

Report

District of Summerland

**Waste Management Plan  
Stage III Report**

June 1991

ASSOCIATED  
ENGINEERING



ASSOCIATED  
ENGINEERING (B.C.) LTD.



June 27, 1991  
File: VD92

4940 Canada Way  
Burnaby, B.C.  
V5G 4M5  
Tel: (604) 293-1411  
Telex: 04-354757  
Facs: (604) 291-6163

The Corporation of the District  
of Summerland  
P.O. Box 159  
SUMMERLAND, B.C.  
VOH 1Z0

Attention: W.S. Fleming  
Administrator

Dear Sirs:

Re: Waste Management Plan  
Stage III Report

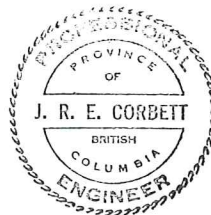
We are pleased to present fifteen (15) copies of our report entitled, Waste Management Plan - Stage III, March 1991. A further five (5) copies have been sent directly to the Ministry of Environment. A summary of the report is contained in the Executive Summary.

It has been a pleasure working with District staff on this project. We look forward to providing continued engineering services in the future.

Respectfully submitted,

ASSOCIATED ENGINEERING (B.C.) LTD.

  
J.R.E. Corbett, M.A.Sc., P.Eng.  
Project Manager



JREC/lp/Re.1

Enclosure

cc: P. Epp - OKWater, Penticton (5 copies)

## EXECUTIVE SUMMARY

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The District of Summerland, a farming and residential community of approximately 8,000 persons, is located in the Okanagan Valley of British Columbia. The District of Summerland is unique in the Okanagan Valley in that it has an urban core of some 5,000 persons utilizing on-site disposal. This situation has developed because the Town Centre is located on very permeable sands and gravels. If the soils had been less permeable, community sewers would likely have been constructed many decades ago. The lack of a community sewerage system is restricting redevelopment of the downtown core. In addition, on-site disposal is exhibiting a significant environmental impact in terms of phosphorus transmission to Okanagan Lake and nitrate levels in the groundwater.

The objective of the Waste Management Plan (WMP) is to establish a scheme for the management of wastewater within the District of Summerland over the next several decades.

The WMP is prepared in three stages:

Stage I outlines the possible treatment and disposal methods with rough preliminary costs, including ideas received at the first public information meetings.

Stage II outlines the various options with an implementation schedule. The various options are costed out in detail to give some appreciation of short and long-range user costs. The Stage II draft was presented at a final public information meeting where further public input was solicited.

Stage III is a short overview report or executive summary which gives the recommended course of action.

### STAGE I REPORT

The Stage I report entitled, Waste Management Plan, Stage I, May 1988 identified the following areas as environmentally sensitive in terms of wastewater disposal due to high phosphorus transmission rates to surface waters and/or high density of development.

- Lower/Upper Trout Creek
- Town Centre
- Lower Town/Peach Orchard Road
- Crescent Beach
- Garnett Valley

The report also identified a number of areas that could become problem areas in terms of wastewater disposal, if development utilizing on-site wastewater disposal is not controlled.

- Front Beach
- Prairie Valley
- Cartwright Mountain

A summary of constraints on on-site disposal for the various areas was presented. In addition, the report evaluated wastewater collection, treatment, and disposal techniques that could be considered for wastewater disposal improvement. Feasible techniques were identified for further investigation in Stage II.

#### STAGE II REPORT

The Stage II report presented nine options for wastewater management within the WMP area. These include:

- Option 1: Regional Sewerage System
- Option 2A: Lake Disposal
- Option 2B: Lake Disposal
- Option 3A: Effluent Irrigation
- Option 3B: Effluent Irrigation
- Option 4: High Rate Land Disposal
- Option 5: Combined Irrigation/Lake Disposal
- Option 6: Cluster Systems
- Option 7: Enhanced On-site Disposal/Land Use Control

Option evaluation was carried out utilizing a decision matrix technique that considers both monetary and nonmonetary factors. The two highest ranking options were:

- Option 1: Regional Sewerage System
- Option 5: Combined Irrigation/Lake Disposal

The District of Summerland pursued the concept of Option 1 with the City of Penticton, the Regional District of Okanagan Similkimeen, and senior levels of government. The concept did not receive support and the District of Summerland decided to proceed with Option 5.

The possibility of the regional approach, however, has not been ruled out by the District if the situation amongst the interested parties changes prior to a final decision to implement Option 5.

#### STAGE III REPORT

The Stage III report presents the recommendations of the WMP and procedures for implementation. The recommendations are as follows:

- .1 Planning should commence to implement the selected option, Option 5. Combined Irrigation/Lake Disposal. Preliminary engineering studies should be carried out in 1991/1992 to refine the design concept and more accurately define costs.
- .2 The District should continue to pursue Option 1: Regional Sewerage System with the City of Penticton, the Regional District of Okanagan Similkimeen, and the senior levels of government. A final decision on whether to pursue Option 1 or Option 5 will be required in early 1992. If the decision is to proceed with a regional approach, the work carried out under the preliminary engineering study is still valuable due to the similar sewerage areas for both options.
- .3 Identification of a suitable treatment plant site is key to the successful implementation of Option 5. Due to existing residential and agricultural land use, selection of a site will not be a straight forward process. Public education, odour control, and site aesthetics/landscaping will be important factors in the establishment of the advanced wastewater treatment plant site.
- .4 Assuming Option 5 is selected and confirmed by preliminary engineering studies, steps to establish a sewerage service area should be taken. It is anticipated that this could be in place by mid-1992.
- .5 Detailed design of the Phase 1 system, award of construction contracts, construction, start-up, and connection of services should proceed following establishment of the Sewerage Service Area with the objective of having the system in full operation by late 1994.
- .6 On-site wastewater management will continue to play a major role in overall wastewater management in the Okanagan Valley for the foreseeable future. A cooperative effort between the senior levels of government and the local government should be encouraged to promote sound on-site disposal practice, improved regulatory controls, public education, and enhanced on-site disposal research. In particular, valley-wide programs such as the introduction of non-phosphate detergents in order to reduce phosphorus generation should be encouraged and supported.
- .7 The Community Plan should be reviewed in light of the findings and recommendations of the WMP. In particular, existing and future development in environmentally-sensitive areas should be examined in regard to the constraints imposed by on-site wastewater disposal. Land use planning should be revised as required in accordance with recommended on-site disposal practices.

