

25. **SUSTAINABLE MANAGEMENT OF WATERWAYS AND WETLANDS IN THE MARSHLANDS/SHIRLEY AREA (HORSESHOE LAKE CATCHMENT)**

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The purpose of this report is to discuss options for responding to urban expansion and major drain replacement works in the Marshlands/Shirley area and to ask the Board to propose an appropriate name for the No 2 Drain. The report has been considered by the Parks and Recreation Committee and was adopted by the Council at its meeting on 14 December 2000. The Parks and Recreation Committee endorsed a suggestion that the No 2 Drain be renamed and that the Board be invited to put forward a name for the Council's consideration.

**INTRODUCTION**

The area concerned is shown on the plan attached.

Analysis and description of the area is simplified if it is divided into two inter-related catchments drained by No 2 Drain and Snellings Drain.

**NO 2 DRAIN CATCHMENT**

The catchment includes peat and old sand dune country. No natural drainage pattern exists. The No 2 Drain system would have been constructed to enable productive use of the land by reducing natural ponding and lowering ground water levels. The system is mainly timber lined. Through Shirley Golf Course, No 2 Drain passes through relatively high ground and is about 3.5 metres deep. In 1956 the drain was lined with concrete slabs held in place with reinforced concrete frames. The drain carries a continuous baseflow of clear water.

**ISSUES**

The level of service provided for market gardening and grazing (given physical constraints such as low land levels and flat drain gradients) has been of a high standard in both operation and maintenance. However, there are issues that affect future management. These include:

- The limited remaining life of No 2 Drain lining through Shirley Golf Course (5-10 years) and its high replacement cost (\$0.6M).
- Development proposals by the golf club for the course in the area of No 2 Drain.
- Settlement of the peat soils area due to shrinkage (when dried peat soils shrink but do not expand to their original volume when wetted).
- Rural and residential subdivision within the catchment causing increases in surface water entering the No 2 Drain system together with associated contaminants.
- Barriers to the movement of aquatic life between the Avon River, Horseshoe Lake and No 2 Drain.

**OPTIONS**

The main options identified for the No 2 Drain system have been tabulated in figure A below:

**Figure A - No 2 Drain System**

	<b>Total Cost</b>	<b>Timing</b>	<b>Advantages</b>	<b>Disadvantages</b>
<b>Option 1</b> Renew precast concrete frame and slab lining.	\$0.6M	Flexible, but before 2010.	Drain service maintained.	Replacement by future generations. Unsightly.
<b>Option 2</b> Piping.	\$1.25M	Flexible, but before 2010.	Above plus usable space above pipe.	As above plus higher peak discharge flow and velocities.
<b>Option 3</b> Environmental asset waterway and pond.	\$0.7M	Staged: Land purchase before 2001. Works before 2010.	As above plus ecological landscape as recreation values plus fits in with Golf Club development plans.	Acquisition of private land necessary.

A 'do nothing' option has not been considered. This would involve the gradual collapse of the existing drains resulting an extensive ponding, sustained high ground water levels and consequent adverse effects on roads, properties and crops.

The latter part of this report includes a discussion on No 2 Drain and Snellings Drain options.

### SNELLINGS DRAIN CATCHMENT

The land is old sand dune country with rural land use west of the drain and established residential land to the east. Undeveloped residential land is located in the northern part of the catchment. It is likely that in time the entire catchment will be residential. No natural drainage system exists and surface runoff and ground water are drained by a constructed utility drain that is timber-lined. It carries a continuous ground water-fed baseflow.

### ISSUES

The main issues are:

- Progressive urbanisation of the whole catchment with the following consequent effects:
  - (i) Flooding of an existing residential area due to capacity limitations in the waterway between Snellings Drain and Horseshoe Lake.
  - (ii) Increased contaminant accumulation in Horseshoe Lake.

Under the above circumstances there is need to establish subdivision conditions that satisfy the mitigation of water quality and quantity effects in accordance with an overall parks and waterways concept for the area.

