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May 06, 1989 Our file: 308-011

Waste Management Plan for Electoral Areas A, C, and D

FINAL STAGE TWO REPORT

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T.R. Underwood, P.Eng.

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April 25, 1989

Regional District of
Okanagan-Similkameen
101 Martin Street
Penticton, B.C. V2A 5J9

Attention: Ms. V. Sutton,
Administrator

Dear Madam:

Re: **Final Stage Two Report**
Waste Management Plan for Electoral Areas A, C, and D

We are pleased to submit herewith our FINAL Stage Two Report for the Waste Management Plan for Electoral Areas A, C, and D. The Stage Two Report was submitted to the Regional District in Draft form in August 1988. Through the fall of 1988, input was received related to the Draft Stage Two Report. This input included a review meeting with government agencies on November 10, 1988. Comments relating to the Draft Stage Two Report received through the fall of 1988 and the points presented in a letter dated April 14, 1989 from the Okanagan Water Quality Control Project, are reflected in the FINAL Stage Two Report.

With submission of the FINAL Stage Two Report, the Waste Management Plan for Electoral Areas A, C, and D has been substantially completed. The Stage Three Report, Summary, will be submitted to the Regional District upon receipt of some clarification of review comments by the Okanagan Water Quality Project.

Copies of the FINAL Stage Two Report have been forwarded to representatives of government agencies who have participated in Waste Management Plan workshop sessions. We look forward to an opportunity to meet with you to discuss the FINAL Stage Two Report.

Yours truly,

T.R. Underwood, P.Eng.

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
T. R. UNDERWOOD

TRU/db
enc.

S T A G E T W O R E P O R T

WASTE MANAGEMENT PLAN
FOR ELECTORAL AREAS A, C and D
REGIONAL DISTRICT OF OKANAGAN SIMILKAMEEN

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10.1 Introduction

The Stage One Report addresses phosphorus loadings and other wastewater related concerns throughout Electoral Areas A, C, and D and defined ten (10) areas of population concentrations where an alternative sewerage system warranted evaluation. A preliminary analysis of alternative system options for these 10 areas is presented in the Stage One Report with capital cost estimates and statements relating to resolution of wastewater concerns. The concluding Section 9 of the Stage One Report summarized alternative system options and presented suggestions related to the preferred approach.

The Stage Two Report is presented as a continuation of the Stage One Report and describes in a greater level of detail the preferred alternative sewerage systems. The assessments herein focus on the preferred alternative for areas where an alternative system is considered feasible. These assessments presented in the Stage Two Report include:

- resolution of technical or performance concerns which were described as outstanding issues in the Stage One Report and/or were brought up as comments during the agency workshop or public information sessions in January, February and March 1988.

- refinement of the conceptual designs of proposed alternative systems which includes collection system, trunk sewer and disposal components.

- review and re-evaluation of preliminary capital cost estimates presented in the Stage One Report to reflect modifications or refinements of the system design concept.

- recalculation of resultant user costs associated with the proposed alternative sewerage systems.

The emphasis of this Stage Two Report related to alternative systems is, therefore, on refinements to the proposed system conceptual designs and associated capital and user costs. Performance factors, in terms of phosphorus removal and resolution of other wastewater related problems, are only summarized based on data presented in the Stage One Report. The appropriate sections of the Stage One Report should be referred to for detailed information on performance criteria.

A preliminary user cost calculation was included in the Stage One Report assessments of alternative systems. These user cost analyses were intended to illustrate the order of magnitude of user costs which would result from construction of the sewerage systems proposed. Refined user cost calculations are presented in the Stage Two Report which reflect re-evaluated capital costs for each system and consideration of the size and land use of benefiting lots. The Stage One user cost analyses did not consider parcel size and equivalency of seasonal tourist commercial land uses in the calculation of equivalent benefiting parcels.

User cost calculations presented in the Stage Two Report are based on a benefiting unit equivalent to a single family house. Where the proposed sewerage system provides service to a lot which is subdividable in accordance with Community Planning documents, each additional lot which may result from the subdivision has been considered as the equivalent of one half of a benefiting unit. This methodology is somewhat conservative and eliminates the need to undertake a subdivision potential analysis of each potentially subdividable parcel. While this formula is somewhat simplistic, it does recognize a higher parcel tax for potentially subdividable properties as compared to a "standard" single family lot. Where a large parcel is serviced by a sewerage system but subdivision is not identified by the applicable Community Plan and/or where the parcel is within the A.L.R., the parcel is counted as one equivalent unit. As

was discussed at agency workshop sessions, proposed sewerage systems should not result in increased development pressures of lands within the A.L.R.

Related to seasonal tourist commercial land uses, equivalent benefiting units have been calculated on the basis of 10 seasonal occupancy units (campsites and motel units) to one single family house. For comparison purposes, the Town of Osoyoos uses a 6:1 campsite to single family unit in its sewer rate bylaw and the RDOS a 4:1 ratio in its rate bylaw for the Okanagan Falls sewerage system. The 10:1 ratio can be justified on the basis of phosphorus loadings and annual wastewater flow. Criteria presented in section 3.1.2 of the Stage One Report derives an annual phosphorus loading of 1.0 kg per person for a permanent single family house and 0.1 kg per person for a seasonal unit including campgrounds and motel units. On a flow basis, a single family unit generates an annual wastewater volume of about 500 m^3 and a campsite unit, about 50.0 m^3 based on a .4 month occupancy period. The flow and phosphorus loading estimates both have a 10:1 ratio for a house compared to a campsite unit. The 10:1 ratio for campsites to equivalent single family units is subject to modification as part of a more detailed feasibility assessment of any one of the sewerage systems.

Capital cost assistance from senior levels of government is a major factor in the derivation of preliminary user costs for debt retirement. There is uncertainty with respect to both eligibility and the level (percentage) of assistance that may be available for the construction of community sewerage systems described herein. Accordingly, four alternative assistance formulae have been used to derive user costs for debt retirement components as described following:

Formula #1 - No funding available under OK Water Quality Project. Assistance available from Ministry of Municipal Affairs under Revenue Sharing Act in amount of 25% of project cost with OK Water Board assistance of 24% of this amount

also available. **Total assistance rate under Formula 1 is, therefore, 31% of the total project cost.**

Formula #2 - Funding assistance available under OK Water Quality Control project in the amount of 75% for trunk sewers, forcemains, disposal systems, and pumping stations only. It should be noted that OK Water Quality Project funding does not at the present time apply to forcemains, pump stations, etc. The 75% assistance would not apply to collection system components, however, 25% grant under Revenue Sharing Act would be available for collection systems. In both cases, Okanagan Water Board assistance in amount of 24% would apply. **Assistance rates in this case would be 93% on trunk sewers, forcemains, treatment, etc. and 31% on collection system components.**

Formula #3 - Assistance Formula 3 assumes that the Okanagan Water Quality Project assistance in the amount of 75% of project cost and 24% equivalent Okanagan Basin share would apply. **In this case, the assistance is 93% of the total project cost.**

Formula #4 - This formula assumes that no assistance would be received from either the Okanagan Water Quality Project or the Okanagan Basin Water Board. **Under this formula, benefiting parcels of land would be responsible for 100% of the system cost.**

The Stage Two Report does not present recommendations related to scheduling of the construction of any of the proposed community sewerage systems. It is recognized that the Okanagan Water Quality Project will consider proposals for rural area sewerage system construction on an Okanagan Valley wide basis and will, therefore, determine priorities on the basis of this overall assessment. Before any of the proposed systems are advanced to the predesign or detailed feasibility study stage, the senior government assistance uncertainties will have to be resolved.

A second major focus of this Stage Two Report is general wastewater related policies which are proposed for adoption by the Regional District. The policy statement proposals evolved from discussions and comments at technical workshop sessions with government agency representatives. The policy statements are summarized in Section 5 of the Stage One Report and are intended to apply to areas which, over the long term future, will continue to rely on individual septic tank and tile field systems for wastewater treatment and disposal. The objective of the policy proposals is to address criteria which will enhance the long range performance and suitability of individual wastewater systems.

10.2 Stage Two Report Format

Section 11 of this Stage Two Report describes community sewerage system proposals for concentrated development areas within Electoral Areas A, C, and D. The Stage One Report concluded with priority grouping suggestions based on wastewater related problems resolved (including phosphorus removal) and capital cost. These priority groupings designated one to three include the following:

Group One (Highest Priority)

Osoyoos Northwest Sector
Tugulnuit Lakeshore (North of Oliver)
Sawmill Road Area (South of Oliver)

Group Two

Osoyoos Southeast Sector
South Vaseux Lake
East Vaseux Lake

Group Three (Lowest Priority)

Gallagher Lake
Kaleden Lakeshore
Skaha Estates
Osoyoos Southwest Sector

A greater level of detail is given herein to systems in the higher priority or Group 1 category. The analysis includes detailed descriptions of system components, collection system options, capital costs and user rate calculations. A somewhat reduced level of detail has been given to the three areas in the lower priority Group 2 category. Outstanding technical aspects defined through the review of the Stage One Report are addressed for the Group 2 systems, together with a summary of cost estimates. No additional evaluation is presented in the Stage Two Report for the lowest priority systems in the Group 3 classification.

Group 1 and 2 community sewerage system proposals are described in Sections 11.1 to 11.6 inclusive. Section 11.7 presents general recommendations related to the Group 3 systems which are intended as recognition that an alternative system may ultimately be required in each of these four areas.

Section 12 of the Stage Two Report is a discussion of proposed policy statements related primarily to the long term use of individual septic tank and disposal systems. Each of six policy recommendations are described in Sections 12.1 to 12.6 inclusive. These sections include a description of the objectives of each policy proposal followed by a discussion of possible implementation implications. The discussion of implementation implications is intended to assist the Regional District in determining what the effects of each policy proposal will be.

11.1 Northwest Osoyoos Sector - Electoral Area A

11.1.1 Alternative System Objectives

The Northwest Osoyoos Sector comprises a 5.8 km length of the Osoyoos lakeshore extending from the Town of Osoyoos boundary north to the north end of Osoyoos Lake. Figures 11.1 to 11.3 inclusive illustrate the Northwest Osoyoos Sector. As shown in Figures 11.1, 11.2 and 11.3, the sector includes six relatively small areas of concentrated development on the lakeshore. In total, the six development areas represent about 129 residential units or a population of 375.

The Stage One Report (Section 4.1.1) described concerns in the Northwest Sector area of the Ministry of Health related to individual septic tank and tile field systems and individual water wells. Specific concerns include:

- lots being too small for an approved on-site sewerage system and water well
- lots not being "deep" enough to enable compliance with standard 30 m setback from lakeshore as specified by the Health Regulations
- separation distances often being inadequate for an individual well from disposal systems on neighbour's property.

An assessment of individual lot size in the Northwest Sector concluded that about 8% of lots using both individual on-site sewage disposal systems and water wells comply with the Regional District minimum parcel size area requirement of 1672 m^2 (18000 $ft.^2$). Approximately 72% of lots have an area of less than 836 m^2 (9000 $ft.^2$) which is one half of the specified minimum parcel size of 1672 m^2. The evaluation of the lot sizes in relation to the Regional District Zoning Bylaw for the area confirms the documented concerns of the Ministry of Health.

A second concern in the Northwest Sector is the phosphorus contribution to Osoyoos Lake from individual on-site disposal systems. A majority of existing housing units are sited on phosphorus transmission polygons having Moderate or higher rating. Overall, the phosphorus removal efficiency of septic tank and tile field systems along the lakeshore is computed to be less than 43%.

An alternative or community sewer system is proposed in the Northwest Sector area to resolve concerns of the Ministry of Health and reduce the phosphorus loading to Osoyoos Lake from individual septic tank and tile field systems. A sewerage system in the Northwest Sector area would make several lots, which currently cannot be built upon due to size constraints, developable for residential use. Servicing of the lakeshore area by a sewerage system would result in a reduction of the phosphorus loading to Osoyoos Lake by about 205 kg per year.

The Stage One Report (Section 6.1) evaluated options for an alternative sewer system for the Northwest Sector. The Stage One Report concluded that the alternative involving a collection main following the old CP Rail right of way and connected to the Town of Osoyoos was preferred. The system is illustrated conceptually in Figures 11.1, 11.2 and 11.3. The major component of the proposed sewerage system is a 150 mm sewage collection forcemain approximately 5750 m in length extending from Lacey Point in the south to the north end of Osoyoos Lake. Each "pocket" of development along the lakeshore would have a local collection system which would pump into the collection main on the old CP Rail right of way. At the Town of Osoyoos municipal boundary, the 150 mm forcemain would discharge into a gravity flow trunk sewer.

The Stage One Report concluded with a statement of preference for the collector system following the CP Rail right of way and provided preliminary capital cost estimates for collection systems in each residential area serviced by the system. In sections following, the options for sewage collection in the Northwest Sector area are

evaluated in more detail with presentation of revised capital cost, operating and maintenance cost and user rate estimates.

11.1.2 Alternative Collection System Evaluation

11.1.2.1 Collection System Options

Three design approaches have been evaluated for service to residential areas in the Northwest Sector area; conventional gravity sewers (CGS), gravity septic tank effluent collection (GSTE) and low pressure systems (LPS). Section 5.2 of the Stage One Report presents a description of each collection system alternative and provides a general statement of site conditions where each option is most applicable. In most instances, conventional gravity sewer systems have the highest construction cost followed by gravity septic tank effluent systems and low pressure systems.

Conventional gravity sewer systems are often referred to as conventional municipal systems. The systems collect raw sewage from each house connected to the system, therefore, no works other than the service pipe are required on properties serviced. As compared to GSTE and LPS systems, conventional gravity systems are less expensive to operate and maintain both from the point of view of the system operating utility and individual homeowners.

A gravity septic tank effluent collection system collects septic tank effluent from each house as compared to the conventional system which collects raw sewage. Cost savings which may be achieved in comparison to a conventional system are:

- average pipe sizes may be reduced from 200 mm to 150 mm dia. This represents a material cost savings of about $5.00 per metre of main.
- manholes may be eliminated recognizing that the septic tanks have removed larger solids which tend to result in line plugging problems. Manholes are, however, suggested at major collection main intersection points.

- line and grade of the collection main is not as critical as conventional systems. There is, therefore, more flexibility to modify alignment to avoid poles, trees, pavement areas, etc. and thereby reduce restoration costs.
- septic tank systems will provide some attenuation of peak sewage flows which may be reflected in savings for pump station construction.
- septic tank effluent pumping stations are less expensive than raw sewage pumping stations recognizing that a majority of solids have been removed by the septic tanks.

The preceding represent design criteria associated with gravity septic tank effluent collection systems which result in reduced construction costs compared to conventional systems.

Unlike the conventional collection system, individual homeowners must continue to operate and maintain their septic tanks with a GSTE collection system. Pumpout of septic tanks on a regular basis is important to ensure that solids carryover into the collection system, which could result in plugged main, does not occur. Environmental impact concerns relating to possible leaking and/or overflowing septic tanks remains a possibility.

Low pressure septic tank effluent collection systems simply comprise a relatively small main in the street into which each homeowner pumps effluent from their septic tank. In some instances, the sewer utility owns and operates the septic tank effluent pumps and in other cases, the effluent pump is 100% the responsibility of the homeowner. Design factors associated with a low pressure system which result in cost savings as compared to a conventional system are:

- collection pipe sizes are reduced from 200 mm to 75 mm and 100 mm diameter.
- no manholes are required. Piping connections are suggested at ends of the system to permit periodic flushing.
- except where lift requirements exceed the capacity range of individual effluent pumps, sewage pumping stations are not required.

- collection main is installed at sufficient depth to avoid freezing related problems. As compared to conventional gravity systems, the excavation depth is reduced considerably.
- service line costs are reduced by reducing the pipe size from 100 mm to 50 mm diameter and decreased depth.
- the line and grade of low pressure systems is relatively unimportant. There is, therefore, flexibility to alter alignment to avoid poles, pavement, etc. and reduce restoration costs.

While the cost of system construction using a low pressure system is reduced, costs to the individual homeowner for operation and maintenance are considerably greater as compared to the gravity flow options. At the time of system construction, the individual homeowners will have to purchase and install a septic tank effluent pump. The cost will depend on the material of the pump enclosure (steel, fibreglass or concrete chambers are available), the overall depth of the pumping chamber and the design head requirements of the pump. As the design lift requirements increase, the operating horsepower of the pumps increases and the cost appropriately. Capital costs associated with individual septic tank effluent pumps in fibreglass chambers are anticipated to average $800.00 per unit including installation and electrical. The pump installation cost of $800.00 assumes that the septic tank is in satisfactory condition. It should be anticipated that some homeowners will also have to replace their septic tanks because of structural deterioration, leakage and/or inadequate size. If septic tank replacement is necessary, costs will likely range between $1200 and $2000 depending on location, access, depth, ground conditions, etc.

Ongoing operation and maintenance attributable to the homeowner would include periodic septic tank pumpout and electrical energy for the effluent pump. Maintenance responsibility for the individual pumps is an aspect which warrants very careful consideration. Operating low pressure collection systems in the United States generally have the

operating authority (Regional District or Municipality) being responsible for pump operation and maintenance. With this arrangement, reference (10) materials recommend that the operating authority carry out a preventative maintenance program with costs reported to vary between $80 and $120 per year. If the operating authority accepts responsibility for maintenance of individual pumps, these pump maintenance costs would have to be passed on to the benefiting properties in the form of increased user fees in comparison to the other alternatives. Legal aspects associated with the operating authority being able to enter onto private property to undertake maintenance of individual effluent pumps would have to be addressed. For purposes of this evaluation, it is assumed that the responsibility for installing and operating septic tank effluent pumps would remain with individual homeowners. Operating costs incurred by homeowners for operation and maintenance of individual pumps are, however, considered in the overall cost comparison of the options.

11.1.2.2 Northwest Sector Collection System Options

Conceptual designs for each of the three collection alternatives have been prepared for each developed area to be serviced in the Northwest Sector area. On the basis of these conceptual designs, capital cost estimates for each collection alternative in each of the proposed service areas were prepared.

Figures 11.1, 11.2 and 11.3 illustrate each residential area to be serviced in the Northwest Sector and conventional collection systems at Lacey Point, 104th Avenue area, Roberts Point, and Inkaneep Point. In the Stage One analysis, a conventional gravity system was concluded to be unfeasible because of adverse topography in the 87th Street and 196th Avenue areas and thus a low pressure collection system is illustrated in Figure 11.3. Whether the collection system is CGS, GSTE or LPS, the general alignment and location of collection pipes will be the same for all alternatives.

Differences between the systems are best illustrated by considering one of the residential areas in detail. For this purpose, the 104th

Avenue area illustrated on Figure 11.1 has been selected. Elements of each collection system option applied to the 104th Avenue area are described as follows:

Conventional Gravity Collection System

- 260 lineal metres of 150 mm gravity sewer
- 2 manholes
- 70 metres of 75 mm of low pressure collection main to service 3 residences at the east end of the service area which are too low in relation to the road elevation to be serviced by gravity.
- 10 - 100 mm diameter gravity sewer services and 3 - 50 mm diameter pressure services.
- sewage pumping station and forcemain connection.

Gravity Septic Tank Effluent Collection System

- 330 lineal metres of 75 mm diameter low pressure collection main.
- 2 flushing assemblies.
- 13 - 50 mm diameter service connections.

Capital cost estimates for each collection alternative for the 104th Avenue area are presented in Table 11.1. The cost estimate comparison for CGS and GSTE shows a $14,000 cost saving with the gravity septic tank effluent collection system. The cost savings are achieved by deleting manholes and a reduction in the capital cost of the wastewater pumping station. Cost estimates for all other components for these two options are comparable.

TABLE 11.1

CAPITAL COST ESTIMATES FOR WASTEWATER COLLECTION OPTIONS FOR 104th AVENUE AREA

	CGS	GSTE	LPS
Gravity Collection Main			
150 mm 260m	$ 14,300	260m - $ 14,300	none
Low Pressure Main			
75 mm 70m	2,800	70m - 2,800	330m- $ 13,200
Manholes 2	3,600	none	none
Cleanouts/Flush Ports	none	2 1,000	2 600
Gravity Services 10	5,000	5,000	none
Pressure Services 3	750	3 750	13 3,250
Road Restoration	4,000	3,000	2,000
Sewage Pumping Station	30,000	22,000	none
Subtotals	$ 60,450	$ 48,850	$ 19,050
Contingencies & Engineering	14,550	12,150	4,950
TOTAL	**$ 75,000**	**$ 61,000**	**$ 24,000**
Homeowner Cost for Indiv. Pumps	**$ 2,400**	**$ 2,400**	**$ 10,400**

The estimated capital cost of the low pressure system is less than one half of the other options principally because the sewage pumping station is unnecessary. Capital cost savings are also realized in the collection main, services and restoration with the low pressure collection system.

11.1.2 Evaluation of Collection System Options

The collection system evaluation described in the previous section for the 104th Avenue area has been carried out for all proposed service areas in the North West Sector. Capital cost estimates for each service area are summarized in the left most column of Table 11.2. Items of note with respect to the comparison of basic capital cost are:

- In the Lacey Point area, residences above and west of the CP Rail right of way would be serviced by a gravity septic tank effluent collection system under the low pressure alternative. Low pressure systems are not recommended where negative discharge pressures are probable. The area of Lacey Point east and below the CP Rail right of way can be serviced by a low pressure system.
- Low pressure systems with individual pumps pumping directly into the 150 mm collection forcemain are feasible up to and including Roberts Point. North of Roberts Point, operating pressures approach the head capabilities of commonly available units. Cost estimates for low pressure systems at Inkaneep Point and the 87th Street-196 Avenue areas include a pumping station that would be required for the gravity septic tank effluent collection system.

TABLE 11.2

COST COMPARISON OF COLLECTION SYSTEM ALTERNATIVES

Conventional Gravity System (CGS)

Area	Capital Costs	Indiv. Pumps	Capitalized O.C.*	Total
Lacey Point	$170,000	-	-	$170,000
104th Avenue	75,000	$ 2,400	$ 2,300	80,000
Roberts Point	70,000	-	-	70,000
Inkaneep Point	67,000	$ 3,200	$ 2,250	72,000
87th & 196 Ave.	212,000	4,800	4,500	221,000
Total	**$594,000**			

Gravity Septic Tank Effluent (GSTE)

Area				
Lacey Point	$135,000	-	$10,000	$145,000
104th Avenue	61,000	$ 2,400	4,700	68,000
Roberts Point	56,000	-	4,250	60,000
Inkaneep Point	56,000	$ 3,200	5,800	65,000
87th & 196 Ave.	174,000	4,800	11,700	191,000
Total	**$482,000**			

Low Pressure System (LPS)

Area				
Lacey Point	$ 88,000	$16,000	$20,000	$124,000
104th Ave.	24,000	10,400	9,700	44,000
Roberts Point	20,000	13,600	12,750	46,000
Inkaneep Point	48,000	14,400	13,500	76,000
87th & 196 Ave.	103,000	28,000	26,300	157,000
Total	**$283,000**			

TABLE 11.3
SUMMARY OF TOTAL COST EQUIVALENTS

Area	CGS	GSTE	LPS
Lacey Point	$170,000	$145,000	$124,000
104th Avenue	80,000	68,000	44,000
Roberts Point	70,000	60,000	46,000
Inkaneep Point	72,000	65,000	76,000
87th & 196 Ave.	221,000	191,000	$157,000

* Capitalized Operating Costs of Homeowner for Septic Tank Pump Out and Pump Operation and Maintenance

Considering only system capital cost, Table 11.2 indicates that servicing all lakeshore residential areas with conventional gravity collection systems is the most expensive option at a capital cost of $594,000. Provision of gravity septic tank effluent collection systems results in a capital cost reduction of $112,000 (approx. 20%). The cost savings are achieved primarily by the deletion of manholes and pumping station cost reductions. Low pressure septic tank effluent collection systems have an overall estimated capital cost of $283,000 which is 50% of conventional gravity system costs and 60% of the cost of gravity septic tank effluent collection systems.