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## LIST OF ABBREVIATIONS

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BOD	Biochemical Oxygen Demand
du	dwelling unit
ha	hectare
kg/yr	kilogram per year
km	kilometer
m	metre
mg/L	milligram per litre
mm	millimetre
P	Phosphorus
SDG	Small Diameter Gravity
STEP	Septic Tank Effluent Pumping
WMP	Wastewater Management Plan

## 1.0 INTRODUCTION

---

### 1.1 WASTEWATER MANAGEMENT PLAN OBJECTIVES

The District of Summerland, a farming and residential community of some 8,000 persons, is located in the Okanagan Valley of British Columbia (Figures 1-1 and 1-2).

Wastewater management throughout the District is by on-site disposal utilizing primarily septic tanks and tile fields.

The Okanagan Basin Study in the early 1970's and subsequent updates have identified residential septic tanks/tile fields as a significant phosphorus source in areas where a combination of permeable soils, shallow depth to groundwater, and close horizontal proximity to surface waters allow high phosphorus transmission rates.

The Waste Management Act, introduced in 1982 as a replacement for the Pollution Control Act, introduces the concept of the Waste Management Plan (WMP). A WMP contains provisions or requirements for collection, treatment, handling, storage, utilization and disposal of wastewater or solid waste within the whole or a specified part of a municipality or regional district. Once approved by the Ministry of Environment, a municipality or regional district is authorized to discharge waste in accordance with the plan.

The objectives of the WMP are:

- To identify and review the wastewater management alternatives that are capable of adequately removing phosphorus and that are technically available to existing and potential development in Summerland and to select the technically feasible alternatives for detailed analysis.
- To develop discharge criteria for those technically feasible wastewater management options that involve discharge of sewage treatment plant effluent to surface waters or to land.
- To evaluate the capital and operating costs of these technically feasible wastewater management options, both from an overall cost point of view and on a cost per user per annum basis under alternative funding and cost-sharing formulas.
- To evaluate the environment, social, public health, engineering operational and financial advantages and disadvantages of technically feasible wastewater management options.



- To select the most appropriate wastewater management option or mix of options that can be economically achieved and which can be implemented in phases to meet short and long-term environmental goals.

The WMP is prepared in three stages:

Stage I outlines possible treatment and disposal methods with rough preliminary costs, including ideas received at the first public information meetings.

Stage II outlines the various options with an implementation schedule. The various options are costed out in details to give some appreciation of short and long-range user costs. The Stage II draft was presented at a final public information meeting where further public input was solicited.

Stage III is a short overview report or executive summary which gives the recommended course of action.

## 1.2 STAGE I REPORT

The Stage I report entitled, Waste Management Plan, Stage I, May 1988 identified the following areas as environmentally sensitive in terms of wastewater disposal due to high phosphorus transmission rates to surface waters and/or high density of development.

- Lower/Upper Trout Creek
- Town Centre
- Lower Town/Peach Orchard Road
- Crescent Beach
- Garnett Valley

The report also identified a number of areas that could become problem areas in terms of wastewater disposal, if development utilizing on-site wastewater disposal is not controlled.

- Front Bench
- Prairie Valley
- Cartwright Mountain

A summary of constraints on on-site disposal for the various areas was presented. In addition, the report evaluated wastewater collection, treatment, and disposal techniques that could be considered for wastewater disposal improvement. Feasible techniques were identified for further investigation in Stage II.

## 1.3 STAGE II REPORT

The Stage II report presented nine options for wastewater management within the WMP area. These include:

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- Option 4: High Rate Land Disposal
- Option 5: Combined Irrigation/Lake Disposal
- Option 6: Cluster Systems
- Option 7: Enhanced On-site Disposal/Land Use Control

Option evaluation was carried out utilizing a decision matrix technique that considers both monetary and nonmonetary factors. The two highest ranking options were:

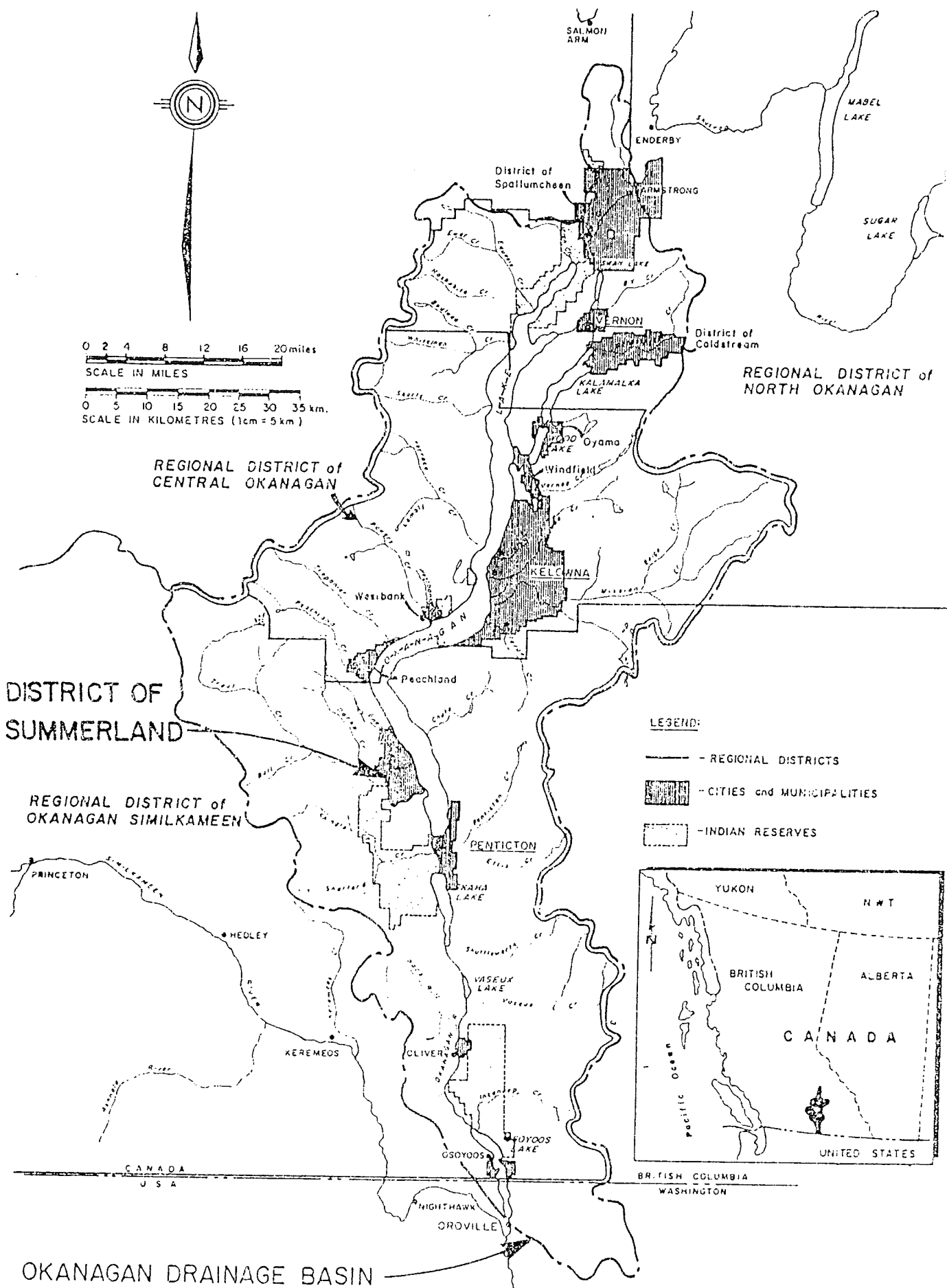
- Option 1: Regional Sewerage System
- Option 5: Combined Irrigation/Lake Disposal

