relating to maintenance, management and monitoring would also be available.

In most cases advisory services are expected to result in an application for funding being made to Environment Waikato. In other cases property owners may seek only information and advice. All applications will be assessed within a set of standard criteria these reflecting the fundamental objectives of the project (See Appendix 4).

Where applications are approved, a simple Farm Plan will be prepared which will set out the proposed work programme. Property owners will be encouraged to prepare the plan themselves with assistance from Environment Waikato as needed.

Financial contributions under Clean Streams will be up to 35% of the cost of the work.

### **Activities eligible for funding will include:**

- Fencing materials and labour
- Planting materials and labour (including releasing and blanking for up to three years)
- Alternative water supply (where applicable)

Plant species for which commercial return is expected will not be eligible for funding. All maintenance costs will be expected to be met by the property owner and this will be agreed prior to the commencement of work. Maximum unit costs will be established for materials and labour. Any costs in excess of this would be borne by the property owner.

The processes already in place under the new projects programme will provide the basis for the financial processing under Clean Streams. Upon completion of works to Environment Waikato specifications, a share of the costs will be reimbursed to the property owner. In kind contributions provided by the property owner would be included in the works costs and eligible for a funding share.

Where appropriate, depending on the scale of work, number of funding participant's etc., it is proposed that a Memorandum of Understanding (MOU) be entered into with the property owner regarding future maintenance. In cases where Environment Waikato financial contributions exceed \$10,000 this MOU will be registered on the property title.

## **7.4 Project Management**

Provision will be made for the servicing of the project in the form of annual programme planning, financial management, Farm Plan preparation and monitoring of achievements.

## **7.5 Planting and Fencing Materials**

It is expected that as Clean Streams gains momentum there will be a significant annual requirement across the region for the supply of planting and fencing materials.

Commercial and other community based nurseries will be informed of the opportunities under the Clean Streams project, thus assisting to generate interest and competition between suppliers. An information day specifically for future suppliers will be planned to occur as early as possible and repeated annually. A result of this information day may be that Environment Waikato will provide to participating farmers a schedule of those nurseries that are able to supply the materials likely to be needed, and their price lists.

It is likely that there could be cost advantages from bulk tendering of materials although the costs to administer this would need to be evaluated. This and other options will be explored as the project proceeds and appropriate opportunities pursued as they arise.

## **7.6 Partnerships**

Opportunities for partnerships with other agencies will be investigated as the project proceeds. These may include collaborative relationships, including sponsorships, with the dairy industry, research agencies and suppliers. The intention will be to achieve greater impacts from the available resources, and to establish ongoing projects that can continue to achieve improvements after the completion of the scheme.

# **8 Assessment Criteria**

In assessing the merits of individual projects, reference will be made to the environmental goals and regional priorities discussed in Section 6. Individual proposals will be assessed under the categories outlined in the attached form (appendix 3). The form has been devised to be a simple process that can be completed on site with a minimal administration associated with it.

## 9 Monitoring

It is vital that the progress made with Clean Streams over time is monitored. This monitoring is expected to occur at various levels.

### Monitoring of Project Objectives

It is proposed that within the project management component, progress against the overall objectives of the project (see section 5) be monitored. A geographic database will record where works have been undertaken and a regional picture will be established over time as to the extent and location of the completed protection works.

### Environmental Impacts

It is expected that existing research catchments and Environment Waikato monitoring programmes will be utilised to provide information as to the environmental benefits arising from progressive riparian protection. A number of existing monitoring sites are located in those key catchments likely to receive focus under Clean Streams. Some additional sites may need to be established. This will be investigated in 2002 / 03.

### Site/Project Monitoring

It is intended that as part of Environment Waikato's property inspection programme selected Clean Streams projects will be inspected on a regular basis. This will be limited to high priority or extensive protection projects and will assist to maintain contact with property owners. It will also serve to ensure that maintenance programmes are monitored against any memorandums or agreements that may apply.