A more realistic comparison of the collection system alternatives is provided by considering homeowner costs for individual pumps and operation and maintenance costs. Table 11.2 provides cost estimates for individual pumps (homeowner costs) and capitalized operating costs for each alternative. The capitalized operating costs include the following:

- for gravity septic tank effluent collection and the low pressure option, it is assumed that homeowners would have their septic tanks pumped out every two to three years at a cost of $60 to $90. Septic tank pump out cost is, therefore, an average of $30 per year which is equivalent to a capital cost of $250.
- for preventative and other maintenance, the individual pumps represent a minimum average cost to homeowners of $60 per year. This annual cost is equivalent to an additional capital cost of approximately $500 per installation.

With consideration of the costs for individual pumps and capital cost equivalents of estimated operating costs as shown in Table 11.2, the apparent cost economy of low pressure systems is significantly reduced. As an example, the low pressure system is the least cost alternative in terms of basic capital cost for Inkaneep Point. When individual pump capital costs and operating costs are considered, gravity septic tank effluent becomes the least cost option as shown in Table 11.3. The information presented in Table 11.2 confirms that the selection of a collection system alternative(s) should consider operating and individual pump costs.

Implementation of a community sewerage system in the Northwest Sector area will include a detailed evaluation of collection alternatives during design. A final decision should be based on detailed cost estimates and the preferences of residences in the area. Potential system users may be agreeable to paying higher user costs for conventional collection systems recognizing the higher operation and maintenance costs associated with low pressure and gravity septic tank effluent collection options.

For purposes of this Waste Management Plan and the preparation of overall capital cost estimates for the Northwest Sector sewerage system, the following collection system selections have been made:

Lacey Point - Conventional Gravity System
104th Avenue - Low Pressure System
Roberts Point - Gravity Septic Tank Effluent Collection
Inkaneep Point - Gravity Septic Tank Effluent Collection
87th St.-196 Ave. - Low Pressure System

A conventional gravity sewer system is selected for the Lacey Point area because it is an urban density area which immediately adjoins the Town of Osoyoos boundary where a conventional system is used. A gravity septic tank effluent collection system is the second choice for the Lacey Point area. Low pressure systems are proposed in the 104th Avenue, 87th Street, and 196th Avenue area because the capital cost of the system is the lowest based on data in Table 11.3. For similar reasons, a gravity septic tank effluent collection system is selected for Inkaneep Point. Considering that only $14,000 separates low pressure and gravity septic tank collection options for Roberts Point in Table 11.3, a gravity collection system is selected and will likely be more acceptable to homeowners in the area.

11.1.3 Capital Cost Estimate Summary

The overall capital cost of the proposed collection system in the Northwest Osoyoos Sector is presented in Table 11.4. Based on collection system recommendations discussed in the previous section, the overall capital costs (including trunk sewers) for the recommended system are estimated to be $955,000. Using phosphorus loading reductions for the sector derived in Section 6 of the Stage One Report, the capital cost of $955,000 is equivalent to $4650 per kg/year of reduced phosphorus loading. The cost per kg is based on a total reduction for the sector as a whole of 205.6 kg/year.

TABLE 11.4

NORTHWEST SECTOR SEWERAGE SYSTEM

PART A: OVERALL CAPITAL COST ESTIMATE

Area Served	Collection	Trunk Sewers	Subtotal	Cumulative Total
Lacey Point	$ 170,000	$ 134,000	$ 304,000	$
104th Avenue	24,000	70,000	94,000	398,000
Roberts Point	56,000	115,000	171,000	569,000
Inkaneep Point	56,000	82,000	138,000	707,000
Willow Beach, 87th St.-196 Ave.	103,000	145,000	248,000	955,000

PART B: PHOSPHORUS LOADING REDUCTIONS

Area Served	Cumulative $ Capital Cost	P Reductions*	Cost per kg P
Lacey Point	$ 304,000	33.6	$ 9050
104th Avenue	398,000	48.6	8190
Roberts Point	569,000	74.0	7690
Inkaneep Point	707,000	112.5	6280
Willow Beach, 87th St.-196 Ave.	955,000	205.6	4650

* Loadings in kg/year from Table 6.3 Stage One Report

11.1.4 User Cost Calculations

Four alternative formulae for assistance from senior government agencies have been used to estimate user costs for proposed alternative sewerage systems. These assistance formulae are described in detail in Section 3.4 of the Stage One Report. Estimated user costs for debt retirement for the Northwest Osoyoos area are presented in Part A of Table 11.5. The user costs are based on present populations in the Northwest Sector with allowances for campsites and potentially subdividable parcels as described in Section 10.

In addition to the user costs presented in Part A of Table 11.5 for debt retirement, other costs which benefiting homeowners will have to pay include:

- a once only connection fee payable when an application is made to connect to the system. Connection fees charged by Municipalities and Regional Districts is variable, ranging from about $100 to the actual cost of the service construction from the main to the property line which may be in excess of $1000. At the present, the connection fee charged by the Town of Osoyoos is $500 which is considered applicable for the Northwest Sector. In the final analysis, a lower connection fee may be adopted for pressure services recognizing that pressure connections are less expensive to construct. Lowering of the connection fee for pressure services may offset higher system operating costs for people serviced by low pressure systems. Homeowners will be responsible for costs for constructing the service pipe from the house or septic tank to the service provided at the property line. This cost will vary depending on the distance, soil conditions, restoration, etc. In general, the pressure services will be less expensive to construct than gravity service connections for reasons similar to descriptions presented in Section 11.1.2.1.

TABLE 11.5

NORTHWEST SECTOR COLLECTOR SYSTEM - USER COST ANALYSIS

PART A: DEBT RETIREMENT PARCEL TAX

AREA SERVICED	CAPITAL COST	BENEFITING PARCELS	PER PARCEL COST*			
			Formula 1	Formula 2	Formula 3	Formula 4
to Lacey Point	$ 304,000	41	$ 567	$ 258	$ 59	$ 800
to 104th Avenue	398,000	53	580	290	58	830
to Roberts Point	569,000	70	620	288	63	900
to Inkaneep Point	707,000	88	600	285	62	890
to Willow Beach	955,000	164	448	206	45	650

*** Parcel Tax per year**

Formula 1 - 25% Revenue Sharing (B.C. Gov't.) + 6% OK Water Board
Formula 2 - 75% MOE - OK Water Quality + 18% OK Water Board on Trunk Sewers, Formula 1 on Collection System
Formula 3 - 75% MOE - OK Water Quality + 18% OK Water Board on all components
Formula 4 - No Assistance.

PART B: USER FEES AND HOMEOWNER ANNUAL COSTS

Area	At Time of Connection			Annual Costs			
	Con. Fee	Ind. Pump	Total	User Fee	ST Pump Out	Pump O & M	Total
Lacey Point (40 lots)	$500	0	$ 500	$ 90	0	0	$ 90
104th Avenue (13 lots)	$500	$800	$1300	$ 90	$ 30	$ 60	$180
Roberts Point (17 lots)	$500	0	$ 500	$ 90	$ 30	0	$120
Inkaneep Pt. (18 lots)	$500	0	$ 500	$ 90	$ 30	0	$120
196th & 87th (35 lots)	$500	$800	$1300	$ 90	$ 30	$ 60	$180

- a monthly user fee for collection, treatment, and disposal system maintenance. In the case of the Northwest Osoyoos area, the annual user fee is anticipated to be $90.00 per single family dwelling which is the current user rate of the Town of Osoyoos.

Homeowner operation and maintenance costs for septic tank pump-out and pump operation will vary depending on the area and the type of sewerage system constructed.

Part B of Table 11.5 summarizes all non debt retirement-type users' costs. At the time of connection, homeowner costs will vary between $500 and $1300 depending on whether an individual pump is required. As part of a pre design assessment, consideration should be given to including the individual pump purchase costs in the overall capital cost of the system. If the operating authority provides the pumps, the cost differential between gravity and pressure services will be reduced from $800 to about $350. The differential is further reduced if a reduced connection fee is charged for pressure services as described preceding. It should be noted that septic tank replacement will be necessary in some cases, the costs of which are not included in Table 11.5.

Total annual costs for the Northwest Sector sewer system may be derived from Table 11.5 by combining data from Part A and Part B. As an example, with 25% assistance from the Provincial Government (Formula 1), a homeowner in Roberts Point would pay:

- $448 parcel tax for debt retirement (Part A)
- $120 annually for user fees and septic tank pump-out.

Increased development in the Northwest Sector area will reduce the net cost to individual users by increasing the number of benefiting parcels. To illustrate the relationship of increased population on the user fee calculations, a user cost analysis has been undertaken using the projected 2007 population as derived in Section 4.1.2 of the Stage One Report. Anticipated development includes:

- 20 single family lots in Lacey Point area
- allowance for the equivalent of 10 lots in the area of the packing house south of Roberts Point
- subdivision of lakeshore parcels in the 194th and 87th Street areas which are not in the ALR
- addition of 30 mobile home sites at Willow Beach.

The preceding would result in an increase of benefiting parcels from 164 given in Table 11.5 to 231. Resultant overall user costs given in Table 11.5 would, therefore, be anticipated to be reduced by about 30%. Resultant user fees for the 2007 population are:

Formula 1 - $ 318/year
Formula 2 - $ 146/year
Formula 3 - $ 32/year
Formula 4 - $ 470/year

The user cost estimates for the 2007 population are based on an overall system capital cost of $955,000 and, therefore, assume that no additional collection system components will be required to service new development. This assumption is valid if collection systems are constructed by property developers at the time of subdivision for future connection to the proposed Northwest Sector trunk sewer system.

11.1.5 Summary

A community sewerage system is described for the Northwest Sector of Electoral Area A which would service all lakeshore development to the north end of Osoyoos Lake. The major element of the proposed sewerage system is a pressure collector main approximately 5.8 km in length extending from a connection to the Town of Osoyoos sewerage system to the north end of Osoyoos Lake. Overall system capital cost is estimated to be $955,000 which includes collection components in all proposed system service areas. The sewerage system, as proposed, would resolve present concerns with individual septic tanks, individual wells and relatively small lot sizes in the area and reduce the phosphorus loading to Osoyoos Lake by an estimated 205 kg/year.

The schedule for implementation of the proposed sewerage system in the Northwest Sector is uncertain. It is, however, important that the Regional District recognize the ultimate objective of constructing the proposed sewerage system and implement several policies which will preserve the concept of the system and ultimately facilitate construction of the system. Recommendations related to the Northwest Sector sewerage system are:

(1) The Regional District should undertake formal discussions with the Province and/or CP Rail to obtain recognition that the old CP Railway right of way will be available for future construction of the wastewater collection main system as proposed. The alignment and grade of the railway right of way is ideal for the sewerage system. If the right of way is not available for the collection main, capital cost estimates for the system would increase significantly. The importance of the CP Railway right of way for the collection system cannot be over-emphasized.

(2) The Regional District should require a preliminary sewer system design as part of the approval process of any significant subdivision in the Northwest Sector area. The objective is to ensure that any future development in the area will have a subdivision layout which is compatible with the overall sewerage system concept as derived in this Waste Management Plan.

(3) To reduce the possibility of new development in the Northwest Sector increasing sewerage system capital costs by additional collection system requirements, the Regional District should consider requiring collection mains be installed as a condition of subdivision approval. Collection mains can be installed at significantly lower capital costs at the time of subdivision as compared to an existing community because pavement restoration and other utility interferences are avoided. Implementation of this policy would result in collection mains being installed which, in the future, would simply be connected to proposed trunk sewer mains.

11.2 Tugulnuit Lake Sector - Electoral Area C

11.2.1 Alternative System Objectives

The Tugulnuit Lake Sector in Electoral Area C is located immediately north of the Village of Oliver and includes the lakeshore area around Tugulnuit Lake and concentrated development between the Lake and the Village. Figure 11.4 illustrates the Tugulnuit Lake Sector. The population of the Tugulnuit Lake area is estimated to be about 1088.

Wastewater concerns related to individual septic tank and tile field systems in the Tugulnuit Lake area are described in Section 4.2.1 of the Stage One Report. In general, soils in the Tugulnuit Lake area are permeable sands and gravels and, therefore, individual tile field systems operate satisfactorily from a hydraulic point of view. High groundwater table conditions are a major constraint affecting the feasibility of individual systems at the north end of Tugulnuit Lake. In this area, site specific designs of mound-type systems are required by the Ministry of Health.

The major concern with septic tank and field systems in the granular soils of the Tugulnuit Lake area is the potential for contamination of the groundwater. About 20 homes on the west lakeshore all use individual wells for water supply. Adequate separation distances between individual wells and tile field systems cannot be provided in many cases in this area because of inadequate lot area.

The South Okanagan Lands Irrigation District (S.O.L.I.D.) has three production wells on Harrison Way at the south end of Tugulnuit Lake (see Figure 11.4). These wells are the water source for a community water system serving residences in the Tugulnuit Lake area. There is the potential for contamination of these wells by individual septic tank and disposal systems in the area. Based on regular water quality testing by the Ministry of Health, there is no evidence of contamination of the S.O.L.I.D. water wells.

11.2.2 Alternative Connection Alignments to the Village of Oliver

The Stage One Report evaluated a sewerage system for the Tugulnuit lakeshore area as a component of a sewerage system conceptually designed to service all development north of the Village boundary to Tugulnuit Lake. With the objective of servicing all development in the Tugulnuit Sector (Sub-areas 2, 3B, 1 etc.) on Figure 11.4, a connection to the Village of Oliver by forcemain on Park Drive was proposed. As illustrated conceptually by Figure 11.4, the forcemain connection comprises about 1400 m of pipeline from a lift station at the south end of Tugulnuit Lake to the Okanagan River Bridge.

Arising out of the review of the Stage One Report, a connection from the Tugulnuit lakeshore area to the west to the McPherson Drive area was identified as being shorter and potentially having a lower capital cost. The alternative of connecting to the McPherson Drive area is also illustrated in Figure 11.4.

This section describes in detail the connection to the Village of Oliver alternatives via Park Drive and via McPherson Drive. In both cases, the collection system proposed for service to the Tugulnuit lakeshore is the same. As illustrated in Figure 11.4, the system comprises sewer lift stations at both ends of the Lake. Gravity sewer systems are proposed which would service development in the immediate vicinity of each lift station. A 100 mm forcemain is proposed from the north end lift station following Tugulnuit Drive to the south end of the Lake. This forcemain conveys pumped wastewater collected at the north end of the Lake and serves as a low pressure collection system for homes on the west lakeshore.

The estimated capital cost for collection components for a sewer system to service the Tugulnuit lakeshore area (Sub-areas 3A and 4) are presented in Table 11.6. The cost estimates only include collection components up to and including the lift station at the south end of the Lake.

TABLE 11.6

TUGULNUIT LAKESHORE COLLECTION SYSTEM

CAPITAL COST ESTIMATE

Item	Description		Estimated Cost
Sub-Area 3A			
1.	Ø200 Gravity Sewer	1050 m	$ 63,000
2.	Manholes and Cleanouts	12	21,000
3.	Gravity and Pressure Services		27,000
4.	Ø100 Low Pressure Collection Main	400 m	20,000
5.	Collection System Restoration		20,000
6.	Sanitary Sewer Lift Station		50,000
	Subtotal		**$ 201,000**
	Contingencies & Engineering (allow 25%)		**49,000**
	Total Sub-Area 3A		**$ 250,000**
Sub-Area 4			
1.	Ø200 Gravity Sewer	650 m	$ 39,000
2.	Manholes and Cleanouts	9	11,000
3.	Gravity and Pressure Services		5,000
4.	Lift Station		35,000
5.	Ø100 Forcemain	700 m	28,000
6.	Restoration		8,000
	Subtotal		**$ 126,000**
	Contingencies & Engineering (allow 25%)		**31,000**
	Total Sub-Area 4		**$ 157,000**
	Total Sub-Areas 3A and 4		**$ 407,000**

11.2.2.1 Connection to Oliver via Park Avenue

As illustrated in Figure 11.4, a connection to the Village of Oliver via Park Drive will involve approximately 1400 m of 150 mm diameter forcemain following Tuc-el-Nuit and Park Drives. Although not shown in Figure 11.4, forcemain and gravity sewer provisions have been made to the east side of the Okanagan River Bridge for a sewer service extension into the Tugulnuit Lake area. The alignment for the forcemain along Park Drive is essentially flat, therefore, there would be a relatively modest design static lift on the proposed lift station at the south end of Tugulnuit Lake.

Ideally, the forcemain would be constructed at the same time as sewer collection mains in Sub-Areas 3B and 2. In this case, the forcemain could be installed in a common trench with gravity collection mains minimizing excavation costs and road restoration costs. If not constructed in association with gravity sewer mains, road restoration becomes a significant component of the overall system capital cost estimate given following.

CAPITAL COST ESTIMATE
FORCEMAIN CONNECTION TO OKANAGAN RIVER BRIDGE

Item	Description		Estimated Cost
(1)	150 mm dia. Forcemain	1400 m	$ 70,000
(2)	Connections at Okanagan River Bridge		1,000
(3)	Road Restoration		25,000
	Total Construction		**$ 96,000**
	Contingencies & Engineering (allow 25%)		**24,000**
	Total Project Cost		**$ 120,000**

11.2.2.2 Connection to Oliver via McPherson Drive

Figure 11.4 illustrates a connection to the Village of Oliver from the Tugulnuit lakeshore area to an existing trunk sewer which services the McPherson Drive area. A 1985 Urban Systems Ltd. report titled "Sewer and Water Study, The Village of Oliver" (1) states that the McPherson Drive trunk sewer has reserve capacity for a population equivalent of 600. Adequate hydraulic capacity is, therefore, available for the combined population of Sub-Areas 3A and 4 which is estimated to be about 252.

The connection to McPherson Drive will require approximately 280 metres of 150 mm diameter forcemain to the "crest of the hill" and 340 metres of gravity sewer down to a connection to the McPherson Drive trunk sewer main. The overall length of the pipelines is, therefore, about 720 m or one half of the distance to the Okanagan River Bridge.

With the connection to the McPherson Drive area, the lift station at the south end of Tugulnuit Lake will have to be designed for a static lift of about 25 metres. Lift station pumps will, therefore, be larger in terms of operating horsepower as compared to the connection to the Okanagan River Bridge where the static lift is minimal.

A capital cost estimate for the connection to the Village of Oliver system in the McPherson Drive area is presented in the tabulation following:

CAPITAL COST ESTIMATE

FORCEMAIN CONNECTION TO MCPHERSON DRIVE AREA

Item	Description		Estimated Cost
(1)	150 mm dia. Forcemain	280 m	$ 15,400
(2)	Gravity Sewer Main	340 m	20,600
(3)	Manholes	5 ea	9,000
(4)	Road Restoration		6,000
	Total Construction Cost		**$ 51,000**
	Contingencies & Engineering (allow 25%)		**13,000**
	Total Project Cost		**$ 64,000**

11.2.2.3 Evaluation of Connection Options

The estimated capital costs of connection alternatives to the Village of Oliver sewer system are $64,000 for the connection via McPherson Drive and $120,000 for the connection to the Okanagan River Bridge via Park Drive. From the point of view of capital cost, there would appear to be a significant preference for the McPherson Drive alternative. As noted earlier, the estimated costs for the Park Drive option reduce by 25% to 30% if the forcemain is constructed at the same time as gravity sewer extensions in Sub-Areas 3B and 2. Whether or not the forcemain can be constructed concurrent with gravity sewer mains depends on the Village of Oliver's plans for boundary extensions and the schedule for construction of services.

From an operational point of view, the connection to the Okanagan River Bridge via Park Drive has some potential advantages. The pumps for this option would be lower horsepower and designed for a minimal static lift, therefore, operational costs over the long term will be lower. The Park Drive alignment would result in the wastewater from the Tugulnuit Lake area being pumped directly to the lift station at the Village Treatment Plant. The McPherson Drive alignment would result in Tugulnuit lakeshore wastewater being pumped by the McPherson Drive lift station to the treatment plant lift station. Pumping of wastewater is, therefore, minimized with the Park Drive alignment to the Okanagan River Bridge.

For purposes of this Waste Management Plan, summary cost estimates are based on the McPherson Drive connection alternative. Should servicing of the Tugulnuit lakeshore areas be undertaken concurrent with other areas, the cost advantages of the McPherson Drive alignment are reduced, therefore suggesting further consideration of the Park Drive alignment.

11.2.3 Capital Cost Estimate Summary

The overall estimated capital cost for the proposed sewerage system to service the lakeshore area of the Tugulnuit Lake Sector is presented in Table 11.7.

TABLE 11.7
CAPITAL COST SUMMARY
TUGULNUIT LAKESHORE SEWERAGE SYSTEM

Collection System - Sub-Area 3A	$ 250,000
Collection System - Sub-Area 4	157,000
Connection to Oliver via McPherson Drive	64,000
Treatment & Disposal Improvements	140,000
Total	**$ 611,000**
Estimated Phosphorus Loading Reduction	197.5 kg/yr.
Capital Cost per kg/year	$ 3,100
Approximate Service Population	252

A provision of $140,000 has been included in the capital cost estimate for capacity improvements at the Oliver sewage treatment plant and effluent disposal system to accommodate flows from the Tugulnuit lakeshore area. As described in Section 7.1.4, the Oliver treatment plant has some modest reserve capacity. Whether or not this reserve capacity would be available for service to the Tugulnuit lakeshore area depends on decisions by the Village to extend sewer mains to other presently unserviced areas. The $140,000 allowance for treatment and disposal system improvements requires more detailed analysis as a component of a long range expansion evaluation of the Village sewerage system.

As given in Table 11.7, provision of a sewerage system in the Tugulnuit lakeshore area would result in an estimated phosphorus loading reduction to Tugulnuit Lake of 197.5 kg/year based on the present population for the area. The capital cost is equivalent to $3100 per kg/year of estimated phosphorus loading reduction.