Option 1 involves a regional sewerage scheme with the City of Penticton. Wastewater from the District of Summerland would be pumped to the City of Penticton, treated in the advanced wastewater treatment plant, and disposed of by a future combined surface water/effluent irrigation system. The scheme is attractive to the District of Summerland as there is minimal impact on land use within the District. The scheme is also attractive on a regional basis as the wastewater is removed from the Okanagan Lake watershed, servicing of the area between Summerland and Penticton would be feasible, and the larger scale of the system allows long-term economic savings and the operation of a single advanced wastewater treatment facility.

Option 5 is the most suitable scheme if the District of Summerland proceeds on its own. The scheme offers a high degree of environmental protection, redevelopment of the urban areas, and flexibility in terms of effluent disposal.

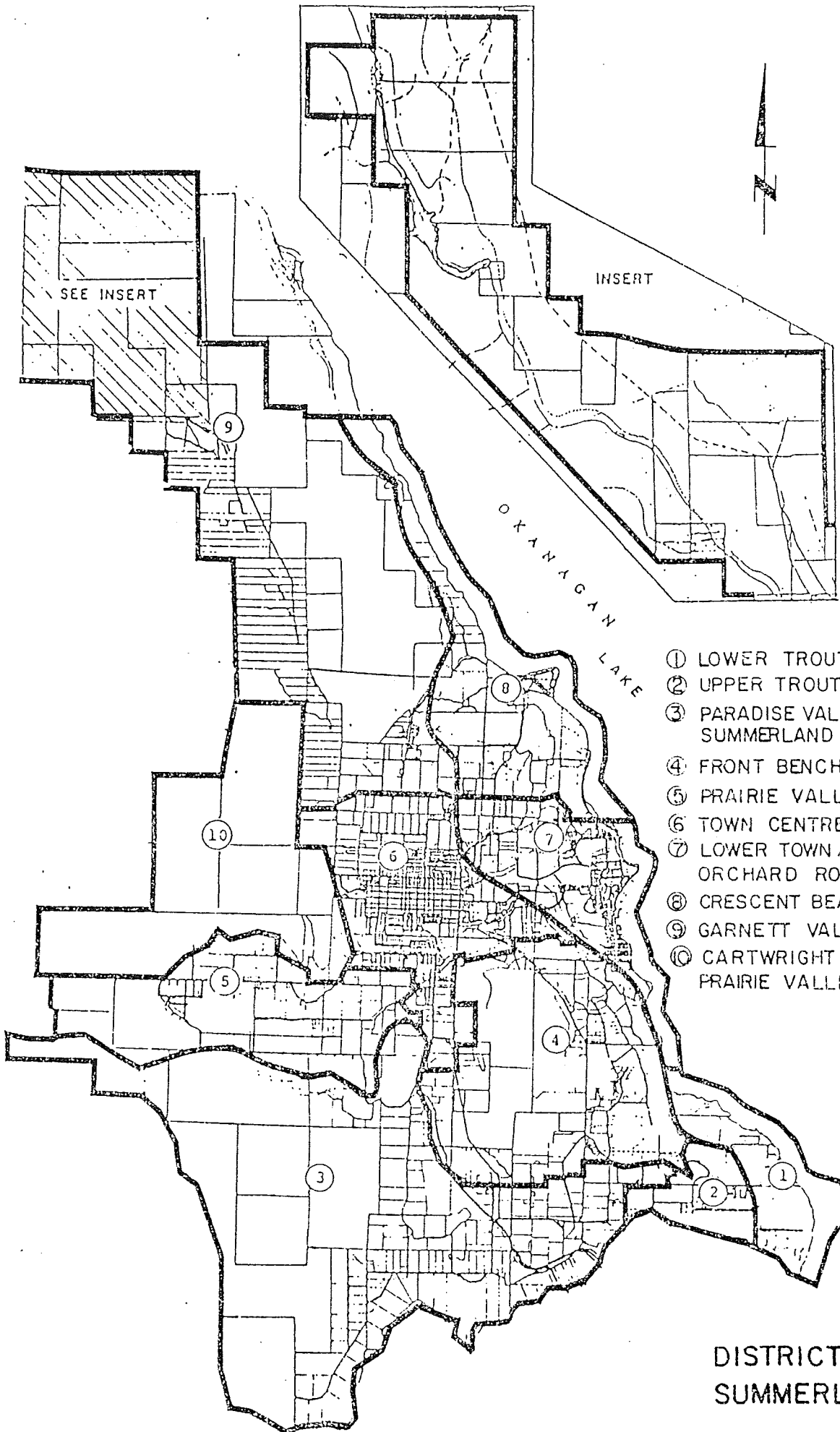
The District of Summerland pursued the possibility of Option 1: Regional Sewerage System with the City of Penticton and the Regional District of Okanagan Similkameen. The concept did not receive support from the City of Penticton due to the lack of immediate financial advantage to the City and potential long-term capacity concerns with the City's treatment and disposal works. The Regional District did not believe that the provision of community sewerage in the area between Summerland and Penticton was desirable from a land use planning viewpoint.