## 10 Annual Programme

The project will go through a number of stages throughout its life. The following provides an outline of the stages and the expected emphasis of each.

### Stage one (Year 1 to 3)

- Promotion. Raising awareness of the issues, and the opportunities for farmers to obtain Environment Waikato assistance.
- Pilot catchments. Establishment of strategically located sites that can be used for promotion of the concepts and solutions and which provide opportunities for monitoring effectiveness.
- Applications for assistance are expected to increase rapidly during this time.
- Review of the project and regular adjustments to ensure maximum effectiveness.

### Stage 2 (Years 4 to 7)

- Major activity. It is expected that at this stage there will be large numbers of farmers who have prepared riparian plans, had them approved, and are working on their implementation.

### Stage 3 (Years 8 to 10)

- Wind down. With the fund due to finish after ten years it will be necessary to ensure that farmers plan their proposals to be completed in time. Opportunities may exist by this time to develop alternative sources of financial support such as sponsorship to enable a continuation of some plans and transitional arrangements will be prepared as appropriate.

### Stage 4 (Subsequent years)

- Advisory services continue through Environmental Education Programmes and enforcement of rules becomes more significant.

# 11 Links to other Environment Waikato Programmes

The Clean Streams Project effectively implements policies in a number of Environment Waikato Policy documents (see section 2), and will be closely linked with a number of other Environment Waikato initiatives, in particular the Biodiversity Project and Project Watershed.

It is expected that for the Waikato River catchment, there will be a close relationship between Project Watershed and Clean Streams. A distinction is that Project Watershed will have a focus on achieving 'stable streams' through soil conservation measures. The riparian project has a broader focus to address non-point discharges and achieve 'clean streams'. The two projects will have their own set of eligibility criteria, however from a practical point of view the public contact with both programmes will be largely through the same advisory service. The only significant distinction will be the source of funding. These connections will be developed further as time proceeds.

Environmental Education Programme will provide the advisory service and the education activities such as field days and seminars for the project. This will involve a significant but manageable refocusing of the EE Programme's Sustainable Agriculture and Landcare Projects.

It is anticipated that Clean Streams will utilise the community consultation framework put in place under Project Watershed, in particular the Liaison Subcommittees. It is expected that these subcommittees will provide input to the annual programme preparation process and assist in the promotion of the Clean Stream objectives.

It is also expected that Clean Streams will achieve some of the objectives presently being developed by the Biodiversity Project team as extensive networks of streambanks are planted in natives and close liaison will be maintained over implementation methods.

The large area of un-grazed water body margin proposed in this strategy carries with it a significant plant and animal pest threat. This will be managed by maintaining close links with biosecurity staff, both in terms of providing the best advice to farmers, and in terms of co-ordinating community pest control schemes where appropriate.

Finally, the use of regulation has been provided as a complementary method for the promotion of the protection of water bodies. Regulatory approaches can have adverse impacts on the relationships needed to achieve voluntary action, and close contact with enforcement staff will be needed to ensure that the two programmes act in concert.



# Appendix 1: Legal Framework

## Resource Management Act 1991

Environment Waikato is required under s5 of the Resource Management Act 1991 (RMA) to promote the sustainable management of natural and physical resources in carrying out its functions. Sections 6 and 7 of the RMA requires Council to recognise the importance of among other things the preservation of the natural character of the coastal environment (including the coastal marine area) wetlands, and lakes and rivers and their margins and the protection of them from inappropriate use and development.

Under S30 of the RMA Environment Waikato has the following relevant functions:

- The control of the use of land for the purpose of soil conservation and maintenance and enhancement of water quality, including coastal waters (30(1)(c)(i) and (ii));
- The control of discharge of contaminants into water (30(1)(f)); and
- The control of the introduction or planting of any plant in, on or under the beds of water bodies for the purpose of soil conservation, and the maintenance and enhancement of the quality of water in that water body (30(1)(g)(i) and (ii)).