11.2.4 User Cost Calculations

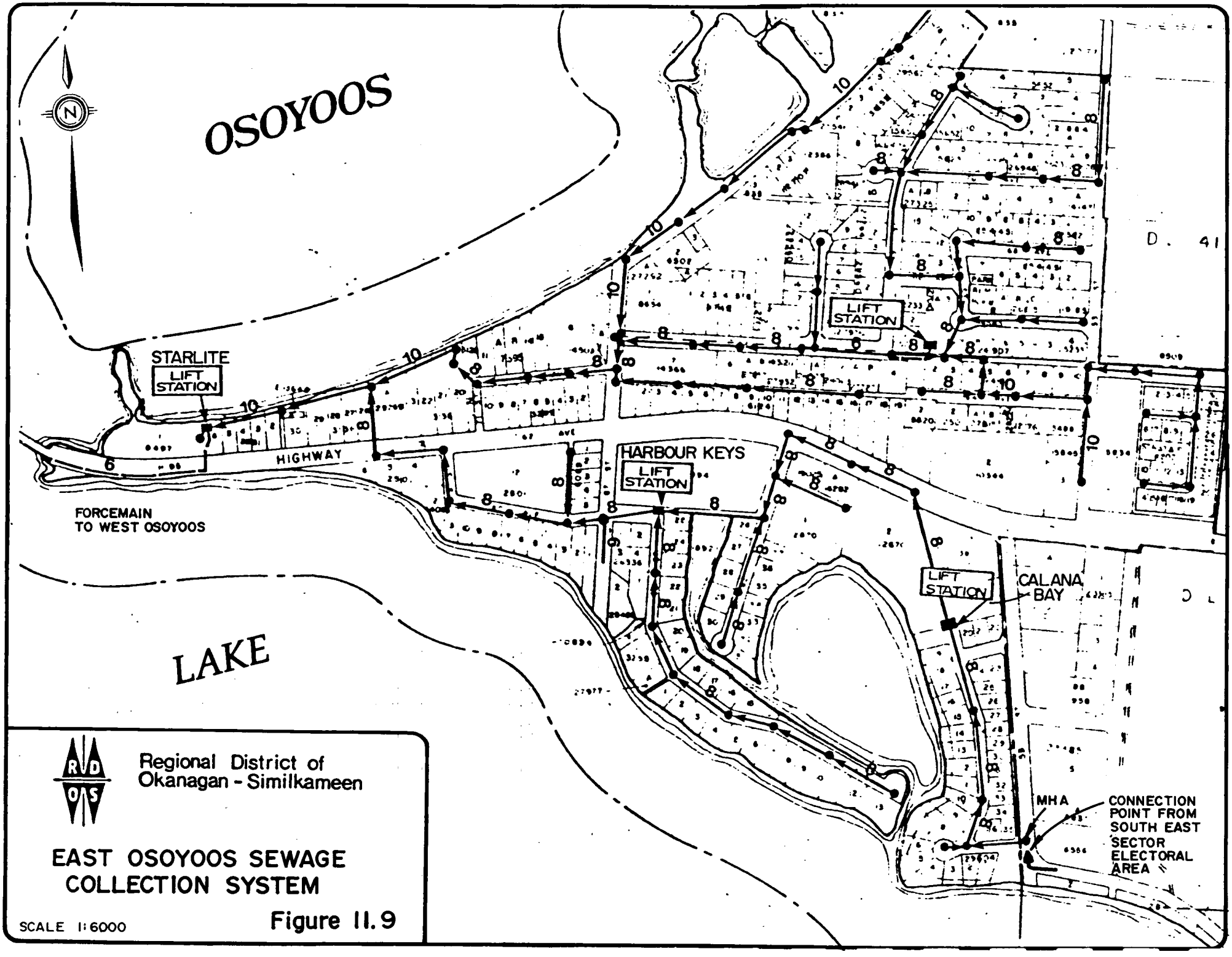
Utilizing the senior government assistance formula summarized in Section 10, net user annual costs for capital debt retirement have been calculated for the described sewerage system to service the Tugulnuit lakeshore area. The user costs for debt retirement are summarized as follows:

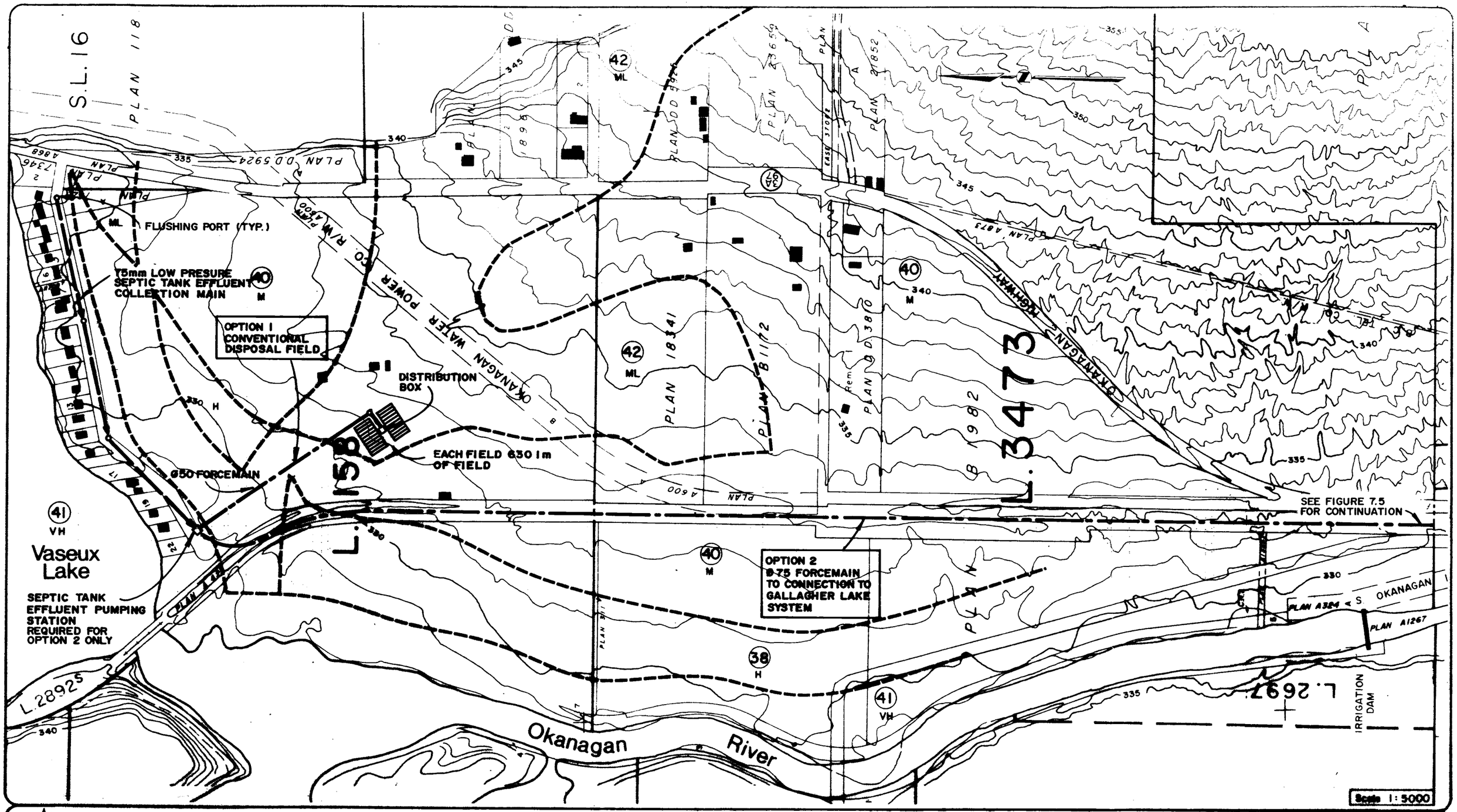
USER COSTS FOR DEBT RETIREMENT

Total System Capital Cost	$ 611,000
Total Equivalent Benefiting Parcels	140
User Costs - Formula 1	$ 335/year
Formula 2	$ 200/year
Formula 3	$ 35/year
Formula 4	$ 480/year

The immediate Tugulnuit lakeshore area does not have a significant potential for future development, therefore, the number of benefiting parcels will increase only marginally in the future. Service extensions into areas outside the lakeshore zone are possible to increase the number of benefiting parcels and thereby reduce the user costs given for capital debt retirement.

Other user costs including connection fees, user rates, etc. are summarized in the tabulation following. Based on the 1987 Sewer Rate Bylaw of the Village of Oliver, each single family residence would pay an annual user fee of $72.00 for collection, treatment, and disposal system operation and maintenance. At the time of connection to the sewer system, each homeowner would pay the Village of Oliver (assuming the Village of Oliver is the operating authority of the system) a connection fee of $300.00. Properties on the west side of Tugulnuit Lake which would be serviced by a low pressure main (see Figure 11.4) would also have costs for supply, installation and operation of pumps, and annual septic tank pump-out.

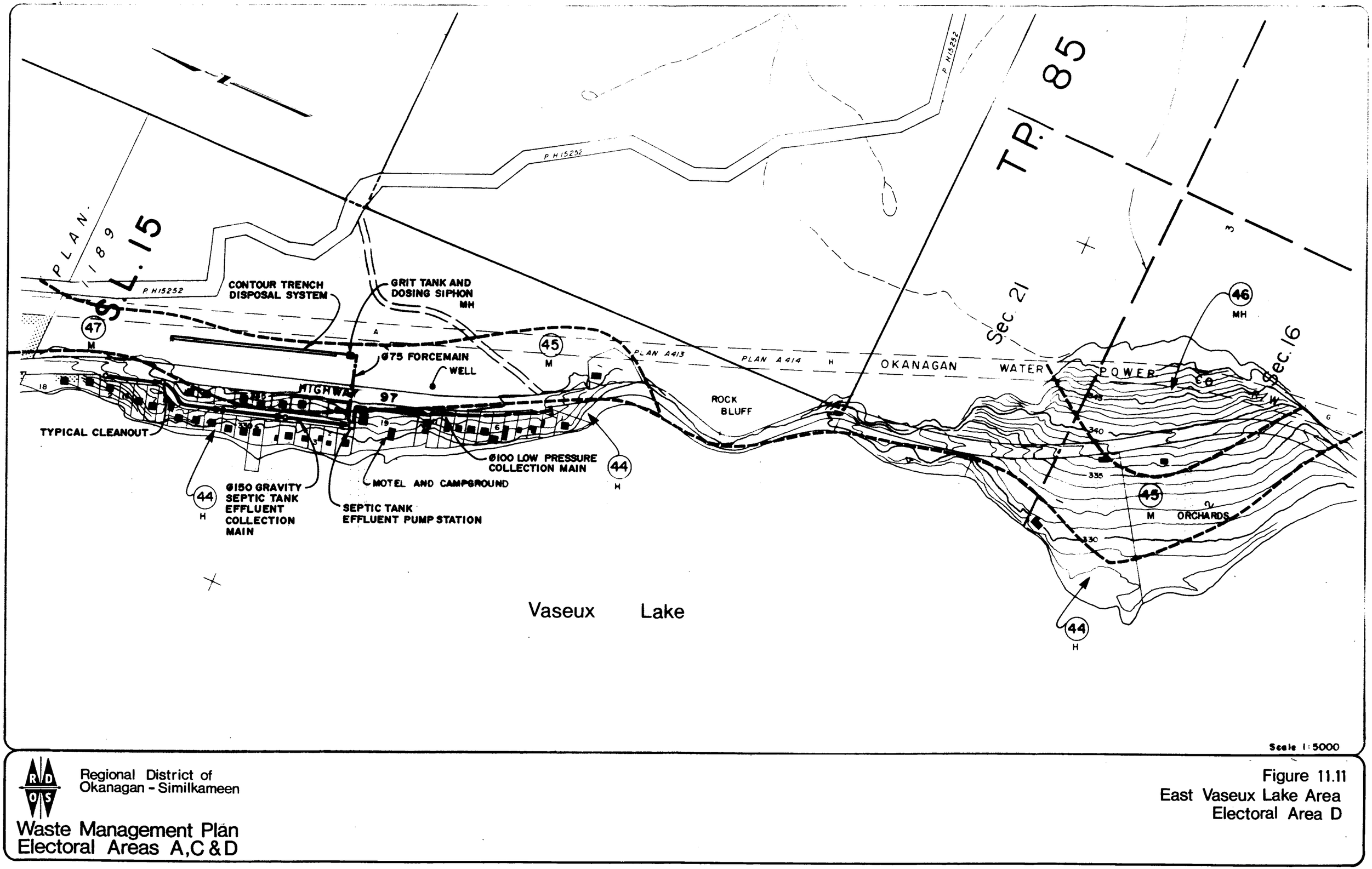

OSOYOOS
LAKE
STARLITE
LIFT STATION
HIGHWAY
FORCEMAIN
TO WEST OSOYOOS
HARBOUR KEYS
LIFT STATION
LIFT STATION
LIFT STATION
CALANA BAY
MHA
CONNECTION POINT FROM SOUTH EAST SECTOR ELECTORAL AREA
D. 41
Regional District of Okanagan - Similkameen
EAST OSOYOOS SEWAGE COLLECTION SYSTEM
SCALE 1:6000
Figure 11.9



Regional District of Okanagan - Similkameen

Waste Management Plan
Electoral Areas A, C & D

Figure 11.10
South Vaseux Lake
Electoral Area C



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Regional District of Okanagan - Similkameen

Waste Management Plan
Electoral Areas A,C & D

Figure 11.11
East Vaseux Lake Area
Electoral Area D

ANNUAL USER AND HOMEOWNER COSTS

At Time of Connection				Annual Costs			
Service Type	Connection Fee	Ind. Pump	Total	User Fee	S.T. Pump-Out	Pump O & M	Total
Gravity Serv. (approx. 100 lots)	$ 300	0	$ 300	$ 72	-	-	$ 72
Pressure Serv (approx. 25 lots)	$ 300	$ 800	$1100	$ 72	$ 30	$ 60	$162

Total costs associated with the pressure services will be significantly greater than the gravity services; $800 more at time of connection and $90.00 more annually. As described in Section 11.1.4, the operating authority, in the final analysis may decide to provide pumps for low pressure services as part of the system capital cost and implement a lower pressure connection fee to reduce the cost differential.

11.2.5 Summary

Within Tugulnuit Lake Sector located adjacent and north of the Village of Oliver, lakeshore development has been identified as a priority area for service by an alternative sewerage system. Septic tanks and tile field systems servicing residences and commercial development along the Tugulnuit lakeshore are sited in Very High and High phosphorus transmission areas and contribute an estimated 197.5 kg/year of phosphorus to the Lake. Potential adverse impact of septic tank and tile field systems on individual and community water supply wells in the area is also a concern.

A sewerage system is proposed which would service the lakeshore area of Tugulnuit Lake. The system illustrated conceptually in Figure 11.4 includes gravity collection mains and lift stations at both the north and south ends of the Lake. Development on the west side of the Lake is proposed to be serviced by a low pressure collection main requiring each homeowner to install pumping facilities for septic tank effluent. Wastewater is proposed to be collected to a lift station at the south end of Tugulnuit Lake and pumped to the Village of Oliver sewerage system. Connection alternatives via Park Drive and via McPherson Drive were evaluated with the McPherson Drive option preferred because of lower capital costs.

The Park Drive alignment may warrant further consideration if sewer extensions to other areas in the Tugulnuit Lake Sector are also constructed. Sewer extensions to service development in the Tugulnuit Lake area, but not in the immediate vicinity of the Lake, do not realize significant reductions in phosphorus loadings.

The sewerage system proposed for the Tugulnuit lakeshore does not include residential and commercial development on the Osoyoos Indian Reserve sited on Very High and High phosphorus transmission areas. Ideally, the proposed lakeshore sewerage system should service development at the south end of the Lake on the Indian Reserve. Discussions with the Osoyoos Indian Band Council about the general objectives of the Waste Management Plan and the conceptual plan to provide a sewerage system on the Tugulnuit lakeshore are recommended. The Band should be encouraged to consider participating in the sewerage system with the objective of servicing lakeshore development on Reserve lands. Jurisdictional and cost sharing arrangements will have to be addressed at some point in the discussions with the Band.

The Tugulnuit lakeshore sewerage system, as proposed, would service a total population approaching 250 and recreation related commercial development. Overall project costs are estimated to be $611,000, which includes a $140,000 allowance for capacity improvements at the Oliver sewage treatment plant. Additional evaluation is required to

confirm the validity of the $140,000 allowance for improvements to the Oliver treatment and disposal systems.

The proposed sewerage system results decreases the phosphorus loadings in the Tugulnuit Lake Sector from 277.4 kg/year to 79.9 kg/year, a reduction of 197.5 kg/year. Although the sewerage system, as proposed, only services 23% of the population in the Tugulnuit Lake Sector, the phosphorus loading reduction achieved approaches 72% of the total for the sector.

11.3 Sawmill Road Area - Electoral Area C

11.3.1 Alternative System Objectives

The Sawmill Road sector is a rural residential area south of the Village of Oliver paralleling the Okanagan River and is illustrated in Figures 11.5 and 11.6. From the boundary of the Village of Oliver, the distance to the southern end of the Sawmill Road sector is about 3.0 km. Development in the Sawmill Road Area is predominantly small holding rural and low density residential. The largest concentration of housing development is located at the southern end of the sector.

The Stage One Report (Section 4.2.1) summarizes observations of the Ministry of Health with respect to the operation of individual septic tank systems in the Sawmill Road Area. Although soils in the area are fine grained (percolation rates in the 10 to 15 minutes per 25 mm range), disposal systems generally function satisfactorily. All homes in the area derive water supplies from individual wells which average 7 metres in depth. Adequate separation distances between wells and disposal fields may be a concern at the north and south ends of the Sawmill Road Area where parcel sizes are as small as 1300 m^2 (0.33ac).

Ministry of Environment Soil Suitability for Septic Tank Effluent Absorption Mapping (2) classifies the Sawmill Road Area between moderate and low suitability. Areas fronting on the old CP Railway Right of Way (see Figures 11.5 and 11.6) are generally 60% moderate and 40% low septic tank feasibility classifications. Land adjacent to the Okanagan River Flood Control dyke generally has a low septic tank feasibility rating. On the basis of the Ministry of Environment mapping, the Sawmill Road Area is certainly not ideal for septic tank and disposal systems with high groundwater conditions being a major constraint.

Section 4.2.1.2 of the Stage One Report derives phosphorus loading estimates for the Sawmill Road Area. Phosphorus transmission ratings

in the Sawmill Road Area range between Moderate and Very High. Overall individual systems in the Sawmill Road Area have an average phosphorus removal efficiency of 52%. The total phosphorus loading from the Sawmill Road sector approaches 190.7 kg/year.

The principal objective of a community sewer system in the Sawmill Road area is the reduction of phosphorus loadings. Provision of a community sewer system in the Sawmill Road Area would achieve a phosphorus loading reduction from 190.3 kg/year to 47.0 kg/year, a reduction of 143.7 kg/year. The sewerage system would serve a population of approximately 210 in the Sawmill Road sector.

The Stage One Report, Section 7.1, provides an assessment of alternative sewer systems for the Sawmill Road Area. Options evaluated included a connection to the Village of Oliver system and a separate, community ground disposal system in orchard areas to the west. A system involving a low pressure collection system with a connection to the Village of Oliver sewer system had an estimated capital cost one half of the other option, and is therefore preferred.

11.3.2 Alternative System Description

Figures 11.5 and 11.6 illustrate, in conceptual detail, a low pressure sewerage system proposal which would service the Sawmill Road Area. The area is ideally suited to a low pressure collection system for the following reasons:

- high groundwater table conditions make conventional gravity alternatives impractical and costly.
- all houses in the Sawmill Road Area are lower in elevation as compared to the connection point with the Oliver sewer system, therefore, individual septic tank pumps will operate with positive pressure.
- the Sawmill Road Area is essentially flat, therefore, head will not be a constraint affecting the operation of septic tank effluent pumps.

The primary component of the sewer system in the Sawmill Road Area is a low pressure collection main paralleling the old CP Railway approximately 2.5 km in length extending south from the Village of Oliver boundary. Pressure connections would be provided directly to adjacent homes from this main. Figures 11.5 and 11.6 also illustrate pressure collection laterals which service homes separated from the main collector adjacent to the CP Railway Right of Way.

All homes serviced by the proposed collection system would be required to maintain their septic tanks in service and install chambers and pumps at the septic tank outlet. Homeowners will have to pump out their septic tanks on a regular basis (every two to three years) to reduce the possibility of solids plugging the effluent pumps.

11.3.3 Capital Cost Estimate

A capital cost estimate for the proposed low pressure sewerage system in the Sawmill Road Area is presented in Table 11.8. The system capital cost estimate is $250,000, which is $34,000 lower than preliminary estimates given in the Stage One Report. The difference in cost is largely the result of a re-evaluation of road restoration requirements. With the low pressure system, mains need only be buried to a depth of 1.2 m which reduces the impact on existing paved surfaces.

TABLE 11.8

SAWMILL ROAD AREA COLLECTION SYSTEM

CAPITAL COST ESTIMATE

Item	Description	Estimated Cost
1.	Connection to Village of Oliver System	$ 6,000
2.	Ø75 and Ø100 Pressure Collection Mains 3250m	144,000
3.	Fitting and Flushing Assemblies	7,000
4.	Pressure Services - approx. 75 req'd.	23,000
5.	Road Restoration	20,000
	Subtotal	**$ 200,000**
	Contingencies & Engineering (allow 25%)	**50,000**
	Collection Total	**$ 250,000**
	Allowance for Capacity Improvements	
	Village of Oliver Treatment and Disposal Systems	$ 110,000
	Total Project	**$ 360,000**

Estimated Phosphorus Loading Reduction	143.7 kg/yr.
Capital Cost per kg/year	$ 2,500
Approximate Service Population	207

The capital cost estimate presented in Table 11.8 includes an allowance of $110,000 for capacity improvements to the Village of Oliver sewage treatment and disposal systems. Adequate reserve capacity is available in the treatment plant for the Sawmill Road Area, however, the reserve capacity may be committed to other development within Village boundaries by the time the Sawmill Road Area is serviced. A provision for capacity improvements at the Oliver treatment plant for the Sawmill Road Area makes the capital and user cost estimates consistent with similar data for the Tugulnuit Lake area.

11.3.4 User Cost Calculations

Concerns were expressed during agency workshop and public meetings that the provisions of a community sewerage system in the Sawmill Road Area would result in development proposals. The present rural residential and agricultural character of the area could be negatively impacted by subdivision proposals made feasible by the community sewerage system.

The Oliver Area Community Plan (3) specifies little or no population growth for the Sawmill Road Area to 1991. The majority of the Sawmill Road Area is within the Agricultural Land Reserve which is a constraint affecting higher density residential land use in the area. the Community Plan also shows the Sawmill road Area as within the Okanagan River Floodplain which represents a significant restriction on possible low density single family residential development in the area.