The District of Summerland thus decided to pursue Option 5: Combined Irrigation/Lake Disposal with continued examination of Option 1.



LOCATION PLAN

FIG. I-1



- ① LOWER TROUT CREEK
- ② UPPER TROUT CREEK
- ③ PARADISE VALLEY /SOUTHWEST SUMMERLAND
- ④ FRONT BENCH
- ⑤ PRAIRIE VALLEY
- ⑥ TOWN CENTRE
- ⑦ LOWER TOWN/PEACH ORCHARD ROAD
- ⑧ CRESCENT BEACH /HWY 97
- ⑨ GARNETT VALLEY
- ⑩ CARTWRIGHT MTN. /NORTH PRAIRIE VALLEY

DISTRICT OF SUMMERLAND

FIG. 1-2

## 2.0 RECOMMENDED WASTEWATER MANAGEMENT SCHEME

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### 2.1 OPTION 5: COMBINED IRRIGATION/LAKE DISPOSAL

The recommended wastewater management scheme is Option 5: Combined Irrigation/Lake Disposal. This scheme is shown in Drawing No. VD92-20-107A.

The scheme consists of a community sewerage system ultimately serving the Town Centre, Lower Town/Peach Orchard Road, Crescent Beach, and Trout Creek. The initial phases would see portions of the Town Centre and Lower Town serviced by the community sewers.

Wastewater treatment would be provided by an advanced wastewater treatment plant located in the Trout Creek area. Disposal of effluent would be to Okanagan Lake via a long, deep outfall. In addition, the effluent would be used for seasonal irrigation.

This option was selected since it offers a high degree of environmental protection, redevelopment of the urban areas, and flexibility in terms of effluent disposal. It also allows the District of Summerland to implement the scheme on its own without approval of the City of Penticton.

In selecting Option 5, however, the District of Summerland has not eliminated the possibility of pursuing Option 1: Regional Sewerage System. If the situation changes and a regional approach becomes attractive to the other parties prior to the implementation of Option 5, the District may elect to re-examine the regional option.

### 2.2 DESCRIPTION

#### .1 Collection

The area to be ultimately serviced by the collection system is shown in Drawing No. VD92-20-107A.

Wastewater from the sewerage area would be collected in a series of conventional gravity sewers and small pumping stations eventually discharging to two larger stations located in Lower Trout Creek and near the intersection of Highway 97 and Lakeshore Drive. The collected wastewater would be pumped from the two stations to the treatment plant located in the Trout Creek area.

The major pumping stations would be equipped with the diesel generation sets for provision of back-up power in the event of a main power failure.

The collection system would be phased to reduce initial capital expenditures. Proposed phasing is discussed in Section 2.3.

## .2 Treatment

The plant could be located in either Upper or Lower Trout Creek. For the purpose of developing this options, it is assumed that the plant would be located west of Highway 97 near Trout Creek. An area of approximately 3.0 ha is required to provide for suitable landscaping and buffering. No evaluation of property has been carried out in this study. The site shown is schematic only. If the plant site is located on lands within the ALR, an exclusion from the ALR would be required.

The design population (Year 2008) of the treatment works is 7100 persons.

The treatment plant will incorporate advanced wastewater treatment technology to obtain the effluent quality required. At this time, it is assumed that the plant would incorporate biological phosphorus and nitrogen removal technology, such as Bardenpho, backup alum precipitation, and final filtration to produce phosphorus effluent concentrations of less than 0.5 mg/L. Chlorination/ dechlorination or ultraviolet disinfection would be provided for effluent disinfection.

Sludge management is assumed to be by on-site dewatering followed by off-site composting. The final product will be suitable for use as a soil conditioner.

The plant would be designed to allow for a 100 percent expansion of capacity in the future to an ultimate design population of 14,200 persons. The architecture of the plant would be compatible with the surrounding development and the site would be landscaped with berms and treed areas to isolate the facility from the surrounding area.

## .3 Disposal

Disposal of effluent would initially be to Okanagan Lake on a year-round basis via an outfall south of Gartrell Point.

Preliminary assessment of the lake bottom contours indicates that the outfall and diffuser would be approximately 300 m in length, discharging at a depth of about 50 m. The outfall diameter would be approximately 450 mm.

An irrigation system, independent of the District's combined irrigation and domestic water system, would be constructed in 1994. An equalization storage pond with a minimum of two days capacity would be constructed at or near the plant to allow for fluctuations in daily demand. The system would be pressurized by an effluent pumping station.

Based on a design population of 7100 persons and an average irrigation rate of 750 mm extending over a 120 day period, approximately 43 ha of land could be irrigated. There are currently approximately 100 ha under irrigation in the Trout Creek area. The effluent could be used on orchards with a drip irrigation system or could be used for golf courses, forage crops, or pasture land.

This option allows partial use of the nutrient value of wastewater effluent for agricultural production without the very high costs of development of wintertime effluent storage.

As two methods of disposal are available, the loss of control of effluent application rates by the municipality is not as critical an issue as in a system utilizing land disposal alone. Implementation of the irrigation system, however, will require careful planning and operational control in order to avoid fluctuations in effluent demand due to the limited storage at the plant site.

The lake disposal mode will achieve about 95 percent phosphorus removal over eight months. The irrigation system could be expected to achieve 98 percent over the remaining four months. This yields an average annual removal of 96 percent for the area serviced by the sewerage system and 93 percent removal for the overall District.

#### .4 On-Site Treatment and Disposal

Under this option, areas of the District will remain on on-site disposal for several years as the community sewerage scheme is implemented and large areas of the District are planned to remain on on-site disposal for the planning horizon of the WMP.

It is essential that land use planning for the above areas recognize the constraints of on-site disposal and that zoning and development decisions are made accordingly in order to avoid problems. This is discussed further in Section 3.7.

### 2.3 PHASING

Due to the high capital cost of the community sewerage system, particularly the collection system, it is desirable to phase the implementation of the works.

The proposed phasing is shown in Table 2-1.

The reduction in initial capital cost can best be achieved by reducing the size of the wastewater collection area in the first phase. Savings in pumping stations and treatment/disposal works cannot be as readily achieved by phasing since the major portion of the construction is required in the initial phase.