## RPS and Waikato Regional Plan

Environment Waikato has prepared the RPS and proposed Waikato Regional Plan (WRP) which execute Council's powers and functions under the RMA. The RPS and WRP contain objectives, policies and methods that seek to improve water quality, improve aquatic habitats and maintain stable river and lake banks. Methods are included that enable Council to use economic incentives and contestable funds to provide fencing and planting of riparian areas. The WRP contains rules that control vegetation clearance and earthworks in riparian areas, control livestock in water bodies and the planting and clearance of vegetation on the beds of rivers and lakes (see Appendix 1). Environment Waikato is using the policies and method in respect of non-point source discharges, including a streamside enhancement fund to assist in meeting the water quality objectives of the WRP.

## Strategic Plan / Annual Plan

The Strategic Plan 2001 – 2011 and Annual Plan 2001 – 2002 states that Environment Waikato will establish a riparian project fund in 2001/02. It will be a contestable fund available from 2002/03, reviewed annually with a limited life of 10 years. The purpose of the fund is to support people wanting to protect and enhance their river and stream banks, seeps, drains and wetlands, particularly by excluding livestock. Landowners will be able to apply for a grant to help meet the costs of riparian protection. Environment Waikato will target areas where the work is most needed – where worsening water quality can be most easily improved.

## **Other Policy Considerations**

### Waikato Regional Coastal Plan

The Waikato Regional Coastal Plan sets out how Environment Waikato will execute its resource management responsibilities in the coastal marine area. The coastal marine area includes estuarine areas that may be affected by the implementation of this Strategy. The presence of livestock in or on mangroves, saltmarsh or eel grass or on muddy substrata in the coastal marine area is a prohibited activity.

### Regional Pest Management Strategy

In addition to the RMA Council also executes powers and functions under the Biosecurity Act 1993 through the Regional Pest Management Strategy. The RPMS sets out the direction and policies for managing plant and animal pests in the Waikato Region. Many plant and animal pests have the potential to have significant adverse effects in water bodies and in riparian areas.

### District Plans

Under the RMA territorial authorities are required to prepare district plans which cannot be inconsistent with national policy statements, regional policy statements and any relevant regional plans (for matters of regional significance or which the regional council has primary responsibility under Part IV). While regional councils have responsibilities in respect of soil conservation, water and the beds of rivers and lakes, district councils have responsibilities for activities on the surface of water bodies and the effects of land use.

Under sections 229 to 237 of the RMA territorial authorities are able to require or create esplanade reserves or esplanade strips for a number of purposes including maintaining or enhancing water quality or aquatic habitats. Formation of these reserves or strips can assist riparian management and protect water bodies from adverse effects of land uses.

### New Zealand Coastal Policy Statement

New Zealand Coastal Policy Statement relates to the coastal environment, which covers estuarine areas that may be covered in this riparian strategy.

## Appendix 2: Criteria for identifying the relative priority for riparian management of sites in pasture areas of the Waikato Region (see DOCS #707307 for details).