From the point of view of economics of a community sewer system for the Sawmill Road Area, additional development improves the overall financial feasibility of the system. Additional development in the area would increase the number of benefiting parcels and thereby reduce capital cost amortization on a per parcel basis. A preliminary analysis of lot sizes in the Sawmill Road Area has been undertaken to address the potential of additional development, both in terms of negatively impacting the present rural character and the resultant user costs for the sewerage system. This parcel size analysis is summarized as follows for the Sawmill Road Area:

- 50 parcels up to 0.39 ha (1.0 acre)
- 13 parcels 0.40 ha (1.0 acre) to 1.0 ha (2.45 ac)
- 16 parcels 1.0 ha (2.45 acres) to 2.5 ha (6.1 ac)

Unless the objectives of the Community Plan were significantly revised to include low density residential development (parcel sizes of approx. 0.1 ha), the 50 existing lots ranging in size up to 0.39 ha

are not considered subdividable. Twenty-nine (29) parcels in the area which are 0.40 ha or greater in size may be subdividable in compliance with the Regional District small holding land use designation (one unit per 0.4 ha of gross area). The Regional District will have to evaluate whether a community sewer system will increase the development potential of the area for small holding residential uses. The parcel size analysis clearly indicates a relatively large number of parcels in the area which are potentially subdividable. The A.L.R. and floodplain boundaries remain as constraints to small holding development in the Sawmill Road Area.

User cost calculations for the Sawmill Road Area have been undertaken assuming no growth and Community Plan revisions to permit small holding residential uses. If the land use designations for the Sawmill Road Area were revised to include small holding residential throughout the sector, adequate developable land area is available for a minimum of 40 additional lots. A small holding residential land use designation for the area therefore, could increase the number of parcels serviced by the sewer system from the present 79 to 119 parcels. User cost calculations for both 79 and 119 benefiting parcels are summarized as follows:

ANNUAL COSTS FOR DEBT RETIREMENT

	No Growth	**Small Holding Development**
Total Benefiting Parcels	79	119
Total System Capital Cost	$ 360,000	$ 360,000
User Costs - Formula 1	$ 345	$ 230
Formula 2	$ 246	$ 163
Formula 3	$ 36	$ 23
Formula 4	$ 500	$ 336

The user cost analysis indicates a 33% reduction in per parcel costs for debt retirement if small holding residential development is permitted in the area. The 33% reduction has a significant impact on end user costs under Formula 1, (31% senior government assistance) and Formula 4, (0% senior government assistance). Depending on the level

of assistance forthcoming from senior government agencies, whether additional development is permitted in the Sawmill Road Area becomes a significant factor in the sewerage system feasibility.

In addition to debt retirement related costs, each homeowner in the Sawmill Road area will have to supply, install and operate an individual pump and pay user and connection fees to the operating authority. Assuming the operating authority is the Village of Oliver, these costs are summarized as follows:

ANNUAL USER AND HOMEOWNER COSTS

(1) At Time of Connection:	
Connection Fee	$ 300.00
Individual Pump	$ 800.00
At Time of Connection Total	**$1100.00**
(2) Annual Costs:	
User Fees	$ 72.00
Septic Tank Pump-out	$ 30.00
Pump Operation & Maintenance	$ 60.00
Annual Total	**$ 162.00**

The above does not include septic tank replacement, should it be necessary, nor construction costs of the service line on private property from the house or septic tank to the property line.

Total costs for the sewerage system in the Sawmill Road area are derived by adding parcel taxes from debt retirement, depending on assistance formula accepted and the annual user/homeowner costs. If, for example, the assistance factor is 25%, (Formula 1), the total costs for sewerage service to a homeowner in the Sawmill Road area would be:

Annual Parcel Tax	$ 345.00
Annual User Fee	$ 72.00
Pump & Septic Tank O & M	$ 90.00
Annual Total	**$ 505.00**
Connection Fee	$ 300.00
Individual Pump	$ 800.00
At Connection Total	**$1100.00**

11.3.5 Summary

The Sawmill Road Area, located adjacent to the Okanagan River south of the Village of Oliver, has been identified as a priority area for service by a community sewer system. The entire Sawmill Road Area has been mapped by the Ministry of Environment as Very High and High phosphorus transmission zones. Septic tank and tile field systems servicing the estimated population of 396 in the area contribute an estimated 190.7 kg of phosphorus per year to the Okanagan River. On an overall sector basis, existing septic tank and disposal field systems achieve a 52% phosphorus removal efficiency.

A low pressure septic tank effluent collection system is proposed which would service a population of 207 in the Sawmill Road Area. The proposed sewer system would connect to the Village of Oliver system at the southern boundary of the Village as illustrated in Figures 11.5 and 11.6. The provision of a community sewer system in the Sawmill Road Area will result in an estimated phosphorus loading reduction of 143.7 kg/year and will reduce potential concerns relating to possible contamination of individual wells in the area by on-site sewage disposal systems.

About 33% of the land parcels in the Sawmill Road Area are over 0.4 ha (1 acre) in size and are potentially subdividable, assuming A.L.R. and floodplain constraints can be addressed. The construction of a community sewer system in the area may increase the potential for development in the area. Concerns were expressed at agency workshop and public meetings about the sewer system negatively impacting the rural character of the area. The financial feasibility of the sewer system is significantly improved if additional development is permitted in the Sawmill Road Area.

The implications of the community sewer system on land use and increased residential development in the Sawmill Road Area will have to be evaluated by the Regional District as a component of future detailed sewerage system feasibility assessment studies.

11.4 Southeast Osoyoos Area - Electoral Area A

11.4.1 Alternative System Objectives

The southeast sector of the Osoyoos Rural Area includes east lakeshore areas extending south from the Town of Osoyoos municipal boundary to the U.S. border. Figures 11.7 and 11.8 illustrate the southeast sector. Tourist commercial facilities principally comprising campsites are the dominant land use in the sector. Six large campgrounds in the sector provide a total of 652 campsites which, at full occupancy, represents a seasonal population approaching 2300.

Concerns of the Ministry of Health that Osoyoos Lake water quality may be adversely impacted by septic tank and tile field systems are addressed in Section 4.1.1 of the Stage One Report. The Ministry samples Osoyoos Lake at public beaches in the southeast sector on a regular basis during the summer months. Data compiled to date indicates that fecal coliform concentrations are less than the maximum standard of 200 MPN per 100 mls for recreational purposes.

Lakeshore areas in the Osoyoos southeast sector have Very High, High and Moderately High phosphorus transmission classifications. In general, disposal fields which service campgrounds in the area are located in agricultural areas to the east of the immediate lakeshore. As a result, disposal systems for campground facilities are generally located in areas having Moderately Low and Moderate phosphorus transmission classifications.

The total phosphorus loading for the Osoyoos southeast sector is estimated to be 100.4 kg/year with commercial developments accounting for about 33% of the total. On an overall basis, existing septic tank and tile field systems achieve an average phosphorus removal efficiency of 88%.

The Stage One Report, Section 6.2, describes a community sewer system which would service, as an initial priority, lakeshore residential and commercial development. The community system would eliminate septic tank and disposal systems in the immediate lakeshore area and thereby reduce the possibility of bacterial contamination of public beaches. The community sewerage system will also result in a reduction of the estimated phosphorus loading from 100.4 kg/year to 24.0 kg/year, a reduction of 76.4 kg/year.

The Stage One Report concluded that a connection to the Town of Osoyoos sewerage system was the preferred alternative for servicing the southeast sector area. Hydraulic capacity in the East Osoyoos sewage collection system was identified as a constraint affecting the feasibility of the proposed connection to the Osoyoos sewerage system. Accordingly, a pump and haul operation was proposed in the Stage One Report to overcome suspected capacity limitations in the existing collection system. Serving the southeast sector area by a connection to the East Osoyoos sewerage system is proposed to minimize initial phase capital costs. In the long range future, a trunk sewer crossing Haynes Point connecting to existing trunk sewers in West Osoyoos is proposed to avoid capacity limitations in the existing sewerage system in East Osoyoos.

11.4.2 Alternative System Description

Figures 11.7 and 11.8 conceptually illustrate the proposed community sewerage system for the southeast sector of Electoral Area A. As shown on the figures, the initial priority of the sewerage system is servicing of the immediate lakeshore area. From the southern boundary of the Town of Osoyoos, a 1 kilometre section of lakeshore to 36th Avenue would be serviced by a conventional gravity collection system. Provisions are made at 36th Avenue for a future extension to the east to service about 90 homes on the East Bench in the vicinity of 25th and 37th Streets. South of 36th Avenue, a low pressure collection main is illustrated in Figure 11.8 which would collect septic tank

effluent from campgrounds and residences located in the immediate vicinity of the lakeshore.

All wastewater from the southeast sector area would be collected to a wastewater pumping station located approximately 300 m south of the Osoyoos municipal boundary. Figure 11.7 illustrates forcemain connections to East Osoyoos (defined as Option #1) and a forcemain connection via Haynes Point to West Osoyoos (defined as Option #2). The Stage One Report described hydraulic capacity limitations in the East Osoyoos sewage collection system and outlined a pump and haul strategy for peak summer sewage flows from the southeast sector.

The Stage One Report (Section 6.2) presented a preliminary capital cost estimate for the East Osoyoos connection of $402,000 compared to $615,000 for the connection to West Osoyoos. The capital cost savings associated with the connection in East Osoyoos were offset to a significant degree by increased annual costs for the pump and haul operation for peak summer flows. The hydraulic capacity available in the sewage collection system in East Osoyoos is the key factor in a final decision related to the connection option and resultant system capital costs.

To more accurately assess the capacity question of the East Osoyoos sewage collection system, a level survey to determine sewer main grades was undertaken in July 1988. This level of detail is somewhat beyond the normal scope of a Waste Management Plan, however, the available system capacity in the existing sewage collection system in East Osoyoos in large part determines the preferred servicing option for the Southeast Osoyoos area. On the basis of the on-site level survey, as-built data provided by the Town and sewage pumping station performance data, a reserve capacity analysis for the East Osoyoos sewage collection system has been completed.

Figure 11.9 illustrates the existing sewage collection system in East Osoyoos from the southeast corner of the municipality where the

connection will be made from the southeast sector of the Rural Area, to West Osoyoos at the Highway 3 bridge crossing. Sewage flows from the southeast sector area would be added to the municipal system at a manhole designated as Manhole A. From Manhole A, wastewater would flow in 200 mm (8") sewer mains and be pumped by existing lift stations at Calana Bay and Harbour Keys, ultimately entering the Starlite Lift Station. This station pumps all collected wastewater from East Osoyoos to West Osoyoos.

The Capacity Analysis for the existing East Osoyoos sewage collection system is summarized as follows:

Component	Hydraulic Capacity	Est. Ex. Peak Flow	Reserve Peak Flow Capacity
Gravity Mains to Calana L.S.	26 L/sec.	2.5 L/sec.	23.5 L/sec.
Calana Bay L.S.	10 L/sec.	2.5 L/sec.	7.5 L/sec.
Gravity Mains to Harbour Keys L.S.	22 L/sec.	6.0 L/sec.	18.0 L/sec.
Harbour Keys L.S.	8 L/sec.	6.0 L/sec.	2.0 L/sec.
Gravity Mains to Starlite L.S.	21 L/sec.	8.4 L/sec.	12.6 L/sec.
Starlite L.S.	26 L/sec.	30.0 L/sec.	0

The reserve capacity analysis for the East Osoyoos sewage collection system illustrates that the three existing lift stations are the capacity limiting components. Based on a theoretical calculation of present peak sewage flows in East Osoyoos, there is no reserve capacity available in the Starlite Lift Station.

Estimated peak sewage flows for the southeast sector area of Electoral Area A, proposed to be serviced by the sewage collection system illustrated in Figures 11.7 and 11.8, are summarized as follows:

Residential Population	- 100	- 45 m^3/day
Campgrounds	- 652 sites	- 296 m^3/day
	Total Average Flow	- 341 m^3/day
Estimated Peak Flow	- (peak factor 4.0)	- 16 L/sec.

The East Osoyoos sewage collection system does not have adequate capacity, limited by the available capacity of the three existing lift stations, to accommodate a peak flow of 16 L/sec. from the southeast sector. Adequate hydraulic capacity does, however, appear to be available in gravity sewers in East Osoyoos for peak flows from the rural area.

To partially resolve the capacity limitations, upgrading of the pumps in the three stations in East Osoyoos is proposed. By installing higher capacity pumps in the three stations, reserve peak flow capacity approaching 12 L/sec. can be provided. These improvements, combined with some equalization storage at the proposed lift station in the southeast sector, would provide adequate capacity for service extensions into the rural area and eliminate the requirement for the pump and haul operation described in the Stage One Report.

As summarized in Section 9 of the Stage One Report, the connection to the Town of Osoyoos sewerage system in East Osoyoos is proposed for servicing lakeshore areas in the southeast sector. As flows from the rural area increase and service extensions are evaluated for the East Bench subdivision area north of 36th Avenue, the connection point should be relocated to West Osoyoos by the forcemain construction across Haynes Point.

11.4.3 Capital Cost Estimate

Table 11.9 presents a capital cost estimate for the proposed southeast sector area sewerage system with a connection to the Town of Osoyoos in East Osoyoos. As compared to preliminary capital cost estimates presented in the Stage One Report (Section 6.2), the estimate has been expanded to include pumping station modifications within the Town of Osoyoos.

TABLE 11.9

SOUTHEAST SECTOR SEWERAGE SYSTEM AND EAST OSOYOOS CONNECTION

CAPITAL COST ESTIMATE

ITEM	DESCRIPTION		ESTIMATED COST
1.	Ø250 Gravity Sewer	950 m	$ 62,000
2.	Manholes	10 req'd.	18,000
3.	Sewer Services		18,000
4.	Ø100 Low Pressure Collector	400 m	20,000
5.	Ø150 Low Pressure Collector	1400 m	84,000
6.	Pressure Services		16,000
7.	Pressure System Appurtenances		6,000
8.	Road Restoration		32,000
9.	Wastewater Pumping Station & Storage Tanks		48,000
10.	Forcemain to Town System	450 m	18,000
11.	Lift Stations Upgrading - Town of Osoyoos		40,000
	Subtotal		**$ 362,000**
	Contingencies & Engineering (allow 25%)		**90,000**
	TOTAL		**$ 452,000**

Estimated Phosphorus Loading Reduction - 76.0 kg/year

Capital Cost per kg/year = $5,950

Approximate Service Population - 93 and 652 campsites

The estimate presented in Table 11.9 includes the complete collection system servicing the Osoyoos lakeshore in the southeast sector as illustrated in Figures 11.7 and 11.8. The system construction could be phased in a north to south direction beginning with the connection to the Town of Osoyoos system. The benefits and incremental costs associated with phasing could be addressed by a more detailed system feasibility assessment.

11.4.4 User Cost Calculations

Preliminary user cost calculations for the southeast sector sewerage system were presented in Section 6.2 of the Stage One Report. This user cost analysis recognized that the majority of benefiting parcels in the southeast sector were multi-acre lots but did not scale user costs relative to parcel size. The proposed southeast sector sewerage system will directly benefit approximately 47 lots or parcels in the area. Of the 47 parcels, 26 lots are approximately 0.4 ha in size or smaller and are not considered subdividable. Accordingly, user charges to these lots are based on a single benefiting unit.

The southeast sector also comprises 21 multi-acre or large parcels ranging in size from 0.6 ha to 7.2 ha. Present land use on these parcels include tourist commercial facilities and agriculture (orchards). All of the parcels in the multi-acre size group are presently within the boundaries of the A.L.R. If all such parcels were outside of the A.L.R., a scale of user fees could be established for these parcels based on area and subdivision potential. With the benefiting parcels within the A.L.R., this type of analysis is not appropriate and may increase applications for A.L.R. exclusions in the area.

User rate calculations for the proposed sewerage system in the southeast sector are further complicated by correspondence (4) from the Agricultural Land Commission indicating approval in principle for A.L.R. exclusions of multi-acre parcels currently being used as campgrounds. These exclusions, if formally approved, may have a significant impact on the development potential in the area, which in turn could increase the number of equivalent benefiting parcels in the area.

To illustrate an approximate range of net user costs for the proposed southeast sector sewerage system, the following assumptions have been made to calculate equivalent benefiting units:

- small lots; considered as one equivalent benefiting unit.
- multi-acre lots; considered as the equivalent of two benefiting units except campsites. Air photographs for the area suggest that a majority of orchards in the area have two dwelling units.
- multi-acre campsite parcels; computed as one equivalent benefiting unit for every 10 campsites or other seasonal occupancy unit.

On the basis of the above, user cost calculations for the southeast sector sewerage system are presented following:

Total Equivalent Benefiting Units	121
Total System Capital Cost	$452,000
User Costs* - Formula 1	$ 286
Formula 2	$ 210
Formula 3	$ 30
Formula 4	$ 415

* For Capital Cost Debt Retirement

The above user cost estimates do not include a monthly user fee for system operation and maintenance and a system connection fee. User costs for system operation, maintenance, treatment and disposal are anticipated to be about $90 per year based on present rate charges of the Town of Osoyoos.

As compared to preliminary user cost calculations presented in Section 6.2 of the Stage One Report, the user charges derived preceding are approximately one third of previous estimates. The reduction is attributable to the calculation of benefiting equivalent units as compared to a simple parcel count, and the elimination of pump and haul as a component of user costs.

11.4.5 Summary

An assessment of alternative sewerage system options for the southeast sector of the Osoyoos Rural Electoral Area A concludes that the lakeshore zone be given priority for alternative system service. The proposed system would service a 2.2 km length of the east side of Osoyoos Lake by a combination conventional gravity and low pressure septic tank effluent collection system. Collected wastewater is proposed to be pumped to a connection to the Town of Osoyoos sewerage system in East Osoyoos. Capacity limitations in the existing East Osoyoos collection system are proposed to be resolved by lift station upgrading and the provision of equalization storage at the proposed lift station in the southeast sector. In the future, a forcemain connection to West Osoyoos is described crossing Haynes Point which increases the service capacity of the system to include all development in the southeast sector.

The proposed southeast sector sewer system will resolve potential concerns relating to bacteria contamination of public beaches in the area. The system will service a permanent population of about 100 and all major tourist related commercial development in the area. Phosphorus loading reductions approaching 76.4 kg/year are anticipated to be achieved with construction of the sewerage system. On an overall basis, phosphorus loadings for the sector will be reduced by 76%.

The estimated construction cost for the proposed southeast sector sewerage system is $452,000 including improvements to lift stations in the Town of Osoyoos. Depending on the level of financial assistance forthcoming from senior government, net user costs for capital debt retirement are estimated to range between $30 and $415 per equivalent benefiting unit.

Correspondence from the Agricultural Land Commission suggests approval in principle of some A.L.R. exclusions in the sector. These A.L.R.

exclusions may significantly impact the preliminary user cost calculations by increasing the potential number of benefiting units of the system. Refinements of the user cost calculations are recommended once the A.L.R. boundary adjustments and land use objectives are finalized.

11.5 South Vaseux Lake Area - Electoral Area C

11.5.1 Alternative System Objectives

The South Vaseux Lake sector comprises 19 single family lots and a 12 unit motel located at the south end of Vaseux Lake as illustrated in Figure 11.10. The South Vaseux Lake Area has a total permanent population of about 47 and is the smallest of the 10 areas considered in the Waste Management Plan for an alternative sewerage system.

Existing lots at the south end of Vaseux Lake utilize on-site septic tank and tile fields for wastewater disposal and individual wells for water supply. According to property owners attending public information meetings, individual wells are shallow and are generally "dug" as compared to construction by drilling. Lot areas average 1080 m^2 which is about 64% of the present minimum Regional District lot area standard of 1672 m^2 for on-site water supply and wastewater disposal systems. The size of existing lots at the south end of Vaseux Lake is a concern to the Ministry of Health from the point of view of potential groundwater contamination and available area to reconstruct failed or malfunctioning wastewater systems.

All existing development at the south end of Vaseux Lake is located within an area having a Very High phosphorus transmission classification. Within this area, existing septic tank and tile field systems achieve approximately 12% phosphorus removal. The total phosphorus loading from the residential area at the south end of Vaseux Lake is estimated to be about 44 kg/year.

The Gallagher-Vaseux Lake Settlement Plan indicates no expansion of the existing residential area at the south end of Vaseux Lake. Population growth in the area would, therefore, be limited to house construction on three vacant lots within the existing "subdivided" area. All lands to the south of the existing lots at the south end of Vaseux Lake are within the Agricultural Land Reserve which is a constraint to population growth in the area.

11.6.5 Summary

The East Vaseux Lake sector comprises 36 homes, 4 vacant single family lots, a campground and motel. The overall phosphorus removal efficiency of individual septic tank and disposal systems is estimated to average 47% with the majority of homes located in an area having a High phosphorus transmission classification.

A community sewerage system is proposed for the East Vaseux Lake Area to reduce phosphorus loadings from individual septic tank and tile field systems and resolve potential concerns about inadequate lot area for replacement or repaired on-site systems. The community system is conceptually designed for the present population, recognizing that the Community Plan foresees no population growth for the area.

Topographic constraints in all directions from the East Vaseux Lake Area restrict potentially feasible wastewater disposal alternatives. Adequate land area is available east of Highway 97 for a community disposal system utilizing a contour trench. Wastewater would be collected from within the community by a combination low pressure and gravity septic tank effluent collection system.

The sewerage system, as proposed, would result in effluent disposal to ground in an area having a Moderate phosphorus transmission classification. The average phosphorus removal efficiencies of present individual septic tank and tile field systems estimated to be 47% would b increased to 77.5% with the proposed community system. The increase of phosphorus removal would result in a loading reduction to Vaseux Lake from 70 kg/year to 30.6 kg/year for a decrease of 39.4 kg/year. The overall estimated capital cost of the system is $211,000 which equates to $5300 per kg/year of reduced phosphorus loading. Additional evaluation of phosphorus sources and water quality parameters in Vaseux Lake is required to determine whether the phosphorus loading reduction will be reflected in an improvement of the water quality in Vaseux Lake.

An alternative community sewerage system has been considered for the south end of Vaseux Lake as a means to achieve phosphorus removal efficiencies consistent with the 80% minimum objectives described in Section 2.0 of the Stage One Report. A community sewer system would significantly increase phosphorus removal efficiencies from the present 12% average removal and resolve potential concerns of the Ministry of Health related to inadequate lot area for individual water and sewerage systems.

There is uncertainty that the reduction in phosphorus loading to Vaseux Lake that will be achieved with the construction of a community sewerage system will be reflected in an improvement of the water quality in Vaseux Lake. The generally shallow water characteristics of the Lake combined with extensive algae and other aquatic weed growth suggests that bottom sediments are a significant phosphorus source. Further study of the relationship between Vaseux Lake water quality and all phosphorus sources is suggested to confirm whether any definable benefit is to be achieved related to water quality by constructing a community sewerage system.

The limited potential for future or additional population growth is another factor which should be considered in a decision to construct a sewerage system for the south end of Vaseux Lake. The service population will be about 50. Unless the Agricultural Reserve boundary is modified and the Settlement Plan for the area is significantly amended, the population benefiting from the sewerage system is anticipated to remain at 50.