Phase 1 (1994) would see the following construction. There are approximately 700 connected commercial/residential properties in this phase.

- Collection system for the commercial core of the Town Centre; the Lower Town commercial/residential area; and the residential area of Lower Trout Creek.
- Highway 97 pumping station and force main to the treatment plant.
- Lower Trout Creek pumping station and force main to the treatment plant.
- Advanced wastewater treatment plant.
- Outfall to Okanagan Lake.
- Effluent irrigation system.

Phase 2 (2006) include the extension of the collection system to serve about 2100 additional commercial/residential properties in the following areas:

- Remainder of the Lower Town/Town Centre sewerage area.
- Upper Trout Creek sewerage area.
- Crescent Beach sewerage area.

Actual phasing schedules could be modified depending upon development demands and project funding.

#### 2.4 ESTIMATED COSTS

The estimated capital costs and annual operation and maintenance costs are shown in Tables 2-2 and 2-3 respectively.

The costs are based on mid-1991 dollars and reflect an Engineering News Record (ENR) Index of 4900. It should be noted that the costs in Stage III report have been revised from the earlier Stage II report costs to reflect phasing of the works and 1991 dollars.



The costs are order-of-magnitude accuracy developed for the comparison of options. Costs should be more accurately estimated at the preliminary engineering stage when the actual location of works and scheduling of construction has been defined. Costs should be updated to the year of construction using an appropriate inflation factor.

## 2.5 FINANCING STRATEGY

Implementation of the proposed community sewerage system has a major impact on the District's finances. In order that the project can proceed, it is necessary to formulate a financing strategy that is both equitable and affordable to local residents. The basis of a proposed financing strategy is discussed below.

- .1 Capital costs will be borne by the District, by regional government through the Okanagan Basin Water Board, and by the provincial government.
- .2 The contribution by the Okanagan Basin Water Board and by the provincial government will be by a grant towards the overall capital costs. The contribution by the District will be in the form of an annual debt repayment.
- .3 Annual operating and maintenance costs will be borne by the District.

The current funding program is in a state of flux and it is difficult to predict future funding levels from the senior government with any degree of certainty. For the purpose of the Stage III WMP report, assumptions on available funding have been made based on recent programs in order to calculate possible user costs for the Phase 1 construction. These assumptions are summarized below.

- .1 Provincial government will provide a grant of 50% of capital costs on all works. In addition, the government will provide a grant of an additional 25% of capital costs on transmission, treatment and disposal works.
- .2 Okanagan Basin Water Board will provide a grant of 24% of the total grants provided above.

The remaining capital costs to be borne by the District are thus 7% of transmission, treatment and disposal works and 38% of collection works.

In addition to senior and regional government funding formulas, a financing strategy for the District to generate revenue for repayment of the debt on capital works and the annual operating and maintenance costs is required. The strategy proposed is a sliding scale of annual rates based on the benefits received from the sewerage system as follows:

Rate "A": Property owners connected to the sewerage system (Phase 1).

Rate "B": Property owners that are scheduled to be connected to the sewerage system by the year 2005 (Phase 2).

Rate "C": Environmental levy on all properties within the District.

The rates would decrease from Rate "A" through Rate "C". The justification of Rate "C" is that all property owners in the District will gain from the environmental benefits of protecting the lake water and from the overall economic benefits that redevelopment of the District will bring to the community.

A possible financing structure is proposed in Table 2-4. It must be emphasized that the rates are approximate at this time. A more detailed rate analysis is required following the preliminary engineering phase.

The financing strategy for the community sewerage system, along with comprehensive land use planning in areas continuing to utilize on-site wastewater management, will provide direction for sound, long-term wastewater management in the District.

TABLE 2-1  
PROPOSED PHASING

PROPOSED WORKS	YEAR OF CONSTRUCTION	ESTIMATED CAPITAL COST (\$)
<p><b>1.0 Phase 1</b></p> <p>Collection:</p> <ul style="list-style-type: none"> <li>• Commercial core of Town Centre</li> <li>• Commercial/residential area of Lower Town and Lower Trout Creek</li> </ul> <p>Transmission:</p> <ul style="list-style-type: none"> <li>• Highway 97 PS and force main</li> <li>• Lower Trout Creek PS and force main.</li> </ul> <p>Treatment/Disposal:</p> <ul style="list-style-type: none"> <li>• Advanced wastewater treatment plant</li> <li>• Outfall</li> <li>• Effluent irrigation distribution system.</li> </ul>	1994	\$13,300,000
<p><b>2.0 Phase 2</b></p> <p>Collection:</p> <ul style="list-style-type: none"> <li>• Remainder of Lower Town/Town Centre sewerage area</li> <li>• Upper Trout Creek sewerage area</li> <li>• Crescent Beach sewerage area</li> </ul>	2006	\$7,600,000
<b>Total Capital Cost</b>		<b>\$20,900,000</b>

1991 #  
27,797,000 1995

TABLE 2-2  
ESTIMATED CAPITAL COST<sup>2</sup>  
OPTION 5: COMBINED IRRIGATION/LAKE DISPOSAL

COMPONENT	YEAR OF CONSTRUCTION	COST <sup>1</sup> (\$)
<b>1.0 Collection</b>		
.1 Town Centre	1994	1,000,000
.2 Lower Town	1994	800,000
.3 Lower Trout Creek	1994	1,200,000
.4 Town Centre/Lower Town/Peach Orchard Road	2006	5,100,000
.5 Upper Trout Creek	2006	500,000
.6 Crescent Beach	2006	500,000
<b>2.0 Transmission</b>		
.1 Highway 97 PS and Force Main to AWTP	1994	1,300,000
.2 Trout Creek PS and Force Main to AWTP	1994	250,000
<b>3.0 Treatment</b>		
.1 Advanced Wastewater Treatment Plant	1994	5,000,000
<b>4.0 Disposal</b>		
.1 Outfall	1994	450,000
.2 Irrigation Distribution System	1994	600,000
Subtotal		16,700,000
25% Engineering and Contingency Allowance		4,200,000
Total Capital Cost		20,900,000

Notes:

*In-line Force Main ?  
Land Port*

- .1 Costs are mid-1991 dollars. ENR cost index is 4900.
- .2 Excludes the cost of connection of the sewer service lateral from the property line to the building and decommissioning of existing septic tank/tile field. This is estimated to be approximately \$1,000 per connection.