### OPTIONS

Two options are tabulated in figure B below:

**Figure B - Snellings Drain System**

	<b>Total Costs (approx)</b>	<b>Timing</b>	<b>Advantages</b>	<b>Disadvantages</b>
<b>Option 1</b> Storage within subdivision plus Snellings Drain improvements.	\$2M CCC \$5.1M subdividers	Staged: Land purchase 2001. Works at time of subdivision.	Subdivision design opportunities.	Compromises economic viability of subdivision. Higher maintenance costs on numerous individual ponds.
<b>Option 2</b> Storage within an enlarged park plus Snellings Drain improvements.	\$2.4M CCC \$2.4M subdividers	Staged: Land purchase 2001. Works done with subdivision.	Integrated with No 2 Drain system. Lower maintenance costs. High ecological and recreation values. Substantially lower total cost.	Greater CCC involvement in land purchase negotiations, planning and cost share administration.

### DISCUSSION ON OPTIONS

All three options for No 2 Drain retain the existing level of service for drainage for rural land north of Mairehau Road.

Option 3 (waterway and pond) involves raising the invert level of the drain through the Shirley Golf Course and creating an environmental asset waterway that can be integrated with the golf club's development intentions. (Discussions have been held with the club and they support this option.) The option will elevate both ground water levels (under low flow conditions) and stormflow levels on land south of Mairehau Road. The consequent ponding would have the ability to attenuate both storm flows and contaminants that enter Horseshoe Lake and the enhanced waterway. The pond itself would become a significant aquatic bird habitat due to its size and location on the coastal flyway. Under this option the Council would purchase the land affected by the pond, or at least provide appropriate compensation. The estimated purchase price has been included in the cost of this option. The extent of the pond and its level would be controlled by a new weir on new No 2 Drain (which was originally constructed to convey a portion of storm flow to Snellings Drain).

The piping option (option 2) has insufficient benefit to warrant the cost. It has been included for completeness and to demonstrate the relatively high cost of piping.

The option of renewing the structural lining (option 1) is less than, but similar in cost to, the waterway and pond option but has none of its recreational and environmental benefits.

The two Snellings Drain options are based on the need to mitigate effects on water quality and quantity, normally achieved by ponding. Ponding volume and, consequently, pond area is minimised if it is located immediately downstream of the development. It is also preferable from an operation and maintenance point of view to have one single pond, in the case of Option 2, a wet pond. Option 1 features several ponds located within the individual subdivisions.

By anticipating urban growth and purchasing land while it is still zoned rural, the eventual cost to the subdivider is significantly reduced. The land purchase cost would be recovered by the Council when a cost-share scheme has been initiated.

Both options provide for replacing Snellings Drain with an environmental asset waterway. The new waterway would provide part of the storm detention storage needed for mitigation purposes. As a green corridor within public land, the waterway would provide a pedestrian/cycle linkage between the new residential area and Clare Park.

## **CONCLUSIONS**

In general terms, the options can be divided into those that are utilitarian and those that involve investment in planning and land acquisition in order to create sustainability and multiple benefit.

For the No 2 Drain system the slightly higher cost of Option 3 (waterway and pond) provides a result that is in keeping with the management philosophy adopted in the Council's Asset Management Strategy for Waterways and Wetlands. This is the recommended option.

The options for Snellings Drain will involve the Council in setting up a cost-share scheme. At this stage the cost apportionment included in Table B needs to be regarded as preliminary only. The equal shares is a simple recognition of the Council's role in achieving greater community good and the subdivider's responsibility for the mitigation of adverse effects. A more detailed report will be provided on a cost-sharing proposal in due course. It requires a subdivision consent application to initiate the legal processes involved. In the meantime it is recommended that Option 2 for the Snellings Drain system be adopted in principle but with property acquisition proceeding.

This report also provides a good example of how a sustainable surface water system can be achieved by investing in planning and the securing of space within the landscape for waterways and wetlands. This is the principal thrust of the Asset Management Strategy for Waterways and Wetlands adopted by the Council, and is the reason why it is important to make appropriate provisions in the Council budget for acquisition over the next ten years.

The Council has adopted the following recommendations:

1. That Option 3 for the No 2 Drain system as described in the report be adopted.
2. That Option 2 for the Snellings Drain system as described in the report be adopted in principle pending a further report on development contributions.
3. That appropriate items be included in the draft Ten-Year Capital Expenditure Programme.

**Recommendation:** That the Board recommend an appropriate name for the No 2 Drain to the Parks and Recreation Committee.

**Chairperson's Recommendation:** For discussion.