11.5.2 Description of Community Sewerage System Alternatives

Section 7.4 of the Stage One Report described two sewerage system alternatives for the South Vaseux Lake Area;-

Option 1 - A Septic Tank Effluent Collection System and a Community Disposal Field.

Option 2 - A Septic Tank Effluent Collection System with Pumping of Wastewater to the Proposed System for the Gallagher Lake Area.

Both alternatives are conceptually illustrated in Figure 11.10.

The community disposal field alternative involves construction of a conventional tile field to the south in an area having a Moderately Low phosphorus transmission classification. The sewerage system, therefore, relocates wastewater from an area having a 12% phosphorus removal classification to an area having a 90% removal. A net reduction of phosphorus loading of 39.2 kg/year would be achieved with the community disposal field alternative.

The second community sewerage system option would involve pumping of wastewater collected at the south end of Vaseux Lake to disposal in a treatment and disposal system for the Gallagher Lake Area. Phosphorus removal efficiencies achieved with a connection to the Gallagher Lake system will be greater than 90%. The feasibility of this option depends on the construction of the Gallagher Lake system. Clearly, the South Vaseux Lake sewerage system would have to be constructed at the same time or after the Gallagher Lake sewerage system.

A preliminary comparison of the alternatives presented in the Stage One Report did not conclude with a preference for either of the alternatives. The community disposal field alternative had a lower capital cost but offered no capacity for future expansion and represented a potential adverse impact on adjacent agricultural land use. Combining the South Vaseux Lake Area with the Gallagher Lake system offered potential operation, maintenance and administrative efficiencies by providing a single sewerage system. The Stage One Report concluded that additional comparative evaluation of the two alternatives was warranted.

11.5.3 Comparative Evaluation of Alternatives

A comparative evaluation of the two community sewerage system alternatives for the south end of Vaseux Lake is presented in paragraphs following. The comparison considers cost criteria and other more general capacity and future expansion factors.

(1) Capital Cost

The collection system is the same associated with both the treatment and disposal options and comprises a low pressure septic tank effluent collection system. For the community disposal field option, individual pumps necessary to be installed by each property owner would pump directly to the disposal field. The static lift to the general vicinity of the Gallagher Lake system would exceed the lift capabilities of single family unit sized pumps, therefore requiring a septic tank effluent lift station to be located at the west end of the access road at the south end of Vaseux Lake as shown in Figure 11.10.

Comparative capital cost estimates for the two treatment and disposal alternatives are presented in Table 11.10.

TABLE 11.10

CAPITAL COST ESTIMATES

SOUTH VASEUX LAKE - TREATMENT AND DISPOSAL ALTERNATIVES

Item	Description		Est. Cost
(A)	**Community Disposal Field Option**		
1.	Low Pressure Collection Main - Ø75 mm	850 m	$ 34,000
2.	Service to Property Line - Ø50 mm	100 m	3,000
3.	Line Flushing Fittings	4	2,000
4.	Road Restoration		5,000
5.	Forcemain to Disposal Field	300 m	6,000
6.	Disposal Field	1640 m	32,000
7.	Solid Headers, Distrib. Box, etc.		8,000
	Subtotal		**$ 90,000**
	Contingencies and Engineering (allow 25%)		**23,000**
	Disposal Site Land Acquisition		**22,000**
	Total Estimated Project Cost		**$ 135,000**
(B)	**Connection to Gallagher Lake System**		
1.	Collection System (Items 1 to 4 from above)		$ 44,000
2.	Septic Tank Effluent Pump Station		25,000
3.	Forcemain to Gallagher Lake	2100 m	73,000
4.	Capital Contribution to Treatment-Disposal		30,000
	Subtotal		**$ 172,000**
	Contingencies and Engineering (allow 25%)		**43,000**
	Total		**$ 215,000**

The community disposal field alternative has an estimated capital cost some $80,000 lower than the connection to the Gallagher Lake sewerage system. The capital costs for the community disposal system option would increase by about $25,000 if the selected disposal site were relocated at a significantly higher elevation to the south and east of the general vicinity illustrated in Figure 11.10. A septic tank effluent collection system would, in this case, be required resulting in the $25,000 cost increase.

(2) Operating Costs

Overall operation, maintenance and administration costs for the South Vaseux-Gallagher Lake sewerage systems are anticipated to be minimized by a single sewerage system servicing both areas. The operation and maintenance costs for the Gallagher Lake system depend on the type of sewage treatment system selected. An annual operation and maintenance cost estimate for a treatment and disposal system at Gallagher Lake designed for a flow of 200 m^3/day is presented following:

Operation Labour	$ 10,000
Electrical Energy	5,000
Phosphorus Removal Chemicals	4,000
Monitoring	2,000
Miscellaneous Materials	4,000
Total Annual Cost	$ 25,000

The operational cost estimate would be applicable to low maintenance treatment systems including aerated lagoons, a rotating biological contactor and an oxidation ditch. Addition of a wastewater flow averaging 25 m^3/day would increase electrical energy and chemical purchase items of the cost estimate. These incremental costs are anticipated to be about $2500 per annum for an average flow of 25 m^3/day from the South Vaseux Area.

Operating costs for the community disposal system alternative are estimated to be $4500 per year. Components of the annual cost estimate include $1000 for labour, $1000 for performance monitoring, $500 for annual grit chamber pumpout and a $2000 allowance for a capital reserve fund for a replacement disposal field should it be necessary.

An operating cost saving of approximately $2000 per year is therefore anticipated with the connection to the Gallagher Lake system. The $2000 savings in operational costs would offset approximately $20,000 to $30,000 of the additional capital cost of the Gallagher Lake connection. Even considering operational cost savings, the connection to the Gallagher Lake system remains approximately $50,000 more expensive than the community disposal field option.

(3) Performance Factors

During agency workshop sessions, the concern that the proposed sewerage system may result in subdivision applications for the adjacent land within the A.L.R. was raised. The community disposal field alternative would be sized for the present development at the south end of Vaseux Lake, therefore, the sewerage would not enhance the development potential of the adjacent land within the A.L.R. Capacity provisions for additional development are relatively straightforward to make in the Gallagher Lake system, therefore, increased pressure for development within the A.L.R. could be a concern with the connection to the Gallagher Lake option. The approval of the Agricultural Land Commission will be required for the proposed community disposal field, however, the system will not require lands to be removed from the A.L.R. Land over the disposal field can be used for agricultural purposes, however, some uses such as livestock grazing may have to be discontinued. Hoof pressure from grazing livestock may result in compaction of the surficial soils over the disposal field and reduce aerobic conditions in the field. Aerobic conditions in the field are important for satisfactory long term performance.

The connection to the Gallagher Lake system results in an estimated phosphorus loading reduction of 42.0 kg/year compared to 39.2 kg/year for the community disposal system. The higher phosphorus loading reduction, approximately 2.8 kg/year, is not significant to justify higher capital costs of $80,000.

On the basis of the comparative evaluation presented herein, the community disposal field option is selected as the preferred alternative.

11.5.4 User Rate Calculation

A user rate calculation for the proposed low pressure collection and community disposal field systems to service the South Vaseux Lake Area is presented following.

USER COSTS FOR DEBT RETIREMENT

Estimated Capital Cost	-	$ 135,000
Total Benefiting Parcels	-	22
User Costs - Formula 1		$ 490
Formula 2		$ 220
Formula 3		$ 50
Formula 4		$ 705

In addition to the above costs for capital cost debt retirement, benefiting residents would pay a monthly user fee for system operation and maintenance. Total annual costs for operation, maintenance and capital reserve fund for field replacement are estimated to be $4500 per year which results in a user levy of $204.00/year. The user levy for operation and maintenance could be reduced to $115.00/year with deletion of the capital reserve fund for a replacement disposal field. Residents would have to be aware, in this case, of a significant increase in user charges should field replacement or major repairs be necessary.

Non debt retirement user related costs for the South Vaseux community sewerage system are summarized following:

ANNUAL USER AND HOMEOWNER COSTS

(1) At Time of Connection:

Connection Fee	$ 300.00
Individual Pumps	$ 800.00
At Time of Connection Total	**$1100.00**

(2) Annual Costs:

User Fees	$ 204.00
Septic Tank Pump-out	$ 30.00
Pump Operation and Maintenance	$ 60.00
Annual Total	**$ 294.00**

A connection fee of $300 is, at this point, an estimate only recognizing that the system is completely new. A more detailed analysis at predesign would address connection fees and user fees with consideration of a reserve fund for system replacement. Homeowners would also have an equivalent annual cost of $90.00 for septic tank pump-out (assumed $90.00 every third year or $30.00 per year) and an average of $60.00 for pump operation and maintenance.

11.5.5 Summary

Community sewerage system alternatives have been considered for service to approximately 19 single family lots and a 12 unit motel at the south end of Vaseux Lake. The development is located in an area having a Very High transmission classification and, as a result, existing septic tank and tile field systems achieve about 12% phosphorus removal. All existing lots average about 64% of the 1672 m^2 minimum lot size for individual water and sewer systems, therefore, there is concern related to potential groundwater contamination and adequate area for disposal system replacement.

Community sewerage system options evaluated included a community disposal field on lands in the A.L.R. south of Vaseux Lake and a connection to a community sewer system that may be constructed for service to the Gallagher Lake area. Capital costs, operating costs and other performance factors of the two options were evaluated with selection of the community disposal system as the preferred alternative.

A low pressure septic tank effluent collection system with wastewater disposal to a community disposal system has an estimated capital cost of $135,000. The sewerage system, as proposed, will result in a phosphorus loading reduction of 39.2 kg/year. The system capital cost, therefore, equates to $3440 per kg/year of reduced loading. Whether a phosphorus loading reduction to Vaseux Lake of 39 kg/year will be reflected in an improvement of the lake water quality requires evaluation.

The community sewer system will service a total population of about 50 located at the south end of Vaseux Lake. No future development is described in the Community Plan for the area, therefore, no provisions for population growth have been made in the system conceptual design. The small benefiting population may be a consideration in determining the priority for the South Vaseux Lake sewerage system.

11.6 East Vaseux Lake Area - Electoral Area D

11.6.1 Alternative System Objectives

The East Vaseux Lake Area is a relatively small concentration of development on the east side of Vaseux Lake as shown in Figure 11.11. Existing development in the area comprises 36 homes, 4 vacant lots, a campground and motel. The area is serviced by a community water system with the water being derived from a well on the east side of Highway #97.

The objectives for a community sewerage system for the East Vaseux Lake Area are essentially the same as described in Section 11.5 for the South Vaseux Lake Area, namely:

- reduction of phosphorus loadings to Vaseux Lake resulting from individual septic tanks on soils having a High phosphorus transmission classification.
- resolution of potential problems of adequate lot area for replacement on-site sewage disposal systems. The community water system servicing the area makes lot area a slightly lower concern relative to the South Vaseux Lake Area.

Section 7.1 of the Stage One Report estimated that the total phosphorus loading from the East Vaseux Lake Area is about 70 kg/year and that a reduction of 39.4 kg/year or about 56% could be achieved with the provision of a community sewerage system. There is uncertainty that a phosphorus loading reduction of 39.4 kg/year will be reflected in an improvement in the water quality of Vaseux Lake. Additional evaluation is warranted by the Ministry of Environment of phosphorus sources in Vaseux Lake and the relationship to water quality parameters.

The principal objective, therefore, of a community sewer system for the East Vaseux Lake area is a reduction of phosphorus loading from individual septic tank and tile field systems servicing a population

of about 100 in the area. The Settlement Plan for the area envisions no future expansion of the existing development area. Future population growth will, therefore, be limited to infilling of present vacant lots.

11.6.2 Alternative System Description

The alternative sewerage system proposed for the East Vaseux Lake Area is illustrated in Figure 11.11. Components of the system include:

- combination low pressure and gravity septic tank effluent collection system.
- wastewater is collected to a central septic tank effluent pump station.
- contour trench disposal system located on the east side of Highway #97 and north of the community water well.

Overall, the community sewerage system relocates the disposal of septic tank effluent from soils having a High phosphorus transmission classification (37.5% removal) to an area having a Moderate transmission classification (77.5% removal).

Topographic constraints on all sides of the East Vaseux Lake area effectively reduced the feasible community system alternatives to the alternative illustrated in Figure 11.11. If the service population of the East Vaseux Lake were in the 1000 to 2000 range instead of 100, options involving wastewater pumping to Okanagan Falls and South Vaseux-Gallagher Lake may have been feasible. Significant capital costs for relatively long wastewater transmission forcemains to the south or north cannot be justified for service to a population of 100.

11.6.3 Capital Cost Estimates

A capital cost estimate for the community sewerage system illustrated in Figure 11.11 is presented in Table 11.11. The capital cost estimate is presented unchanged from the preliminary estimate given in Section 8.1 of the Stage One Report. An allowance for disposal system site acquisition has not been made in Table 11.11 because the disposal site appears to be Crown land.

The overall system capital cost is estimated to be $211,000 which equates to a capital cost of $5300 per kg/year of reduced phosphorus loading based on a total sector loading reduction of 30.5 kg/year.

TABLE 11.11
EAST VASEUX LAKE COMMUNITY SEWERAGE SYSTEM
CAPITAL COST ESTIMATE

Item	Description		Est. Cost
A. Collection System			
1.	Ø150 Gravity Sewer	400 m	$ 24,000
2.	Ø 75 Low Pressure Collector	380 m	19,000
3.	Cleanouts and Appurtenances		2,000
4.	Services		16,000
5.	Road Restoration		10,000
	Subtotal		**$ 71,000**
B. Effluent Pumping and Disposal			
1.	Septic Tank Effluent Pump Station		$ 20,000
2.	Ø 75 Forcemain	120 m	6,000
3.	Bored Crossing of Hwy. #97		8,000
4.	Contour Trench Disposal System		64,000
	Subtotal		**$ 98,000**
	Total System Construction		**$169,000**
	Contingencies & Engineering (allow #25%)		**$ 42,000**
	TOTAL		**$211,000**

11.6.4 User Cost Calculations

Preliminary parcel tax calculations are presented in Section 8.1 of the Stage One Report for the capital cost debt retirement component of user costs. For each of the four senior government assistance formulae used herein and described in Section 10, the per parcel costs for capital debt retirement are:

Benefiting Parcels - 40

Capital Cost - $211,000

Approximate User Costs for Debt Retirement

Formula 1 - $ 395/year

Formula 2 - $ 171/year

Formula 3 - $ 40/year

Formula 4 - $ 570/year

In addition to the parcel tax levy for capital debt retirement, connected houses would have to pay a monthly user fee for operation and maintenance. A preliminary estimate of system operation and maintenance costs is presented following:

Labour (Disposal Field and Lift Station)	$ 3,000
Pumpout of Grit Chamber	700
Performance Monitoring	1,000
Allowance for Miscellaneous Materials	500
Pump Station Electrical Energy	500
Capital Reserve Fund Allowance	3,000
Total	$ 8,700

On a per benefiting parcel basis, the component of the user fee for system operation and maintenance will be $220 per year to provide an annual operating budget of $8700. If the capital reserve component for future disposal field replacement repair is deleted, the operation and maintenance component of the user fees would be reduced to $145 per year per parcel. Provision of a capital reserve fund for future disposal system repair or replacement is recommended, however, the cost to benefiting properties of $ 75 per year may be considered by residents as excessive.

Non debt retirement user related costs for the East Vaseux community sewerage system are summarized following:

ANNUAL USER AND HOMEOWNER COSTS

At Time of Connection				Annual Costs			
Service Type	Connection Fee	Ind. Pump	Total	User Fee	S.T. Pump-Out	Pump O & M	Total
Gravity Serv. (approx. 10 lots)	$ 300	-	$ 300	$220	$ 30	-	$250
Pressure Serv (approx. 30 lots)	$ 300	$ 800	$1100	$220	$ 30	$ 60	$310

A more detailed analysis of user costs would be necessary at the predesign stage to determine whether a user fee including a capital reserve allowance for field replacement (included in $220.00 shown above) and whether a connection fee of $300 are reasonable. Seventy-five per cent of the benefiting properties would have pressure services requiring the installation of individual pumps at an estimated cost of $800 per unit. The pumps also represent an increased annual cost of $60 for operation and maintenance as compared to gravity services.

The $800 difference in costs for gravity and pressure services may prompt statements of being unfair from homeowners in the service area. The differential can be reduced by having the operating authority supply the pumps, (transfer pump supply costs to project capital cost) and by implementing a lower connection fee for pressure services recognizing that their construction is less expensive than a gravity service. In this manner, the differential for "at the time of connection" costs could be reduced from $800 to something in the range of $200-$300. "Fairness" of the cost differential between pressure and gravity services would be addressed by a predesign study.

11.7 Group 3 Community Sewerage Systems

11.7.1 Osoyoos Southwest Sector

A community sewer system proposal involving a connection to the Town of Osoyoos is described in detail in Section 6.3 of the Stage One Report. Service priorities in the Southwest Sector include the Idle-O-Apartments and 10 single family residences located at the east end of 22nd Avenue. Priority is given to these two areas for phosphorus loading criteria, recognizing that both areas have High or Very High phosphorus transmission classifications. Servicing of these two areas with a community system at a cost of $187,000 is difficult to justify solely on the basis of a phosphorus loading reduction estimated to be about 62 kg/year. Unlike the Southeast Osoyoos Sector described in Section 11.4, there are no apparent wastewater concerns in the Southwest Sector related to potential adverse impact on Osoyoos Lake from a bacteriological point of view. Growth potential in the Southeast Sector is limited which further reduces the priority of the area for a sewerage system relative to the Southeast Sector, for example, where proposed exclusions from the ALR could result in major tourist commercial-related development.

Figure 6.7 of the Stage One Report illustrates forcemain alignments which will be necessary to ultimately construct a sewerage system into the Southwest Sector. Should rezoning or other development proposals be received by the Regional District for properties proposed to be crossed by forcemains, the Regional District should request dedication of easements for future sewerage system components. In this manner, future construction of the sewerage system will be simplified.

11.7.2 Gallagher Lake Area

Section 7.3 of the Stage One Report describes a community sewerage system for present and future development at the north end of Gallagher Lake. As illustrated in Figure 7.5, the system would comprise a conventional gravity collection system with collected

wastewater being pumped north along Highway #97 to a treatment and disposal site on the Vaseux Creek fan. The principal design objective of the sewerage system is a reduction of phosphorus loading to Gallagher Lake. Additional study is, however, warranted of the relationship between phosphorus loading and water quality in Gallagher Lake. Overall sewerage system capital cost is estimated to be $588,000 which would achieve a phosphorus loading reduction of about 77.4 kg/year.

Community Planning documents for the Gallagher Lake Area recognize extensive development potential in the area. The Gallagher Lake Area is the largest developable land area in the valley floor area not in the A.L.R. and suitable for development in the three Electoral Areas. Accordingly, it is reasonable to assume that the Gallagher Lake Area community sewerage system will become more feasible on a cost per connection basis as development in the area occurs. To facilitate future construction of the sewerage system, the following is recommended:

- Regional District should request that the Ministry of Environment undertake detailed water quality studies of Gallagher Lake to quantify the potential impact from septic tank and disposal systems in the area.
- evaluations should be undertaken to define and ultimately acquire a suitable treatment and disposal site in the area. As development occurs in the area, site alternatives will be reduced and acquisition costs are likely to increase.
- trunk sewer and forcemain alignments conceptually illustrated on Figure 7.5 should be recognized and easements obtained where necessary as development proposals are received.
- the feasibility of establishing a development cost charge bylaw for the sewerage system should be evaluated. While development could be permitted to use septic tank and field systems, the development cost charges would accumulate to assist in the system construction at some future date.

Any development proposal for the Gallagher Lake Area should recognize the basic concept of the sewerage system and be designed in such a manner as to readily connect to the system. Pre-installation of collection components as described in Section 12.4 may also be considered.

1.7.3 Skaha Estates

Ultimately, it is proposed that wastewater from a sewage collection system servicing Skaha Estates would be pumped to a connection with the Okanagan Falls sewerage system. Overall system capital costs from Section 8.2 of the Stage One Report are estimated to be $1,428,000 of which about $800,000 is attributable to the collection system. The proposed sewerage system would achieve a phosphorus loading reduction of about 130 kg/year based on 1987 population data.

The overall concept of the sewerage system is illustrated in Figures 8.2 and 8.3 of the Stage One Report. The Regional District should, wherever possible associated with development and/or rezoning applications, acquire easements for trunk sewer and forcemain components of the sewerage system. Consideration may also be given to applying a policy requiring pre-installation of collection system components in new low density residential developments in the area. This policy is described in more detail in Section 12.4.

11.7.4 Kaleden Lakeshore Area

Community sewerage system alternatives considered for the Kaleden Lakeshore Area included wastewater pumping to a community disposal system on the Bench area and pumping to the Okanagan Falls system via Skaha Estates. Although having a higher capital cost, pumping to Skaha Estates was considered to be the preferred alternative. At present, there are no apparent major concerns related to septic tank and field systems other than phosphorus loading along the lakeshore. Sewerage system costs of $788,000 are difficult to justify to achieve a phosphorus loading reduction of 77.0 kg/year.