TABLE 2-3

ESTIMATED OPERATION AND MAINTENANCE COSTS  
 OPTION 5: COMBINED IRRIGATION/LAKE DISPOSAL

COMPONENT	ANNUAL O & M COST <sup>1</sup> (\$)
Labour	178,500
Power	31,600
Chemicals	5,500
Maintenance	82,000
Revenue	(3,600)
Total	294,000

Notes:

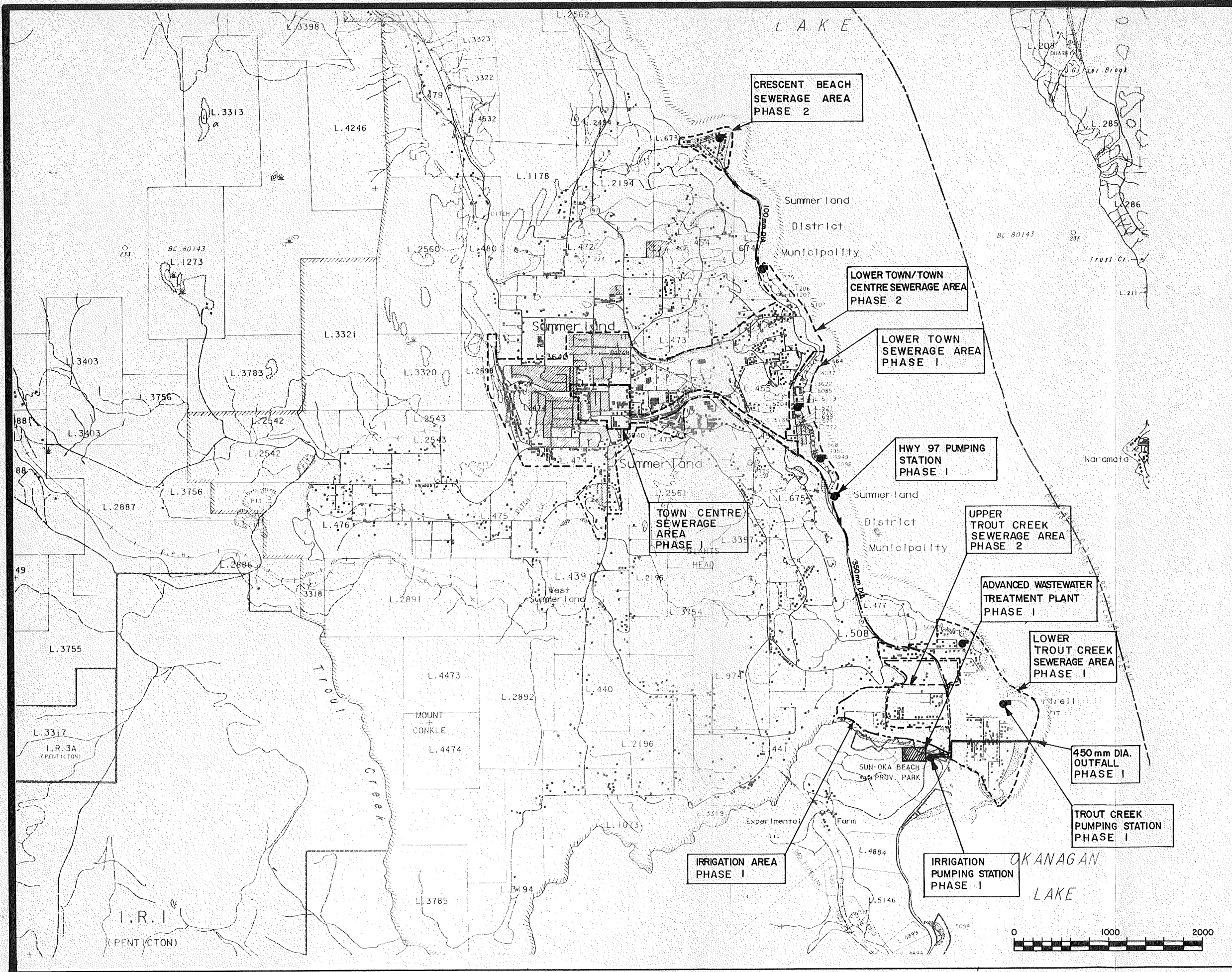
- .1 For year 1995. See Stage II report for details.
- .2 Costs are mid-1991 dollars. ENR cost index is 4900

TABLE 2-4  
PROJECTED RATE STRUCTURE<sup>1</sup>  
PHASE 1

ITEM	COST (\$)
<b>1.0 CAPITAL COST SHARING</b>	
.1 Municipal Affairs Grant <sup>2</sup>	\$6,650,000
.2 OKWATER Grant <sup>3</sup>	2,375,000
.3 OBWB Grant <sup>4</sup>	2,166,000
.4 Capital Share by District	<u>2,109,000</u>
TOTAL PHASE 1 CAPITAL COST	\$13,300,000
<b>2.0 ANNUAL REVENUE REQUIRED BY DISTRICT</b>	
.1 Debt Repayment <sup>5</sup>	265,000
.2 O & M Cost	<u>294,000</u>
TOTAL REVENUE REQUIRED	\$559,000
<b>3.0 RATE STRUCTURE<sup>6,7</sup></b>	
.1 Rate "A"	
\$380/yr @ 700 properties	266,000
.2 Rate "B"	
\$125/yr @ 2,100 properties	263,000
.3 Rate "C"	
\$25/yr @ 1,200 properties	<u>30,000</u>
TOTAL REVENUE GENERATED	\$559,000

Notes:

- .1 For first year of operation, i.e. 1995. Costs are in mid-1991 dollars.
- .2 Assumed to be 50% of capital costs of all works.
- .3 Assumed to be 25% of capital costs of transmission, treatment, and disposal works.
- .4 Assumed to be 24% of the Municipal Affairs and OKWATER grants.
- .5 Based on 11% over 20 years.
- .6 Rate "A" is applied to properties connected to the sewerage system in Phase 1. Rate "B" is for properties to be connected in Phase 2. Rate "C" is an "environmental levy" on all properties within the District. Rates "A" and "B" shown include the "environmental levy".
- .7 Costs exclude a one-time connection cost of about \$1,000 paid directly by the property owner for connection of the building plumbing to the lateral sewer at the property line and decommissioning of the septic tanks/tile field.