Priority	Aquatic biology	Margin biodiversity	On-site water quality	Downstream water quality
A (Score 10)*	<p><b>Streams/rivers</b></p> <p>1. Sites with a maximum width of about 5 m and within about 2 km downstream of a margin with protected indigenous vegetation.</p> <p><b>Estuaries/wetlands</b></p> <p>2. OSWB sites within about 2 km of the upstream limit of salt water intrusion</p>	<p><b>Streams/rivers</b></p> <p>3. Sites of unfenced riparian indigenous vegetation within about 2 km of the margin of a viable area of protected indigenous vegetation.</p> <p><b>Estuaries/lakes/wetlands</b></p> <p>4. Sites that will protect or extend existing areas of vegetation at an OSWB which supports threatened communities or species</p>	<p><b>Streams/rivers</b></p> <p>5. Sites within about 1 km of a forest/pasture margin on spring-fed streams or those draining volcanic geology.</p>	<p>6. Sites where riparian management would effectively reduce contaminant loads to a contaminant-sensitive downstream OSWB.</p>
B (Score 8)*	<p><b>Streams/rivers</b></p> <p>7. Sites with a maximum width of about 5 m and within about 2 km downstream of a margin with other indigenous vegetation (cf. #1).</p> <p><b>Estuaries/wetlands</b></p> <p>8. Other sites within about 2 km of the upstream limit of salt water intrusion (cf. #2).</p>	<p><b>Streams/rivers</b></p> <p>9. Sites of unfenced riparian indigenous vegetation within about 2 km of the margin of a viable area of other indigenous vegetation (cf. #3).</p> <p>10. Sites that would link areas of otherwise non-viable riparian vegetation that are less than about 2 km apart.</p> <p><b>Estuaries/lakes/wetlands</b></p> <p>11. Other sites that will protect or extend existing areas of vegetation which supports threatened communities or species (cf. #4).</p>	<p><b>Streams/rivers</b></p> <p>12. Sites within about 1 km of a forest/pasture margin on other streams (cf. #5)</p>	<p>13. Sites where riparian management would effectively reduce contaminant loads to other high quality downstream waterbodies (cf. #6).</p>
C (Score 5)*	<p><b>Streams/rivers</b></p> <p>14. Sites where at least 1–3 km of stream length will be shaded. Streams no wider than about 5–10 m.</p> <p>15. Any headwater streams in pasture areas.</p>	<p><b>Streams/rivers</b></p> <p>16. Sites of unfenced exotic riparian vegetation within about 2 km of the margin of a viable area of protected indigenous vegetation (cf. #3).</p> <p>17. Sites within 2 km downstream of the margin of a viable area of protected indigenous vegetation.</p> <p><b>Estuaries/lakes/wetlands</b></p> <p>18. Sites which will protect or extend areas of existing vegetation – excluding pasture (cf. #4 and #11).</p>	<p><b>Streams/rivers</b></p> <p>19. Stream sites where no more than about half of the upstream area is in pasture—in particular on spring-fed streams or those draining volcanic geology.</p> <p>20. Any headwater streams in pasture areas.</p>	<p>21. Sites where riparian management would effectively reduce contaminant loads to other downstream water bodies (cf. #6 and #13).</p>
D (Score 2)*	<p>22. All other sites.</p>	<p>23. All other sites.</p>	<p>24. All other sites.</p>	<p>25. All other sites</p>

## Appendix 3: Clean Streams - Assessment Criteria

**Project:**

Criteria	Detail	Ranking	Score
<b>Policy</b>	Extent to which project supported by Environment Waikato Policy. See Section of Strategy Document.	1 - 20	
<b>Environmental Goals</b>	<b>Zone:</b> Ranking according to zone. See attached.	10 - 30	
	Site: <b>Aquatic Biology</b>	2, 5, 8,10	
	Site: <b>Margin Biodiversity</b>	2, 5, 8,10	
	Site: <b>On site Water Quality</b>	2, 5, 8,10	
	<b>Site:</b> Downstream Water Quality	2, 5, 8,10	
<b>Issues / Values</b>	Soil erosion	10	
	Degradation of River/Lake bed	10	
	Cultural	8	
	Recreational	5	
	Scenic	5	
<b>Scale / Scope</b>	Individual	2	
	Sub catchment	5	
	Catchment	10	
<b>Participants</b>	Landowner	5	
	Other stakeholders	5	
	Territorial Local Authority	5	
	QE II Trust	5	
	Nga Whenua Rahui	5	
	Other	5	
<b>Profile / Educational / Promotional value</b>	Public Profile and Demonstration Value	1 - 40	
	<b>TOTAL SCORE</b>		

# Appendix 4: Clean Streams

## Clean Streams