Osoyoos Lake

MATCH LINE SEE FIGURE No

LIFT STATION PUMPS TO Ø300 TRUNK

TYPICAL PROPOSED GRAVITY SEWER

APPROX. LOC. SOLID WELL

Ø300 GRAVITY TRUNK SEWER TO TOWN SYSTEM

Ø150 FORCEMAIN COLLECTOR

104th AVE AREA

Ø150 GRAVITY SEWER MAIN

SEWAGE LIFT STATION

PUMPED SERVICES

C.P.R. RIGHT-OF-WAY

HWM FROM L.R.O. PLAN

TOWN OF OSOYOOS SANITARY SEWER MAINS

OSOYOOS MUNICIPAL BOUNDARY

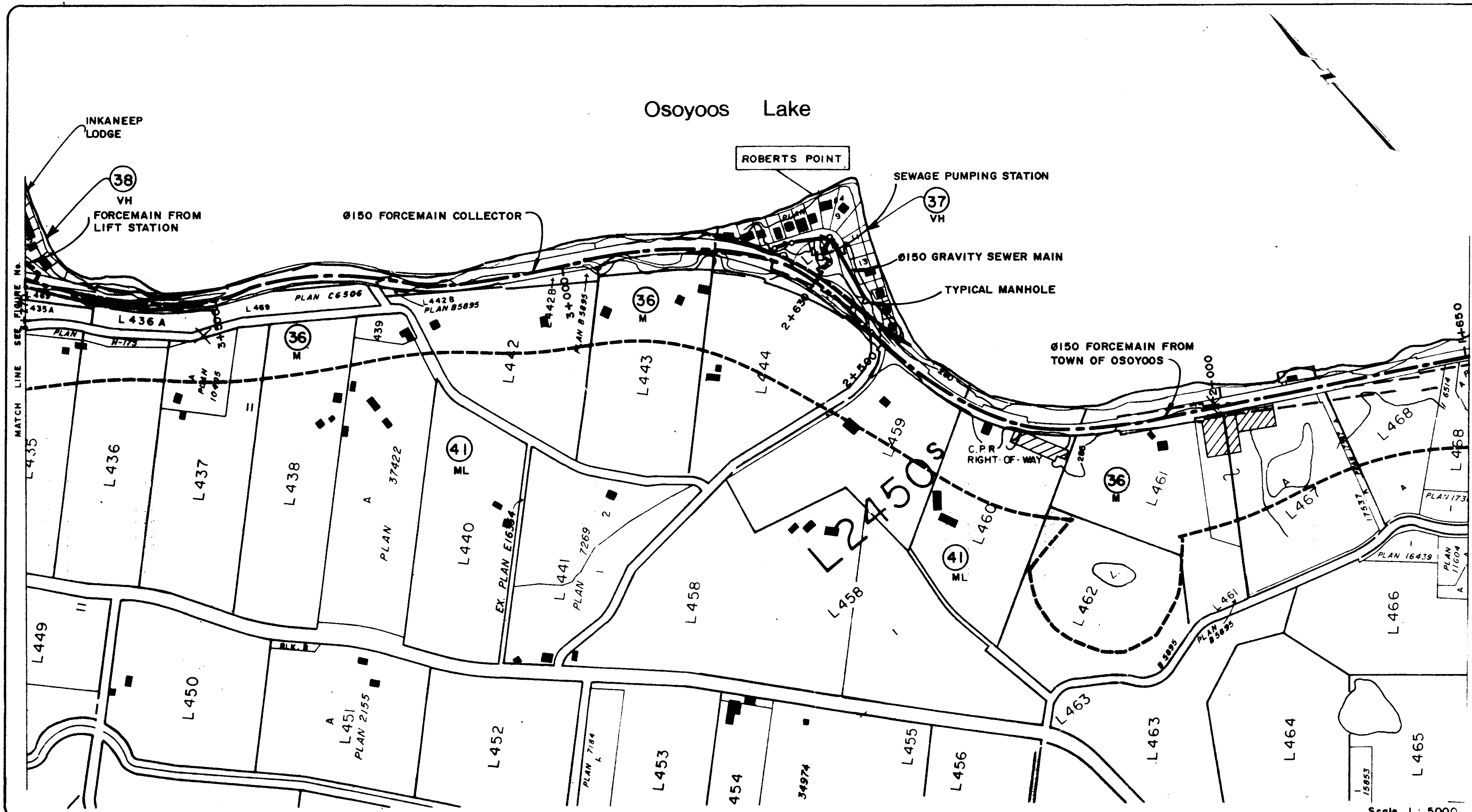
SOUTHERN TRANS PROVINE

Scale 1:5000

Regional District of Okanagan - Similkameen

Waste Management Plan
Electoral Areas A,C & D

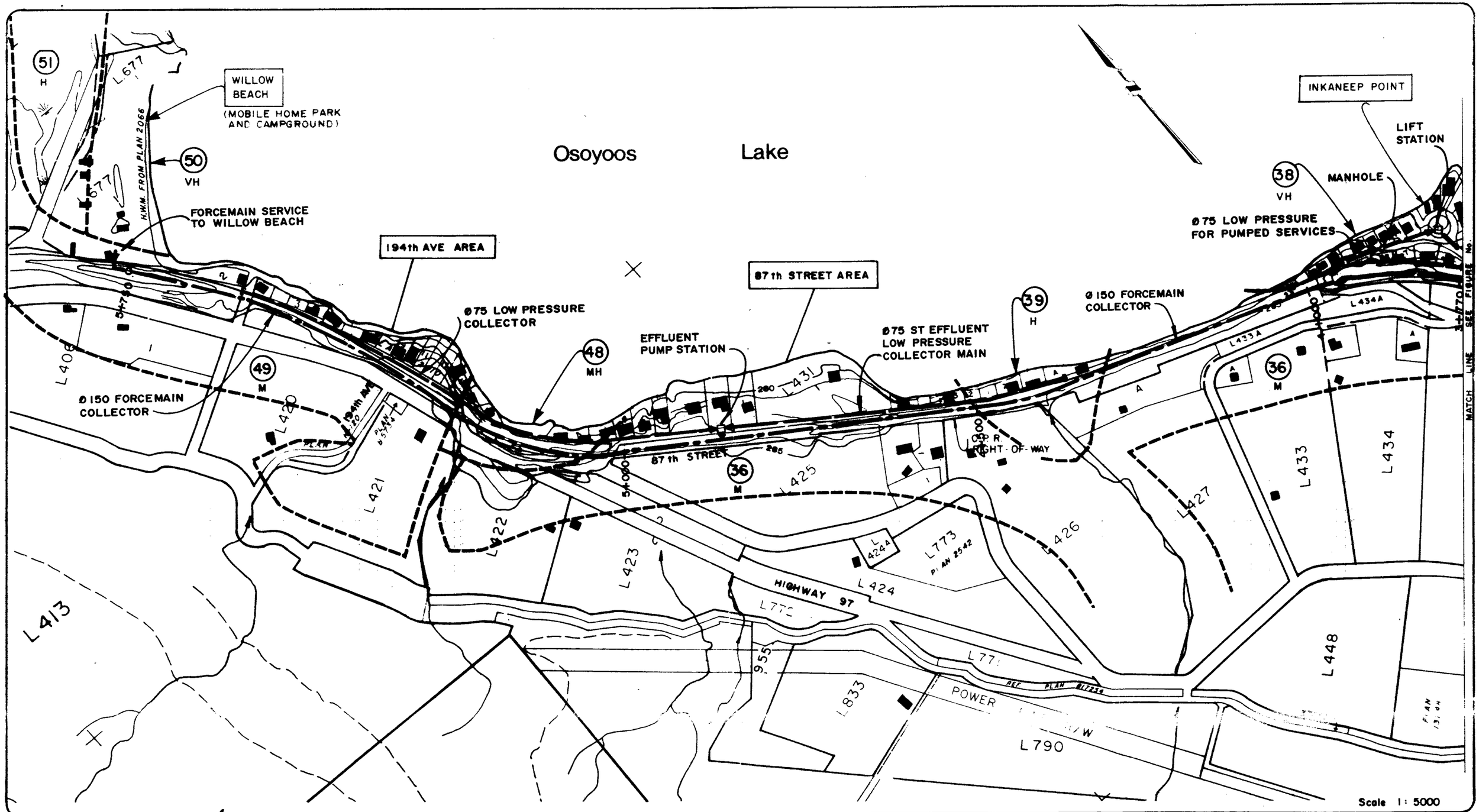
Figure 11.1
North West Sector
Osoyoos Rural Area
Electoral Area A



Regional District of Okanagan - Similkameen

Waste Management Plan
Electoral Areas A,C & D

Figure II.2
Osoyoos Rural Area
Electoral Area A
North West Sector



Regional District of Okanagan - Similkameen

Waste Management Plan
Electoral Areas A,C & D

Figure 11.3
Osoyoos Rural Area
Electoral Area A
North West Sector

Tugulnuit Lake

GRAVITY SEWER MAINS

LIFT STATION

SUB AREA 4

CAMPGROUND

Ø100 FORCEMAIN

Ø100 LOW PRESSURE COLLECTION MAIN

MOTEL

CAMPGROUND

MOBILE HOME PARK

SUB AREA 3A

CAMPGROUND

LIFT STATION

TYPICAL GRAVITY SEWER

FORCEMAIN

SUB AREA 1

GRAVITY SEWER

OPTION 2 CONNECT TO EXISTING SYSTEM VIA MCPHERSON DRIVE AREA

EXISTING TRUNK SEWER

OLIVER MUNICIPAL BOUNDARY

SUB AREA 3B

SOLID WELLS

SCHOOL

Ø150 FORCEMAIN TO OKANAGAN RIVER BRIDGE

OSOYOOS I.R. 1 BOUNDARY

VILLAGE BOUNDARY

OPTION OF CONNECTION VIA PARK DRIVE

SUB AREA 2

EXISTING GRAVITY SEWER

FLOOD

OKANAGAN

DRIVE

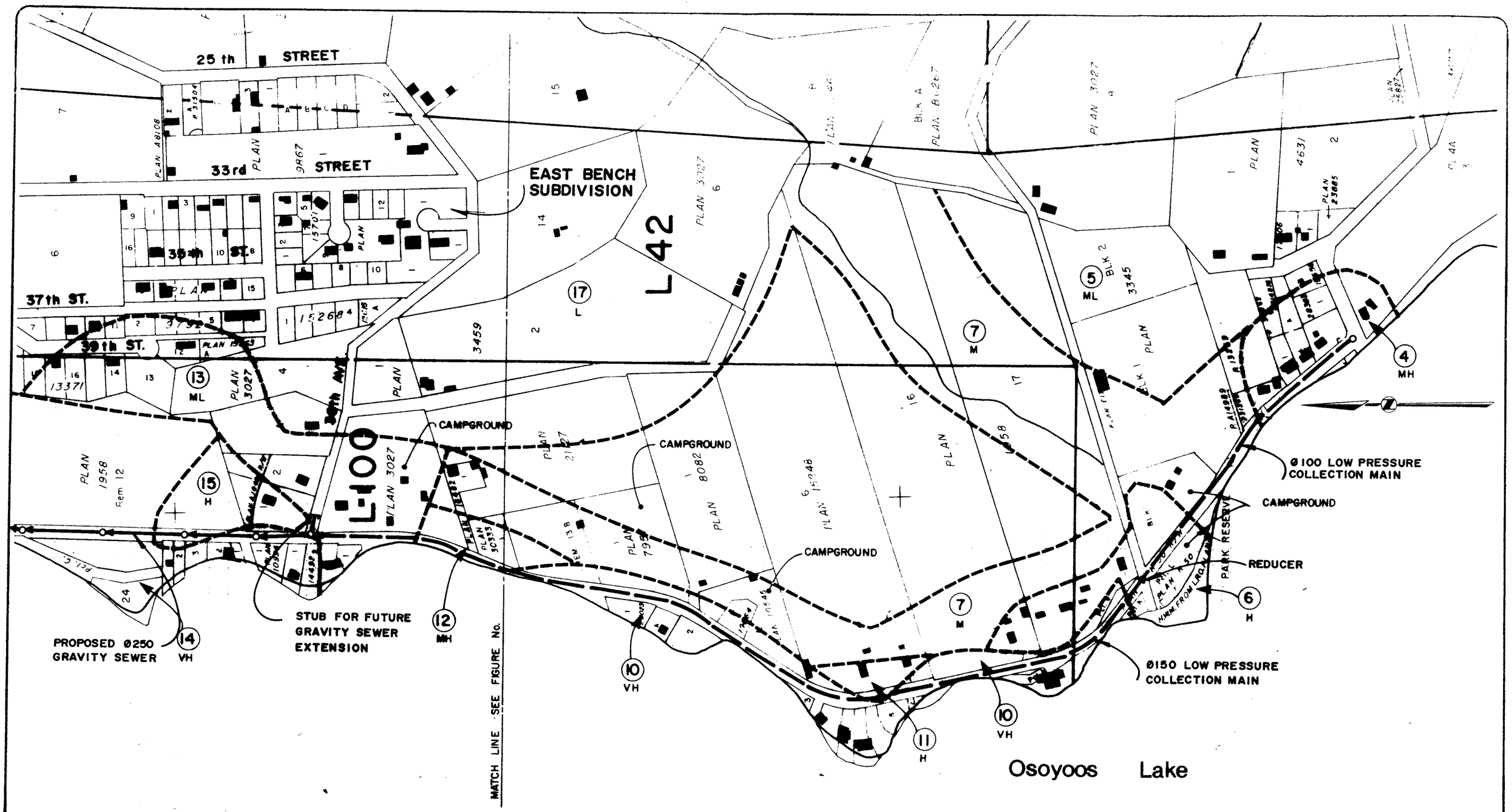
Scale 1:5000

Regional District of Okanagan - Similkameen

Waste Management Plan
Electoral Areas A,C & D

Collection System with connection to Village of Oliver system

Figure 11.4
Tugulnuit Lake Area
Oliver Rural Area
Electoral Area C



Scale 1 : 5000

Regional District of Okanagan - Similkameen

Waste Management Plan
Electoral Areas A,C & D

Figure 11.7
South East Sector
Osoyoos Rural Area
Electoral Area A

25 th STREET

33rd STREET

35th STREET

37th STREET

39th STREET

EAST BENCH SUBDIVISION

L43

L42

L100

PLAN 3847

PLAN 4

PLAN 12262

PLAN 13371

PLAN 3027

PLAN 1958 Rem 12

PLAN 1958 10A 420

PLAN 1958 11B

PLAN 1958 Rem 9

PLAN 1837

PLAN 7957

PLAN 8082

PLAN 10545

PLAN 15948

3459

CAMPGROUND

CAMPGROUND

36th AVE

PROPOSED Ø200 GRAVITY SEWER

SEWAGE PUMPING STATION

TYPICAL MANHOLE

PROPOSED Ø250 GRAVITY SEWER

STUB FOR FUTURE GRAVITY SEWER EXTENSION

Ø150 LOW PRESSURE COLLECTION MAIN

OPTION 1
FORCEMAIN TO TOWN SYSTEM

OPTION 2
FORCEMAIN TO WEST OSOYOOS (CONNECTION TO TOWN OF OSOYOOS)

TOWN OF OSOYOOS EXISTING Ø200 SANITARY SEWER MAIN

OSOYOOS MUNICIPAL BOUNDARY

APPROX. LOCATION HAYNES POINT

Osoyoos Lake

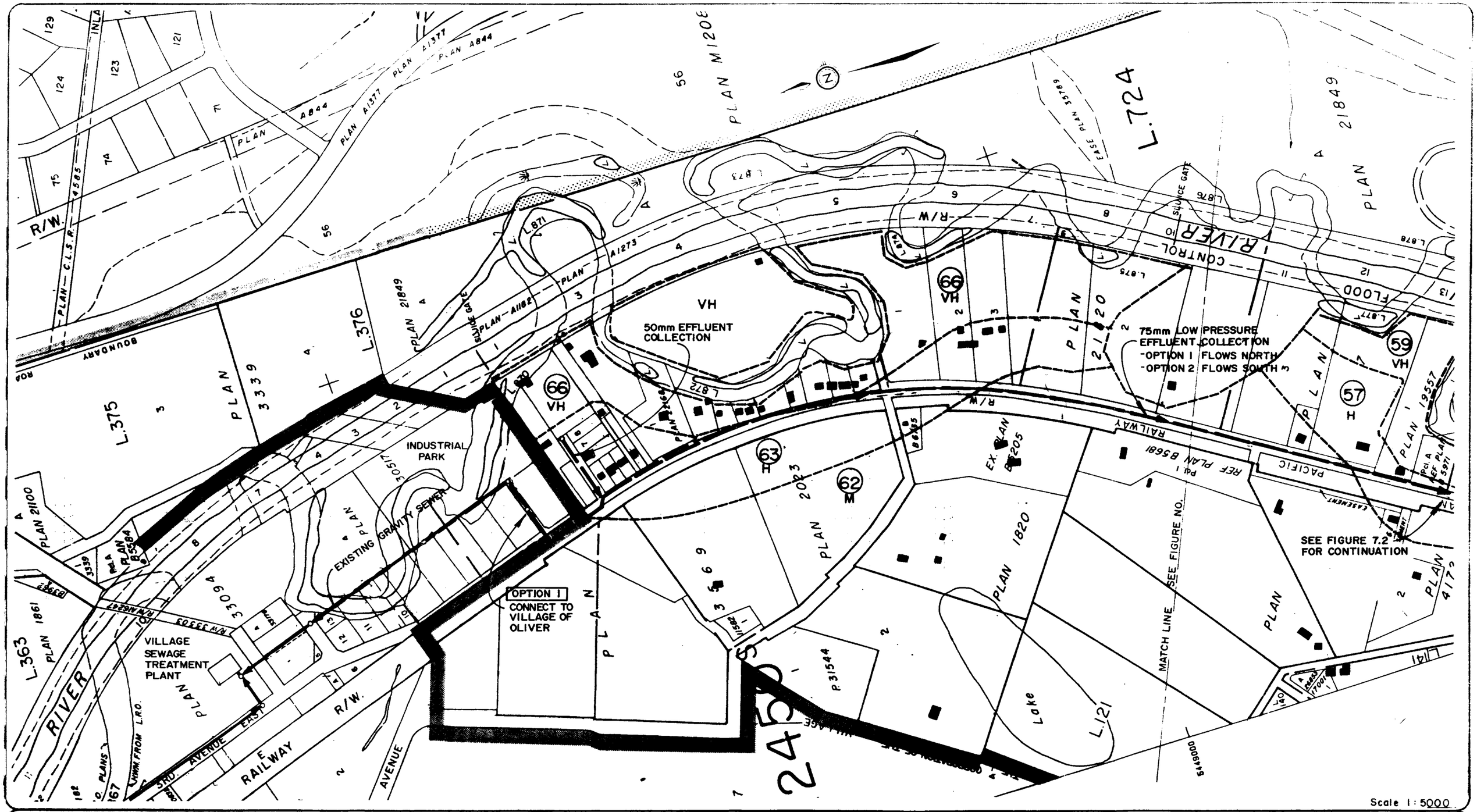
MATCH LINE SEE FIGURE No.

Scale 1:9000

Regional District of Okanagan - Similkameen

Waste Management Plan
Electoral Areas A,C & D

Figure 11.8
South East Sector
Osoyoos Rural Area
Electoral Area A

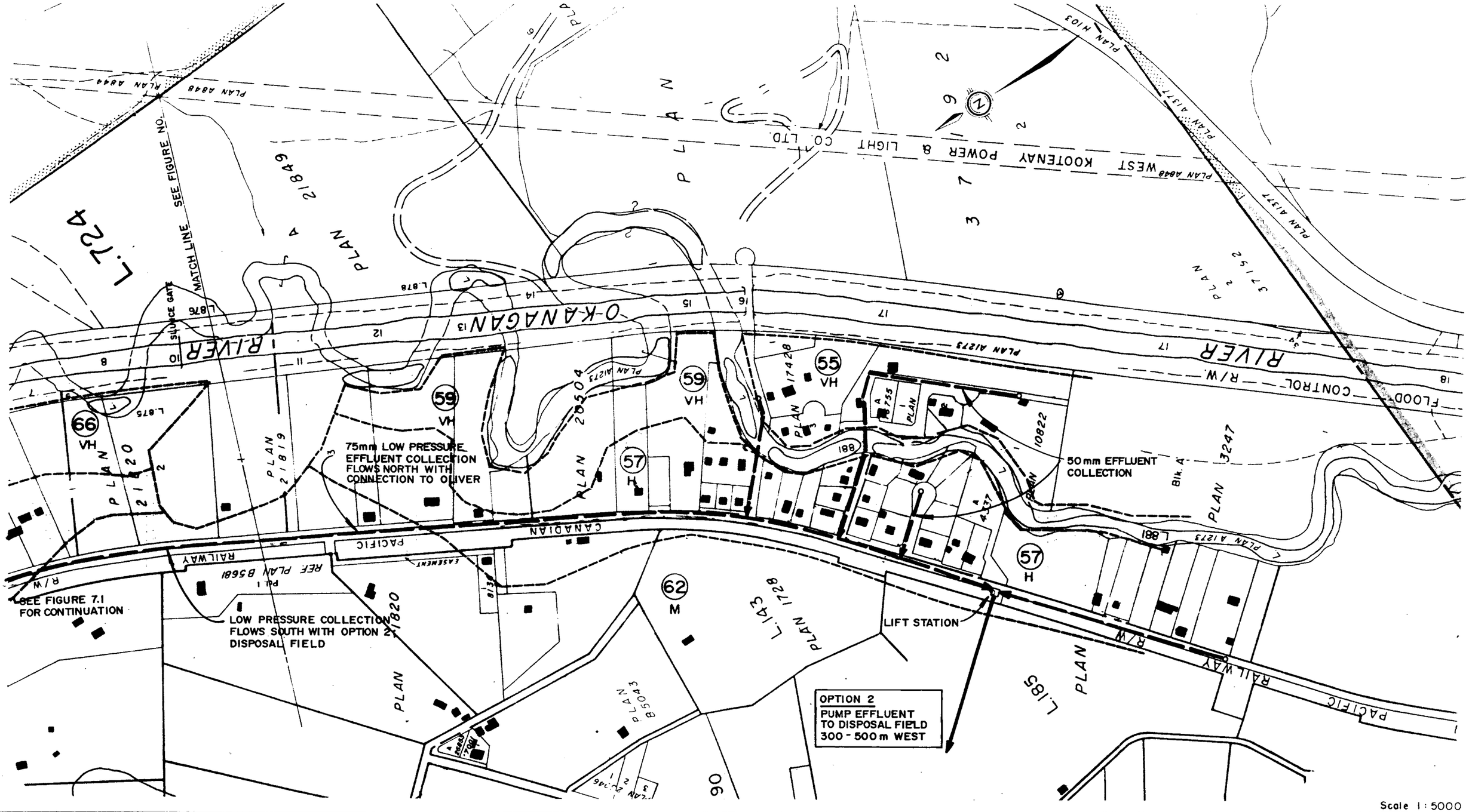


Scale 1:5000

Regional District of Okanagan - Similkameen

Waste Management Plan
Electoral Areas A, C & D

Figure 11.5
Sawmill Road Area
Oliver Rural Area
Electoral Area C



Scale 1:5000

Regional District of Okanagan - Similkameen

Waste Management Plan
Electoral Areas A,C & D

Figure 11.6
Sawmill Road Area
Oliver Rural Area
Electoral Area C

Section 5.3 of the Stage One Report describes several general waste management related policies which the Regional District could consider adopting and/or incorporating into Community Planning documents, zoning bylaws, and other land use related bylaws. The policy statements described herein do not include capital works proposals and are intended to be applicable primarily in areas which are likely to remain serviced by individual septic tank and tile field systems in the long term future. The basic objectives of the policy statements are:

- where possible, achieve phosphorus loading reductions from individual systems presently on Very High, High or Moderately High polygons.
- reduce the possibility of increased phosphorus loadings in the rural areas by reducing the potential of development on Moderately High or higher rated polygons.
- enhance the operation and performance of individual septic tank and tile field systems throughout the three Electoral Areas in general.

The general policy statements presented herein have evolved through the Technical workshop sessions of the Waste Management Plan and review meetings with the Ministry of Environment and the administrative staff and Area Directors of the R.D.O.S. In sections following, each policy statement presented in Section 5 of the Stage One Report is described in detail. Objectives of each policy statement are presented together with a description of specific implications in the three Electoral Areas. This discussion is intended to assist the Regional Board in decisions related to further investigation leading to ultimate formal adoption.

12.1 Minimum Residential Lot Size

12.1.1 Objectives

R.D.O.S. zoning bylaws currently specify a minimum parcel size of 836 m^2 (9000 $ft.^2$) for subdivision when community water service is available and onsite wastewater disposal is proposed. Reduced minimum lot size criteria apply where both community water and sewer systems are provided. Concerns related to the minimum parcel size of 836 m^2 include:

- in areas having a Moderately High or higher phosphorus transmission rating, a minimum lot size of 836 m^3 could result in a significant concentration of houses and a major phosphorus source. Ideally, from an environmental impact point of view, areas having a High phosphorus transmission classification should remain undeveloped. The next best situation, from a phosphorus loading point of view, is to minimize the density of development to the greatest extent possible.
- a lot area of 836 m^2 (9000 $ft.^2$) provides marginal area for a replacement system in the event of operating problems and limits the opportunity to implement alternative design criteria intended to maximize phosphorus removal.