**LEGEND**

- SEWERAGE AREA BOUNDARY
- FORCE MAIN
- PUMPING STATION
- - - - - IRRIGATION AREA BOUNDARY

NO.	DATE	ENG.	BY	SUBJECT

REVISIONS	
PROJECT NO.	VD 92
SCALE	AS SHOWN
DRAWN	V.W.
DESIGNED	J.R.C.
CHECKED	
APPROVED	
APPROVED	
DATE	MAR 1991

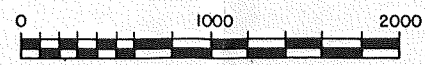
**ASSOCIATED ENGINEERING**

**DISTRICT OF SUMMERLAND**

**WASTE MANAGEMENT PLAN**

**PHASED IMPLEMENTATION  
OPTION 5: COMBINED IRRIGATION/  
LAKE DISPOSAL**

DRAWING NUMBER	REV. NO.	SHEET
VD 92-20-107A		



### 3.0 IMPLEMENTATION

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#### 3.1 PRELIMINARY ENGINEERING STUDIES

Preliminary engineering studies should be carried out for the proposed community sewerage system.

The scope of the studies should include:

- .1 Establishment of the collection area boundaries.
- .2 Confirmation of the existing and future design populations.
- .3 Selection of the treatment plant site.
- .4 Preliminary layout of the collection system and major components such as pumping stations and the advanced wastewater treatment plant.
- .5 Confirmation of potential for seasonal effluent irrigation.
- .6 Estimation of capital and annual costs.

The estimated budget for preliminary engineering studies is \$200,000 in 1991 dollars.

#### 3.2 SYSTEM FINANCING

Based on the confirmation of capital and annual operating and maintenance costs at the preliminary engineering stage, methods of system financing should be formulated.

As discussed in the Stage II report, a high level of senior government funding will be required to bring the project to an affordable level to the local residents. Discussions should be held with the Ministries of Environment and Municipal Affairs to determine the level of senior government funding available to the project.

A financing strategy should then be developed and user rates established to meet the expected debt repayment and annual operation and maintenance costs as outlined in Section 2.5.

#### 3.3 ESTABLISHMENT OF SEWERAGE SYSTEM

Options for establishment of a Sewerage Service should be reviewed and the most appropriate course selected. Alternatives include implementa-



tion under the Waste Management Act provisions or as a local service under the Municipal Act. The latter would require establishment of a by-law under Section 788, provincial approval, and voter approval or consent.

#### 3.4 DETAILED DESIGN

Following approval of the project, detailed design of the works would be carried out. The detailed design should consider possible future expansion of the collection, treatment, and disposal systems.

The required properties for pumping stations and the treatment plant and easements for the pipelines should be acquired.

The design should be prepared in several construction contracts to allow more competitive tendering and possible staging of construction.

#### 3.5 CONSTRUCTION

The works should be constructed by private contractor based on a public tendering system.

The construction period for Phase 1 will be in the order of 18 months.

The construction of the collection system will be disruptive to the community and a well planned public information program should be instituted prior to construction. Other utility upgrading and street repaving should be coordinated with the sewer construction.

#### 3.6 CONNECTION AND START-UP

Conversion of the household plumbing systems from the existing septic tank to the street sewer and decommissioning of the septic tank/tile field would be carried out once the community sewerage system has been completed and put in operation.

The required work on private property could either be carried out as part of the general construction contract or arranged privately by the property owner. Both alternatives should be reviewed at the financial planning stage and the most appropriate method selected.

#### 3.7 ON-SITE DISPOSAL/LAND USE CONTROL

Large areas of the WMP area, including both existing development and new development, will continue to utilize on-site disposal for the horizon of the WMP. Other areas, currently on on-site disposal and scheduled for connection to the sewerage system, will not be serviced by the sewerage system for about 15 years.

Implementation of the WMP must thus consider land use controls and zoning in the above areas.

Implementation of the wastewater management plan should include:

- .1 Revision of the Community Plan to reflect the recommendations of the WMP in terms of identification of environmentally-sensitive areas, recognition of on-site disposal concerns, and establishment of zoning densities and land use in accordance with recommended on-site disposal practices.
- .2 Establishment of a working group composed of staff from the District, British Columbia Environment, and Ministry of Health to promote and encourage improved on-site disposal practices. This could include research and pilot-scale studies into enhanced on-site disposal techniques, public education and recommendations into establishment of on-site disposal criteria such as lot sizes, restrictive covenants, and design parameters.
- .3 With the cooperation of the senior government ministries, establish regulatory controls on on-site systems to ensure systems function to their optimum. These could include approval of plans, monitoring of pump-out frequency, access authority for inspection, and authority to require upgrading if required.
- .4 In conjunction with the provincial government, investigate options and programs to assist and encourage individual property owners to improve and upgrade on-site disposal systems in environmentally-sensitive areas.

Direction in specific areas of the District is as follows. Additional discussion is contained in Stage II report.

.1 Lower Trout Creek

This area is scheduled for sewerage in Phase 1 in 1994 due to the high contribution of phosphorus to the lake from existing on-site disposal. Development and subdivision should thus proceed with the above timing in mind.

.2 Upper Trout Creek

This area is not scheduled for community sewers until the year 2006. Large areas are within the ALR and expected to remain under agriculture. Increased development should not proceed until a planning for the sewer system is in place.

.3 Paradise Valley/Southwest Summerland

This area will remain on on-site disposal.

The area, in general, exhibits a low phosphorous transmission potential and offers favourable on-site disposal conditions. The eastern portion of the area and the area along Trout Creek falls within the "red" and "orange" areas in terms of silt cliff

stability. Development in the "red" area is currently not recommended. Future development in the "orange" area is limited to a 0.4 ha minimum lot size.

Development from an on-site wastewater management viewpoint can proceed based on current zoning and stability criteria. Proposed development in excess of current densities (RC-2) should be evaluated on a site specific basis.

#### .4 Front Bench

This area will remain on on-site disposal.

The phosphorous transmission potential of the soils generally ranges from moderate to low. The primary constraint on development density is stability consideration regarding the silt bluff. The area immediately west of Hwy. 97 falls within the "red" and "orange" zones. Development within the "red" zone is not recommended. Future development in the "orange" zone should be limited to a minimum lot size of 0.4 ha. Areas falling within the above zones should be developed following the slope stability guidelines.