Arising out of the review process of the Stage One Report, suggestions were made by Provincial Government agencies that the minimum residential parcel size, where an on-site septic tank and disposal system is to be used, should be 1672 m^2 (18000 $ft.^2$). Minimum parcel sizes greater than 1672 m^2 are suggested when the house is to be serviced by both an individual on-site septic tank and tile field system and water well.

Benefits to be achieved by revising the minimum residential parcel sizs to 1672 m^2 where individual septic tank and tile field systems are used include:

(1) Increasing the minimum lot size reduces future increases in phosphorus loadings, particularly in Moderately High, High and Very High phosphorus transmission categories. The reduction is achieved simply by reducing the density of development which can occur. A 0.4 ha area of High phosphorus transmission land would result in a phosphorus loading of about 7.2 kg/year if developed with a lot size of 836 m^2. The phosphorus loading is reduced by 50% to 3.6 kg/year with a lot size of 1672 m^2. The reduction achieved is 3.6 kg/year or 50% and is equivalent to the loading from 12 houses sited on a Moderately Low rated phosphorus transmission zone. Reducing the housing density using individual septic tank and tile field systems is, therefore, particularly important on Moderately High or higher phosphorus transmission zones. Relatively small numbers of houses in these areas can represent significant phosphorus loadings.

(2) Increasing the parcel size to 1672 m^2 provides flexibility to implement design criteria for individual disposal systems to maximize phosphorus removal. In the preceding paragraph, 2 homes on a 0.4 ha area of High rated phosphorus transmission land represented an annual phosphorus loading of 3.6 kg/year. Having a minimum parcel size of 1672 m^2 gives the flexibility to construct "oversized" disposal fields to maximize effluent-soil contact and resultant phosphorus reduction. In the example, enlarged disposal systems may increase the phosphorus removal efficiency from 25 to 50% to 50 to 75%. In this case, the resultant loading is reduced from 3.6 kg/year to 1.8 kg/year for the two house example being described.

(3) Increasing the minimum lot size from 836 m^2 to 1672 m^2 provides greater flexibility for system replacement and/or repair when necessary. In almost all cases, tile field systems will ultimately clog and malfunction necessitating replacement.

(4) Increasing minimum parcel size will reduce the possibility of operational problems arising from the cumulative effect of a large

number of individual systems on small lots. Small numbers of individual systems on 836 m^2 lots may function satisfactorily over the long term. A large number of systems in the same area on 836 m^2 lots may result in increased groundwater table elevations, leading to effluent surfacing and other failures within the subdivision.

12.1.2 Implementation Implications

Phosphorus transmission areas classified as Moderately High, High and Very High are priority areas for applying the revised minimum lot size criteria of 1672 m^2. The Regional District would have to amend community planning bylaws and maps throughout the three Electoral Areas to define these phosphorus transmission categories as environmental control zones or a similar designation. Assistance from the Ministry of Environment would be necessary to compile the designation of these environmentally sensitive zones based on phosphorus transmission. Once the control areas are defined, it would be relatively straightforward to specify the requirement for a minimum lot size of 1672 m^2 in the Community Plan and associated zoning documents.

Increasing minimum parcel sizes to 1672 m^2 may result in concerns being expressed by the Agricultural Land Commission. From the point of view of reducing development pressure on agricultural lands, it is preferable that parcel sizes for residential development be as small as possible. In this manner, maximum utilization is achieved of lands designated for development.

Adverse reactions from property owners considering subdivision for low density residential uses would be anticipated with a change of the minimum parcel size to 1672 m^2. With a doubling of the minimum parcel size criteria to 1672 m^2, lot yields resulting from subdivision would be reduced by about one half. Maximizing lot yields would obviously be an objective of subdivision proposals which could be significantly impacted by a change in parcel size criteria to 1672 m^2. In some

instances, subdivisions could be designed in such a manner that each 1672 m^2 lot could be subdivided to 836 m^2 lots once community sewer system service is available.

Applying a 1672 m^2 minimum parcel size criteria to designated environmentally sensitive zones would not have a major impact on present community plans in the three Electoral Areas. To a large degree, MH, H and VH phosphorus transmission areas which would comprise the environmental control zone are lakeshore and/or river fronting areas which are already developed. The revised parcel size criteria would not impact these existing areas. Summarized following are undeveloped areas in each of the Electoral Areas which include vacant or undeveloped lands in MH, H and/or VH phosphorus transmission classifications. These areas would be impacted by a decision to establish environment control zones with a minimum parcel size of 1672 m^2.

Electoral Area A

(1) South-East Osoyoos Lakeshore

Lakeshore areas in south-east Osoyoos would be included in the control zone. In general, the area comprises large land parcels which have tourist-commercial uses. The Community Plan identifies several small areas for small holding residential use. Unless property owners in designated small holding areas request low density residential zoning, the increased minimum parcel size criteria will have little or no impact in the area.

(2) West End Haynes Point

The west end of Haynes Point has a Very High phosphorus transmission classification. A large part of the area is swampy and is identified as park in the Community Plan.

(3) North End of Osoyoos Lake

The Willow Beach area at the north end of the lake has High and Very High phosphorus transmission classifications and would, therefore, be subject to the environmental control zone designation. The Community Plan describes low density mobile land use for the area which, if serviced by sewerage systems permitted under the Waste Management Act, would not be impacted by the increased parcel size.

(4) Okanagan River Plain: North of Osoyoos Lake

Low lying land adjacent to the Okanagan River north of Osoyoos Lake would be completely within the designated control zone. The Community Plan identifies flooding risks and groundwater table elevations as major constraints to development and designates the area as Wildlife Resource and Farm areas. With these designations, the parcel size criteria has little or no impact.

Electoral Area C

(1) Okanagan River Plain

The Okanagan River Plain area south of Oliver to the north boundary of Electoral Area A would be included in the control zone. Community Plans identify flood plain restrictions, and marginal conditions for septic tank systems as major residential development constraints. Except for some small areas in the Sawmill Road area designated as small holding areas, the river plain area is designated for Wildlife and Farm uses. The minimum parcel size revisions would have little or no impact in this area.

(2) Tugulnuit Lakeshore

Areas at the north and south ends of Tugulnuit Lake would be subject to the revised lot size standard. The Community Plan identifies low density residential and low density mobile land uses in both areas. The increased parcel size criteria would impact any development proposal in the lakeshore area of Tugulnuit Lake.

(3) Okanagan River Plain Areas North of Oliver

A large part of the River Plain area is designated as farmland in the Community Plan and would not, therefore, be impacted by the revised lot size criteria. The Community Plan designates two or three small land parcels in the vicinity of Inkaneep Park for low density residential use. These developments could be impacted by the revised lot size criteria depending on the exact location of the control zone boundary.

(4) Gallagher Lake

An extensive area at the north end of Gallagher Lake would fall within the control zone with phosphorus transmission classifications ranging from Moderately High to Very High. The Community Plan identifies significant low density residential in the area which would be impacted by revised lot size criteria. Environmental concerns related to future development in the Gallagher Lake area are addressed in the Community Plan with references to the ultimate provision of a community sewer system in the area. Increasing the minimum parcel size to 1672 m^2 may have a major impact on future development proposals in the Gallagher Lake area.

(5) South and East Vaseux Lake

Undeveloped land adjacent to existing development at the south end and on the east side of Vaseux Lake would be included in the environmental control zone and, therefore, be subject to the increased minimum lot size criteria. In both cases, the Community Plan designates that vacant adjacent land remain as open or farmland, therefore, revised parcel size criteria would have little or no impact in the Vaseux Lake area.

Electoral Area D

(1) Okanagan River Plain South of Okanagan Falls

All river plain areas between Okanagan Falls and Vaseux Lake would fall within the control zone with phosphorus transmission classifications of High and Very High. The Community Plan designates the entire area as farmland, therefore, revised parcel size criteria would have no impact.

(2) Lakeshore Areas of Kaleden

The Skaha Lakeshore area in Kaleden would fall within the proposed control zone. Recognizing that the area is largely already developed, the impact of increased minimum parcel size criteria would not be significant. Sicle Point represents an undeveloped area within the control zone, however, the Community Plan designates the area as park. Lakeshore areas south of Kaleden are designated for open or small holding uses.

On the basis of the preceding discussions, implementing a policy to establish environmental control zones where the minimum parcel size for residential development is 1672 m^2 would not have a significant impact in Electoral Areas A, C and D. Potential impacts on residential uses identified in Community Plans include:

- Willow Beach North End of Osoyoos Lake
- Tugulnuit Lakeshore Area
- Gallagher Lake Area
- North Oliver Rural Area

To a large degree, the objectives of the proposed increase in minimum parcel size criteria are presently achieved by open space and farmland designations in Community Plans. Implementation of the environmental control zone designation with a minimum parcel size of 1672 m^2 (as an example), would serve to reinforce the basic policies in large part already addressed by Community Plans.

Increasing minimum parcel sizes from 836 m^2 (9000 $ft.^2$) for residential units using septic tanks outside of the proposed environmental control zone warrants some consideration by the Regional District. In these areas, a minimum parcel size of something less than 1672 m^2 may be appropriate. The major objective of increasing parcel sizes in general is to ensure adequate lot area is available to replace or repair a septic tank and tile field system. An 836 m^2 lot severely restricts the opportunity of the property owner to contruct a replacement disposal field. This is illustrated by the following area analysis of a typical rectangular 836 m^2 lot:

	Total Lot Area -	836 m^2 (9000 $ft.^2$)
less	House Area	93 m^2 (1000 $ft.^2$) - 11%
less	Driveway and Car Park	84 m^2 (900 $ft.^2$) - 10%
less	House Setbacks - 3 m	93 m^2 (1000 $ft.^2$) - 11%
less	Property Line Setbacks all sides 3 m	274 m^2 (2950 $ft.^2$) - 33%
Residual for Field and Septic Tank		292 m^2 (3150 $ft.^2$) - 35%

The area analysis indicates a maximum of 35% of the lot area or 292 m^2 is available for construction of a disposal field which complies with minimum Ministry of Health setback standards. In permeable soils having a percolation rate of 5 minutes per inch, a minimum area of about 75 m^2 (800 $ft.^2$) is required for a disposal system. In the case of the ideal, rectangular, and flat 836 m^2 lot, a maximum of 25% of the lot area may be available for a replacement system. Invariably, the apparent residual is reduced by:

- outbuilding construction
- vehicle parking areas
- retaining walls and ground slopes
- swimming pool construction.

It is recommended that the Regional District evaluate increasing minimum residential parcel sizes serviced by on-site disposal systems to ensure that adequate site area is provided for system repairs and replacement. Input from the Ministries of Health and Environment will assist the Regional District in this evaluation process.

12.2 Alternative On-Site System Design Criteria

12.2.1 Objectives

At the outset of this Waste Management Plan, the objective of addressing all individual septic tank effluent disposal systems which do not achieve a minimum phosphorus removal efficiency of 80% was stated. In general, this broad objective would apply to all existing development in areas having Moderately High, High and Very High classifications. Ten areas are defined in this Waste Management Plan having a concentration of houses or development which do not meet the 80% phosphorus removal objective. For these ten areas, alternative sewerage systems were evaluated and described. A significant proportion of the Waste Management Plan is devoted to alternative system evaluations and priority definition for these ten areas.

Sewerage system construction does not address or resolve all existing septic tank systems on Moderately High or higher classified areas. In many cases in the study area, small numbers of houses are located on unacceptably high phosphorus transmission areas which do not warrant consideration for an alternative or community sewerage system.

Individual on-site disposal system design objectives are being prepared by the Ministries of Health and Environment which are intended to increase the phosphorus removal efficiency of the disposal system. The revised standards are a "step beyond" the present Ministry of Health requirements which focus on methods to achieve wastewater disposal into the ground.

It is intended that the revised septic tank and disposal system design guidelines which address phosphorus removal would apply to new system construction and reconstruction of existing malfunctioning or failed systems in areas having a Moderately High or higher phosphorus transmission classification. The general applicability of the standards would be within the proposed environmentally sensitive zones described in Section 12.1.

The revised disposal system standards which consider phosphorus removal objectives would also apply to development proposals which may be serviced by a small community-type sewerage system constructed by the developer together with other services. Examples would include a motel-commercial development, small mobile home park, and a small, medium density housing project. It is important that phosphorus removal objectives apply to these types of projects as well as single family residential development.

12.2.2 Implementation Implications

The revised on-site system design standards are intended to generally apply to new development or subdivisions within the designated environmental control zones. Any new subdivision within the designated control zones would, therefore, have to provide adequate lot area such that a disposal system in compliance with the revised standards can be constructed. The implementation of the revised site system standards emphasizes the suggestions in Section 12.1 related to increased lot sizes in the designated environmental control zones.

A preliminary review of the number of existing houses on VH, H and MH rated polygons (environmental control zone) in the three Electoral Areas but not included within the service area of an alternative system has been undertaken. On-site design standards for phosphorus removal may be applicable to these units which are summarized by number and area as follows:

Phosphorus Transmission Classification

Area	VH	H	MH	Total
Osoyoos Rural Area	0	0	0	0
South Oliver Rural	5	23	10	38
Sawmill Road Area	4	4	3	11
Tugulnuit Lake	0	0	0	0
North Oliver Rural	8	30	28	66
Gallagher Lake	0	0	0	0
South Vaseux Lake	0	0	0	0
East Vaseux Lake	2	0	0	2
OK Falls Rural	2	9	13	24
Skaha Estates	1	5	0	6
Kaleden	3	2	2	7
East Penticton Fringe	0	4	0	4
TOTALS	**25**	**77**	**56**	**158**

The preceding tabulation suggests that the revised on-site disposal standards may have long range implications to about 158 existing housing units in the three Electoral Areas representing a total population of about 500. The tabulation does not include houses on Indian Reserves in the Osoyoos, Tugulnuit Lake and Skaha lake areas.

The tabulation indicates that a majority of homes within the proposed environmental control zones and beyond the service area of proposed community systems are located in the Oliver and Okanagan Falls Rural Area. To a large degree, the houses in these two areas are located on multi-acre agricultural lots near the Okanagan River. The proximity to the Okanagan River results in the phosphorus transmission classification of Moderately High or higher. Available site area should not be a constraint for the majority of the housing units to reasonably comply with the revised on-site disposal standards.

The 158 homes in Electoral Areas A, C, and D within the proposed environmental control zone combined represent a phosphorus loading of about 264 kg/year. If present septic tank and tile field systems on these lots were all reconstructed to achieve a minimum of 80% phosphorus removal which is the intent of the revised guidelines, the phosphorus loading would be reduced to about 100 kg/year. The reduction of 164 kg/year is comparable to the loading reductions to be achieved by any of the three high priority sewerage systems.

The revised design standards may also apply to existing development within several of the ten areas evaluated for sewerage systems where construction of the sewer system may be delayed for cost feasibility factors. Areas where this may occur include the areas designated as Group Three (Lowest Priority) and Group Two in Section 10.2. The number of houses within each of these lower priority areas is summarized in the tabulation below:

Phosphorus Transmission Classification

Sewerage System Evaluation Area	**VH**	**H**	**MH**	**Total**
Osoyoos Southeast Sector	11	2	12	25
South Vaseux Lake	16	0	0	16
East Vaseux Lake	0	28	0	28
Gallagher Lake	0	8	23	31
Kaleden Lakeshore	23	4	1	28
Skaha Estates	17	22	35	74
Osoyoos Southwest Sector	5	11	0	16
TOTALS	**72**	**75**	**71**	**218**

It is recommended that the Regional District support in principle the revised on-site disposal system guidelines for phosphorus removal currently being formulated by the Ministries of Health and Environment. The objective of revised on-site disposal system standards is to achieve a minimum phosphorus removal efficiency of 80% for all on-site wastewater disposal systems.

12.3 Alternative System Evaluation at Time of Subdivision

12.3.1 Objectives

From the point of view of hydraulics, individual septic tank systems in Electoral Areas A, C, and D appear to function satisfactorily. Based on extensive discussions with the Ministry of Health associated with this Waste Management Plan, few if any areas were identified where there is a recurring problem with failed systems and the associated problems of effluent surfacing representing a potential health risk. In large part the generally satisfactory performance of individual septic tank and tile field systems is attributable to favourable soil types and conditions in terms of permeability throughout the Southern Okanagan area.

The objective of this policy, which would require a thorough assessment of wastewater disposal alternatives at the time of subdivision, is to ensure that the record of satisfactory individual sewerage system performance is maintained. Where some uncertainty about long term performance exists, an alternative system or approach would be pre-defined and can be implemented in a straightforward fashion. In this manner, future wastewater problems involving a concentration of development where an expensive community system is the only solution, can be avoided.

The importance of a policy where the developer is required to thoroughly address the long range feasibility of on-site and alternative systems will likely become more apparent in the future as development proposals of hillside and bench areas in the South Okanagan are advanced. Residential development in the valley floor in Electoral Areas A, C, and D is significantly constrained by the Agricultural Land Reserve and to a lesser degree, floodplain boundaries. Community Planning documents describe development proposals in the hillside areas in the Oliver and Osoyoos area which would use land of marginal or no value for agricultural purposes, for residential development.

Based on previous experience at other locations in the Okanagan Valley, there is the possibility of a higher rate of hydraulic failure of individual disposal systems serving developments on hillside areas. In general, soil materials in the adjacent hillside area tend to be finer grained and as a result have lower hydraulic capacity characteristics in terms of effluent loading. Disposal fields will, therefore, be somewhat larger in length and area as compared to systems in permeable soils of the valley floor area. Topography, bedrock, and natural runoff water courses are other factors which can negatively impact disposal systems on the hillside area as compared to the valley floor.

On the basis of the preceding, a policy whereby the Regional District requires a thorough examination of wastewater treatment and disposal by the developer is suggested. In this manner, the possibility of major wastewater problems occurring associated with new development proposals is minimized.

12.3.2 Implementation Implications

The wastewater treatment and disposal assessment which is the objective of the policy would be undertaken by property developers and may include:

- confirmation that proposed lot sizes and overall subdivision layout are adequate for satisfactory long term performance of individual systems. Soil conditions, topography and other constraints should be addressed. Proposed parcel sizes should recognize that malfunctions-failures will ultimately occur and that adequate lot area for a replacement system is a basic requirement.
- street alignments and grades should be planned considering that a community collection system may, in the future, be required. A conceptual design for the community system may be requested, together with an assessment of alternative system feasibility.
- the Regional District may, in some cases, require that the collection system be constructed at the time of subdivision

even though use of individual septic tank systems is proposed. Having collection system components in place in accordance with an overall plan significantly reduces the capital cost for alternative systems at a future date.

The policy relating to a thorough examination and pre-planning of sewerage options is intended to principally apply to significant subdivision proposals on the hillside areas or within the service area boundaries of a community sewerage system identified in the Waste Management Plan.

It is not intended that the policy apply to small subdivisions, for example, less than 10 or 15 lots within existing developed areas where satisfactory performance has been demonstrated. Also, it is not intended that the policy would apply to small holding or multi-acre lot subdivisions. More than adequate lot area is usually available in these subdivisions for a homeowner to construct an on-site disposal system with adequate reserve area for a replacement system should it be necessary. The lower density of houses in a small holding or larger lot subdivision generally does not result in groundwater mounding interferences between neighbouring on-site disposal systems.

As noted previously, the policy is intended to apply principally to major low density residential development proposals on hillside areas in the three Electoral Areas. Specific examples include:

- proposed low density residential area, including mobile home parks, located northwest of Oliver approximately 14 ha in size.
- proposed low density residential area located northwest of the Industrial Park in Osoyoos approximately 64 ha in size.

The Regional District should consider applying the policy to low density development proposals within the proposed service area of any of the ten community sewerage systems described in Sections 6, 7 and 8 of the Stage One Report. A major objective, in this case, would be to

ensure that the subdivision layout in terms of road alignments and grades, recognizes the location of proposed trunk sewers. Conceptual designs of sewer collection mains may be requested at the time of subdivision application to demonstrate the feasibility of gravity flow connections to proposed trunk sewers. In this manner, subdivision layouts which may result in the requirement for additional lift stations may be avoided.

Within the priority one and two groups for community sewerage systems, the Regional District may require subdivision developers to install collection mains which would be placed into service at the time of the system construction. In this manner, the capital cost for collection system components of the proposed system will not increase significantly in relation to preliminary cost estimates presented herein. The overall financial feasibility of the systems may be improved if additional development is permitted together with components of collection systems.

Requiring subdivision developers to install collection mains which would be incorporated into a future community sewerage system will result in additional servicing costs which will be reflected in lot prices. It should, however, be recognized that sewage collection main construction costs at the time of subdivision are significantly lower than construction of similar systems subsequently. Factors contributing to the cost economy include:

- flexibility to locate sewer mains anywhere within the road right of way to reduce manhole requirements. Within existing development areas, paved surfaces are a major alignment constraint and usually result in a larger number of manholes and other appurtenances as compared to designs which may have been possible at the time of subdivision.
- pavement and other restoration costs are avoided. Restoration allowances made in preliminary cost estimates presented in this Waste Management Plan range between 10% and 30% of the basic pipe installation cost.

- conflicts which inevitably result with other utilities such as hydro, natural gas distribution systems, telephone, water mains, storm sewers and culverts are avoided. Conflicts with existing utilities during the installation of sewer systems in developed areas inevitably occurs and is reflected by higher construction costs.
- service connections will be installed to property line and marked as to location and depth. The property purchaser can then plan his house layout and lot landscaping in such a manner that a future connection to the system can be completed with a minimum of disruption and restoration to his property.

Collection system components, if installed at the time of subdivision with other utilities, will represent an additional cost to the developer of about $1000 to $1500 per lot in a low density residential development. The per lot cost assumes that sewer mains will generally service lots fronting on each side of a road and include allowances for appurtenances and service connections. To provide a comparison, sewage collection system costs described herein for construction in existing developed areas have the following per parcel costs:

Tugulnuit Lake Area	$ 3200/lot ±
Northwest Osoyoos	$ 3300/lot ±
Skaha Estates	$ 4600/lot
Vaseux East	$ 2100/lot

None of the above per lot costs include lift station or forcemain systems which would normally be classified as trunk sewer components. On a per lot basis, the East Vaseux Lake system cost is $2100 per unit, however, it should be recognized that the system comprising low pressure and gravity septic tank effluent collection was proposed to minimize capital costs.

In summary, it is suggested that the Regional District evaluate implementing a policy requiring a thorough evaluation of individual on-site and community sewerage system options as a condition of

approval of larger low density residential subdivisions. The objectives of the policy are to reduce the possibility of future on-site system operational problems in hillside development areas and ensure that the sewerage system concepts described herein are considered in the layout and planning of subdivisions in areas to be serviced by sewerage systems in the future.