The remainder of the Front Bench area lies within the "white" stability designation. This category is subdivided into D1 and D2. Future development in the D1 area should be limited to 0.14 ha minimum lot size (RC-2 zoning). Development within the D2 area is not constrained by stability considerations and should follow current zoning (RC-2 zoning). Site specific studies should be carried out for proposed developments at densities greater than RC-2 zoning.

#### .5 Prairie Valley

This area will remain on on-site disposal.

Development is constrained in the valley floor area by limitations on on-site disposal caused by impermeable soils and high water tables. Development densities in this area should not be increased from the current zoning (A2 and RC-2) without site specific studies.

Conditions for on-site disposal on the valley sides are more favourable due to the more permeable soils and greater depth to groundwater. Large-scale development, however, could lead to seepage problems below the development. Development densities should not be increased beyond RC-2 zoning without site specific studies.

.6 Town Centre

The commercial core will be sewered under the Phase 1 program in 1994. The remainder of the Town Centre area will be sewered in Phase 2.

The development plans should be formulated with the above timing in mind. The construction of Phase 2 sewers could be considered at an accelerated pace to coincide with redevelopment or development of higher density housing near the Phase 1 sewerage area.

.7 Lower Town/Peach Orchard Road

The commercial/residential area of Lower Town would be serviced by community services in Phase 1. Redevelopment plans should then coordinate with the sewerage program.

The Peach Orchard Road area is scheduled for sewerage in Phase 2. Development in this area should be delayed to coincide with the construction of sewers. As portions of the area are in the "red", "orange" and "yellow" zones in terms of silt bluff stability, development should be consistent with the stability criteria guidelines.

.8 Crescent Beach/Highway 97

Crescent Beach is scheduled for servicing by community sewers in Phase 2.

The Highway 97 areas on the bench above Crescent Beach will remain on on-site disposal. The area is generally suitable for low density development utilizing on-site disposal. The northern portion of the area exhibits bedrock outcrops and shallow soil in some areas. Development in these areas should be governed by site specific studies to determine the suitability of on-site disposal. The areas near the silt bluffs are in the "red" and "orange" stability zones. This presents the major constraint for further development. In general, stability criteria should control future development. In areas of bedrock outcropping, or where densities higher than RS (single family) are proposed, site specific studies should be carried out.

.9 Garnett Valley

The Garnett Valley area will remain on on-site disposal.

The area has been identified as being environmentally sensitive in terms of phosphorous transmission due to the permeable soils and proximity of Eneas Creek. Future development in the valley adjacent to the creek should thus not be considered without controls to minimize phosphorous transmission. Development on the valley sides and bench land area between Eneas Creek and Okanagan

Lake will be limited by topography, shallow soil, and bedrock. Rezoning of the area for residential development should be proceeded by site specific investigation into the suitability of the area for on-site disposal.

.10 Cartwright Mountain/North Prairie Valley

This area would develop an on-site disposal for the horizon of the WMP. The potential, however, does exist to service the Cartwright Mountain area by community sewer in the long-term.

The western portion of the area offers generally favourable conditions for development of on-site disposal. The soils are relatively permeable with a large depth to the groundwater table. Due to the distance from surface watercourses, the potential for phosphorous transmission is low.

The eastern portion of the area (Cartwright Mountain) presents more constraints to on-site disposal. The area is characterized by moderately steep topography, bedrock exposures, and shallow soils in many areas. As portions of this area are currently zoned RS (single family), on-site disposal problems may limit development potential. It is recommended that proposed subdivision investigations to ensure that on-site disposal is feasible, and that the area is developed at densities compatible with one-site disposal capacity.

3.8 SCHEDULE

The proposed schedule for implementation of the selected wastewater management scheme is as follows:

<u>Item</u>	<u>Date</u>
• Decision to Proceed	July 1991
• Complete Preliminary Engineering	March 1992
• Establish Sewerage Service Area	June 1992
• Complete Phase 1 Detailed Design	January 1993
• Complete Phase 1 Construction	August 1994
• Sewerage System (Phase 1) in Full Operation	December 1994
• Commence Phase 2 Detailed Design	April 1997
• Complete Phase 2 Construction	December 1998
• Commence Phase 3 Detailed Design	April 2004
• Complete Phase 3 Construction	December 2006

The above schedule for Phase 1 is fairly optimistic and requires timely decisions on funding and implementation.

The schedule for Phases 2 and 3 is somewhat flexible and implementation could proceed earlier or latter depending upon development and economic decisions.

#### 4.0 RECOMMENDATIONS

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The recommendations of the WMP are as follows:

- .1 Planning should commence to implement the selected option, Option 5: Combined Irrigation/Lake Disposal. Preliminary engineering studies should be carried out in 1991/1992 to refine the design concept and more accurately define costs.
- .2 The District should continue to pursue Option 1: Regional Sewerage System with the City of Penticton, the Regional District of Okanagan Similkimeen, and the senior levels of government. A final decision on whether to pursue Option 1 or Option 5 will be required in early 1992. If the decision is to proceed with a regional approach, the work carried out under the preliminary engineering study is still valuable due to the similar sewerage areas for both options.
- .3 Identification of a suitable treatment plant site is key to the successful implementation of Option 5. Due to existing residential and agricultural land use, selection of a site will not be a straight forward process. Public education, odour control and site landscaping/aesthetics will be important factors in the establishment of the advanced wastewater treatment plant site.
- .4 Assuming Option 5 is selected and confirmed by preliminary engineering studies, steps to establish a Sewerage Service area should be taken. It is anticipated that this could be in place by mid-1992.
- .5 Detailed design of the Phase 1 system, award of construction contracts, construction, start-up, and connection of services should proceed following establishment of the Sewerage Service Area with the objective of having the system in full operation by late 1994.
- .6 On-site wastewater management will continue to place a major role in overall wastewater management in the Okanagan Valley for the foreseeable future. A cooperative effort between the senior levels of government and the local government should be encouraged to promote sound on-site disposal practice, improved regulatory controls, public education, and enhanced on-site disposal research. In particular, valley-wide programs such as the introduction of non-phosphate detergents in order to reduce phosphorus generation should be encouraged and supported.

- .7 The Community Plan should be reviewed in light of the findings and recommendations of the WMP. In particular, existing and future development in environmentally-sensitive areas should be examined in regard to the constraints imposed by on-site wastewater disposal. Land use planning should be revised as required in accordance with recommended on-site disposal practices.