12.4 Waste Management Objectives for Agricultural Operations

12.4.1 Objectives

From the outset of the Waste Management Plan for Electoral Areas A, C, and D, concern has been expressed about the potential impact, including phosphorus loadings, from agricultural operations. While agricultural operations are technically outside of the terms of reference of this Waste Management Plan, some comments and general recommendations related to waste management from livestock operations were considered appropriate.

The objective of this policy is to include recognition of good waste management practices in Regional District prepared Community Planning documents which describe permitted livestock-related land uses in agricultural areas. By including references to acceptable waste handling and disposal practices as compiled by the B.C. Ministry of Agriculture (5) (6), the level of awareness by individual operators may increase. Increased awareness may then result in greater attention to waste handling and disposal practices by operators which could be reflected by a reduction in phosphorus loadings related to livestock.

The objective of a policy statement by the Regional District related to livestock operations is not to impose a rigid set of regulations on the agricultural community nor to set up a system of inspection and monitoring. Such an approach involving regulation and inspection may represent a significant financial impact on existing operations in the Southern Okanagan.

The focus group for the proposed policy statement are small agricultural operations generally involving cattle pasturing on lands within the Okanagan River floodplain area. From the north end of Osoyoos Lake to Okanagan Falls there are numerous small farming operations which represent the potential for significant phosphorus

and other "pollutant" loadings, recognizing that the river plain area has Moderately High to Very High phosphorus transmission classifications. Larger livestock operations are addressed in an Inventory Report (7) prepared by Talisman Land Resource Consultants for the Okanagan Water Quality Project. Okanagan Water Quality Project staff are working with these larger operations to ensure waste management practices in general compliance with accepted guidelines.

12.4.2 Implementation Implications

As described previously, the objective of a policy statement by the Regional District related to waste management practices for livestock operations is to emphasize the importance of environmental quality and increase the awareness of smaller operations. Therefore, it is not envisioned that the policy implementation would have a direct impact in terms of capital expenditures on individual operators.

The Ministry of Agriculture has published two sets of Environmental Guidelines for Beef and Dairy Producers in British Columbia. The preface to the guidelines clearly states that they are not intended to be adopted as legislation by senior or local government. The objective of increasing general awareness of acceptable waste management practices may, however, be achieved by references to the guidelines in Community Planning documents and related technical supplements.

The Ministry of Agriculture Environmental Guidelines present what is best described as common sense approaches to minimizing adverse environmental impact related to animal wastes. Specific waste related aspects addressed by the Guidelines include:

- site grading to divert runoff flow away from livestock holding areas.
- on-site runoff containment systems to minimize the discharge of runoff containing animal wastes to surface water courses.
- livestock water facilities to minimize direct livestock access to surface water courses.

- acceptable animal waste storage, handling and land disposal practices. Disposal practices described as not acceptable include spreading on steep ground, disposal onto frozen ground and disposal within designated floodplain boundaries.

In Section 3.1 of the Stage One Report, phosphorus loadings from agricultural operations within Electoral Areas A, C, and D were estimated to be 194 kg/year via runoff and/or direct discharge modes and about 284 kg/year via groundwater flow. Although these estimates are subject to review, the total loading which approaches 500 kg/year is significant, recognizing the total loading from all septic tank systems in the study area is about 2000 kg/year. Emphasizing the need for acceptable animal waste-related practices by the proposed policy statement described herein indicates the concern of the Regional District related to phosphorus loadings from livestock operations.

12.5 Septic Tank Pumpout Coordination and Operational Data Compilation

12.5.1 Objectives

During agency workshop meetings related to this Waste Management Plan, the importance of regular inspection and maintenance to ensure satisfactory performance of septic tank-disposal systems was emphasized by government agency representatives. Recognizing that individual septic tank and disposal systems would be used in the long term future by a population of about 6000 in the three Electoral Areas (population estimate assumes all 10 sewerage systems are built), the Regional District should, therefore, consider taking a direct role in the operation and maintenance of the systems. With involvement by the Regional District, adequate operation and maintenance of individual systems would be assured with the result that the number of malfunctioning systems and related problems would be reduced.

Specific suggestions for involvement by the Regional District related to septic tank and disposal systems in Electoral Areas A, C, and D include:

- coordination of a central data file system related to system malfunctions, locations, probable causes, etc. This data would be of benefit in the future associated with reviews or re-assessments of this Waste Management Plan.
- institution of a pumpout policy throughout the Electoral Areas whereby the Regional District would levy a parcel tax against each homeowner using septic tanks which would be used to pay for pumpout of septic tanks on an average three year interval. This direct involvement by the Regional District would ensure that a majority of septic tanks are pumped out on a regular basis.
- with cooperation of the Ministry of Health, encourage the distribution of Ministry pamphlet containing information on septic tank operation and maintenance. The objective is to increase public awareness of the importance of operation and maintenance of septic tank and disposal systems.

12.5.2 Implementation Implications

One suggestion related to individual on-site septic tank systems involves the maintenance by the Regional District of records of system malfunctions, failures and repairs. The information would be of assistance in future revisions of the Waste Management Plan, land use and residential density decisions and identifying/confirming the need for alternative systems. This Waste Management Plan addresses in a general manner the performance of existing disposal systems based on observations of Ministry of Health staff. Statistical data which could be derived from the record system as proposed would have been of great assistance for this Plan in confirming wastewater related concern areas and defining the relative priority of proposed community systems.

Establishing a central data file system related to septic tank system performance will require the assistance of the Ministry of Health. Ideally, the system would simply involve a data file of information provided by the Ministry of Health. In this manner, involvement by Regional District staff in terms of time commitments can be minimized.

The second component of this policy would have the Regional District ultimately assume an administrative role in terms of having septic tank pumpout being carried out throughout the three Electoral Areas. In concept, the Regional District would levy an annual tax which would "entitle" each contributing property owner to a septic tank pumpout every three years or other predetermined interval. The Regional District may be able to provide the service at a somewhat reduced cost because of the number of pumpouts required and through coordination of a significant number of pumpouts at one time in a specific area. With Regional District coordinating pumpout services, adequate maintenance of septic tank systems in terms of pumpout would be assured and reflected in fewer malfunctioning system reports.

The pumpout service proposal is somewhat unique for British Columbia as the operation and maintenance of individual systems has been traditionally the responsibility of the homeowner. Implementation of a pumpout program may require amendments to the District's Letters of Patent and careful evaluation of the jurisdiction of the District over facilities which are located on private property.

Administrative structures whereby a regional government has jurisdiction over individual on-site disposal systems have been established and operate in the United States. (8) (9) Septic tank pumpout services have been combined with Certificates of Occupancy which are issued when a property is sold. In this example, a Certificate of Occupancy to the property purchaser is not issued until a statement of septic tank pumpout from a certified contractor is received. Another approach involves a mail-out to homeowners giving the homeowner 60 or 90 days to provide certification that their septic tank has been pumped out. If the requested documentation is not provided in the time period specified, the regional government arranges for the pumpout and invoices the property owner.

Whether the Regional District should assume a jurisdictional role related to septic tank pumpout services requires careful consideration. There are similar examples in the United States which warrant examination in the evaluation process. Several potential problems which would have to be addressed in a more detailed assessment of the pumpout function include:

- variable public opinion. Many people feel that septic tanks should never be pumped out. Reasons include, care to avoid "flushing" large solids into the system, periodic addition of a variety of "enzyme" products, periodic addition of fertilizers to the system, etc. A percentage of the public will be of the opinion that septic tank pumpout is unnecessary and a waste of taxes.
- taxes collected to provide pumpout service at some future date may complicate land transfer-sales transactions.

- complications could develop should frequent pumpouts be required on a malfunctioning or failed system. The public would have to be aware that one pumpout service every three years is paid for by the Regional District and any additional pumping costs are their responsibility.
- two septic tank systems are not uncommon servicing older homes. These systems would represent a complication which would have to be addressed in the taxation structure.
- complaints will arise from residents who have had their tanks pumped immediately preceding implementation of the program.
- multi-acre lots, like orchards, often have more than one dwelling unit. There is some justification for exempting large lots because a failure seldom impacts a neighbour and adequate space for a replacement system is not a concern.
- commercial developments including campgrounds, motels, etc. represent a complication for the rate structure. If included in the program, an equivalent residential unit rate structure would have to be derived.

The preceding are examples of complications which will have to be addressed if the Regional District decides to evaluate implementation of a pumpout program.

Recommendations relating to the Regional District coordinating a public information pamphlet on septic tank operation and maintenance may be considered as a first step in becoming involved with the individual systems. The objective is the same as the pumpout program but not involving direct jurisdictional involvement of the Regional District. The informational pamphlet should be prepared in consultation with the Ministries of Health and Environment and pumpout service contractors. Distribution together with annual tax notices may be considered.

12.6 Implementation Recommendations

The Waste Management Policies described in Sections 12.1 to 12.5 were the subject of review meetings involving Regional District administrative staff and representatives of Provincial Government agencies on February 23, 1988, May 17, 1988 and November 10, 1988. Implementation procedures related to the Waste Management Policies were a major topic of discussion at the November 10, 1988 meeting. Paragraphs following summarize conclusions reached at the November 10, 1988 review meeting related to the Waste Management Policy Statements.

12.6.1 Minimum Residential Lot Size

Implementing the policy described in Section 12.1 which would result in increasing the minimum lot size for residential development to be serviced by individual septic tank and tile field systems will first require amendments to Community Plans. The Community Plans which are affected are:

- Osoyoos' Community and Settlement Plan
- Oliver South Extended Fringe Community Plan
- Oliver's Community and Settlement Plan
- Gallagher-Vaseux Lake Settlement Plan
- Okanagan Falls Settlement Plan
- Kaleden Settlement Plan
- Penticton Fringe Settlement Plan

Implementation of Community Plan amendments related to the minimum parcel size for residential development will require public meetings prior to formal acceptance by the Regional Board. Following acceptance of the Community Plan amendments, increased minimum parcel sizes would be implemented through revisions to zoning bylaws for each of the Community Planning areas. The zoning bylaw amendments would also involve public hearings prior to formal approval by the Regional Board.

12.6.2 Alternative On-Site System Design Criteria

The R.D.O.S. Board has previously, by resolution, indicated to the Provincial Government its support for revisions to design standards for individual septic tank effluent disposal systems which would reduce the potential of adverse environmental impact. Prior to the R.D.O.S. Board considering the adoption and implementation of revised standards, proposed standards will have to be finalized by Provincial Government agencies involved, including the Ministry of Health, Ministry of Environment, and Ministry of Municipal Affairs. The status of the preparation of the revised standards as of November 1988 is uncertain. Once finalized guidelines are forthcoming from the Provincial Government, the R.D.O.S. would implement the standards through revisions to the Subdivision Control Bylaws for each Community Planning area. In the interim, it is suggested that the R.D.O.S. Board re-affirm its previous resolutions related to design standards for individual septic tank and tile field systems and make the Provincial Government aware of its position.

12.6.3 Alternative System Evaluation at Time of Subdivision

The requirement for evaluation of alternative sewerage systems concurrent with subdivision proposals should be considered and become accepted policy by a resolution of the Regional Board. After acceptance by the Regional Board, the policy would be implemented by amendments to the relevant Subdivision Control Bylaws. Regional District administrative staff have indicated that a protocol has already been established with the Regional Approving Officer of Subdivisions in terms of referral and an understanding that the subdivision is considered on the basis of an ultimate lot yield as compared to the number of lots in an individual phase. In this manner, the objectives of the Alternative System Evaluation Policy cannot be avoided by a developer by proposing the development of a subdivision in several phases of a modest number of lots.

12.6.4 Waste Management Objectives for Agricultural Operations

Section 977 of the Municipal Act "Intensive Agriculture" describes jurisdictional aspects available to the Regional District in terms of setting policies and conditions for approval of agricultural operations. Section 977 of the Municipal Act has been withdrawn by the Provincial Government for revisions. Therefore, the Regional District has no jurisdiction related to agriculture operations until such time as Section 977 or a substitute is implemented. The Ministry of Agriculture, as of November 1988, has complete jurisdiction related to the regulation of intensive agricultural operations. The policy statement related to agricultural operations cannot be considered by the R.D.O.S. until such time as jurisdictional authority is established for Regional Districts.

12.6.5 Septic Tank Pump-Out Coordination and Operational Data Compilation

The proposal for the Regional District to expand its functions to include the regulation and coordination of septic tank pump-out services throughout the Waste Management Plan area has been discussed at length at review meetings. While the potential benefits of the program are recognized, the Regional District does not have the resources to administer the program. Serious concerns are detailed in Section 12.5 related to the public acceptance of the proposed role of the Regional District related to septic tank pump-out services. It is, therefore, not recommended that the Regional District proceed on a priority basis with the Septic Tank Pump-Out Coordination Program. The potential benefits and administrative implications of the policy may, however, warrant consideration at some future date associated with amendments to this Plan.

The proposal for the Regional District to establish a data base for operational problems related to septic tank systems is important to establish a data base for future Waste Management Plan amendments. An information referral system should be set up by administrative staff of the Regional District by expanding communication procedures currently in place with the Ministry of Health.

The Stage One Report identified 10 areas in Electoral Areas A, C and D where there was a sufficient population concentration to warrant the evaluation of an alternative community type sewerage system. Preliminary evaluations of sewerage system options are presented for all ten areas in the Stage One Report. On the basis of these preliminary Stage One Report analyses, priority groupings were established based on wastewater related concerns resolved (including phosphorus removal) and capital cost. The priority groupings are:

Group One (Highest Priority)

Osoyoos Northwest Sector
Tugulnuit Lakeshore (North of Oliver)
Sawmill Road Area (South of Oliver)

Group Two

Osoyoos Southeast Sector
South Vaseux Lake
East Vaseux Lake

Group Three (Lowest Priority)

Gallagher Lake
Kaleden Lakeshore
Skaha Estates
Osoyoos Southwest Sector

This Stage Two Report presents a more detailed analysis of collection system options, capital costs and user rates for the three areas identified as Group One (Highest Priority) and the three areas classified as Group Two priority. No additional information is presented in this Stage Two Report for the four areas having Group Three priority (Lowest Priority). The Stage One Report should be reviewed for information on alternative systems for these four areas.

The evaluation of alternative sewerage systems for ten areas within Electoral Areas A, C and D is summarized in Table 13.1. On the left portion of the Table, the preferred alternative system, capital cost, phosphorus loading and capital cost per kg per year of reduced phosphorus loading are given. Other waste management concerns relate to information from the Ministry of Health and whether existing individual septic tank and tile field systems represent a concern to groundwater contamination, adverse impact to surface water courses or public health in general. For the Osoyoos Northwest Sector and the Tugulnuit Lakeshore Area, the Ministry of Health has concerns about inadequate lot size for individual wells and sewage disposal systems and contamination of lakewater adjacent to each area. A potential concern is given for the Sawmill Road Area recognizing that all houses in the area are serviced by individual wells and disposal systems and the entire area is subject to high groundwater table conditions.

The right half of Table 13.1 summarizes the user cost data of the Stage Two Report for all systems in the Group One and Group Two Priority category. User cost data for the Group Three systems has been derived from the Stage One Report. The tabulation for the Group Three systems is not complete for several areas because the assessment of the alternatives was not carried out to the Stage Two level of detail. References are given in the extreme right column of Table 13.1 where more detailed cost and system description information can be obtained.

Annual debt retirement costs given in Table 13.1 are based on a zero (0%) level of assistance from senior government. If, for example, a 50% level of capital cost assistance were provided by the Provincial Government, the debt cost component could be reduced by one half. Ranges are given for operation and maintenance costs and connection fees depending on whether the collection system proposed is a conventional gravity system (lowest cost) or a low pressure system requiring the homeowner to supply, install, operate and maintain a septic tank effluent pump. Prior to implementation of any of the collection systems, a more detailed analysis of user costs is

required. A scale of connection fees depending on type (i.e., low pressure or conventional) and supply of individual pumps as system capital cost may be considered to reduce the range of actual costs to the homeowner.

Section 12 of the Stage Two Report describes general Waste Management related Policies which the Regional District could consider adopting and/or incorporating into Community Planning documents zoning bylaws and other land use related bylaws. These Waste Management Policies would generally apply to development not proposed to be ultimately serviced by a community sewerage system or where the community sewerage system construction is likely to not occur in the short to mid term future, i.e., areas in Priority Group Three. Recommended general Waste Management Policies are summarized as follows:

12.1 Minimum Residential Lot Size

The minimum parcel size of 836 m^2 (9000 $ft.^2$) where community water system service is available and individual on-site sewerage system is used, is considered to be too small to provide a reserve area for system replacement (if necessary) and meet phosphorus removal objectives. It is recommended that the Regional District adopt a minimum parcel size of 1672 m^2 (18000 $ft.^2$) for houses to be serviced by individual sewage disposal systems and where the proposed lot is within an area having a Very High, High or Moderately High phosphorus transmission classification as shown on Ministry of Environment Phosphorus Transmission Maps. Implementation of this policy will require amendments first to Community Plans throughout the Waste Management Plan area and secondly to zoning bylaws.

12.2 Alternative On-Site System Design Criteria

The Ministries of Health, Environment and Municipal Affairs are jointly preparing revised design standards for individual septic tank and tile field systems which have a minimum 80% phosphorus removal objective. Subject to review of the standards upon completion by the

Provincial Government, it is recommended that the R.D.O.S. formally accept the standards. In the interim, it is suggested that the R.D.O.S. Board reaffirm their prior resolutions supporting the concept of disposal system design standards which recognize phosphorus removal objectives.

12.3 Alternative System Evaluation at the Time of Subdivision

The objective of this policy is to ensure a thorough review of all wastewater disposal alternatives at the time of subdivision. In the future, the majority of residential development is likely to occur on hillside areas in the southern Okanagan Valley where there may be a significantly greater number of factors, including lower permeability soil types, bedrock, topography, etc. influencing the satisfactory long term performance of individual disposal systems. Accordingly, this policy would make a thorough analysis of options a condition of subdivision approval. Implementation of this policy will require a resolution of the Regional Board and amendments to Subdivision Control Bylaws.

12.4 Waste Management Objectives for Agriculture

Agricultural operations represent a significant potential source of phosphorus in Electoral Areas A, C and D. This policy would involve recognition of the Ministry of Agriculture Environmental Guidelines in sections of Community Planning documents relating to Agricultural Land Use. It is not intended that the Regional District would become actively involved inthe regulation and inspection of agricultural operations. Until Section 977 of the Municipal Act relating to intensive agriculture is revised and accepted by the Provincial Government, the Regional District has no jurisdictional authority to consider this proposed policy statement.

12.5 Septic Tank Pump-Out Coordination and Operational Data Compilation

Suggestions were made during review meetings and workshop sessions that the Regional District should consider expanding their functions to include pump-out of individual septic tanks. Through a taxation levy, the Regional District would obtain sufficient funds such that each homeowner having a septic tank would receive a pump-out service at three year intervals. Implementation of the policy is not recommended in the short term future recognizing potential adverse public opinion and the lack of staff and resources of the Regional District to administer the program. A referral system with the Ministry of Health is recommended so that the Regional District can establish a data base of septic tank malfunctions-failures. The information will be of benefit to future amendments of the Plan and can be set up by expanding referral procedures currently in place with the Ministry of Health.

Stage Two Report

BIBLIOGRAPHY

(1) "Sewer and Water Study, The Village of Oliver", Urban Systems Ltd., February, 1986.

(2) "Soil Suitability for Septic Tank Effluent Absorption", B.C. Ministry of Environment, Sheet 82E-013.

(3) "Technical Supplement to Oliver's Community and Settlement Plan", Regional District of Okanagan-Similkameen, March 1980.

(4) Letter dated 25 January 1988 to Regional District of Okanagan-Similkameen from Agricultural Land Commission.

(5) "Environmental Guidelines for Beef Producers in British Columbia", Agricultural Engineering Branch, B.C. Ministry of Agriculture and Food, 1979.

(6) "Environmental Guidelines for Dairy Producers in British Columbia", Agricultural Engineering Branch, B.C. Ministry of Agriculture and Food.

(7) "Agricultural Phosphorus Source Inventory for the Okanagan Water Quality Project", Talisman Land Resource Consultants, December, 1986.

(8) "Report to the Skeena Union Board of Health on Cost Effective, Small Scale Sewerage Systems", W. Bailey, P.Eng., B.C. Ministry of Health, September, 1983.

(9) "Planning Wastewater Management Facilities for Small Communities", United States Environmental Protection Agency, EPA - 600/8-80-030, August, 1980.

(10) "Alternatives for Small Wastewater Treatment Systems, Pressure/ Vacuum Sewers", United States Environmental Protection Agency.

TABLE 13.1

ALTERNATIVE SYSTEM SUMMARY

AREA	ALTERNATIVE SYSTEM	CAPITAL COST	OTHER WASTE-WATER CONCERN	PHOSPHORUS LOAD. REDUCTION (1)	COST PER kg/yr.	USER COST DATA					
						SYSTEM TYPE (2)	DEBT COST/Lot (3)	OPERATION COSTS (4)	TOTAL ANNUAL COSTS	CONNECTION COSTS (5)	REFERENCE (6)
GROUP 1											
Osoyoos Northwest	Connect to Osoyoos	$ 955,000	Yes	205.6	$ 4650	CGS & GSTE & LPS	$ 640	$90 - $180	$730 - $820	$500 - $1300	Stage II Sec. 11.1
Tugulnuit Lakeshore	Connect to Oliver	611,000	Yes	197.5	$ 3100	CGS & LPS	$ 480	$72 - $162	$552 - $642	$300 - $1100	Stage II Sec. 11.2
Sawmill Road	Connect to Oliver	360,000	Potential	143.7	$ 2500	LPS	$ 500	$162	$662	$1100	Stage II Sec. 11.3
Subtotals		**$1,926,000**		**546.8**							
GROUP 2											
Osoyoos Southeast	Connect to Osoyoos	$ 452,000	Potential	76.4	$ 5950	CGS & LPS	$ 415	$ 90(±)	$505(±)	$ 500	Stage II Sec. 11.4
South Vaseux Lake	Community Disposal Field	135,000	Potential	39.2	$ 3440	LPS	$ 705	$294	$999	$1100	Stage II Sec. 11.5
East Vaseux Lake	Community Disposal Field	211,000	Potential	30.5	$ 5300	GSTE & LPS	$ 570	$250- $310	$820 - $880	$300 - $1100	Stage II Sec. 11.6
Subtotals		**$ 798,000**		**146.1**							
GROUP 3											
Gallagher Lake	Treatment & Disposal Vaseux Creek Area	$ 588,000	No	77.4	$ 7600	CGS	$ 430	not est.	-	not est.	Stage I Sec. 7.3
Kaleden Lakeshore	Connect to Okanagan Falls	788,000	Yes	77.0	$10200	CGS & LPS	$ 1110	not est.	-	not est.	Stage I Sec. 8.3
Skaha Estates	Connect to Okanagan Falls	1,428,000	Potential	129.9	$11000	CGS	$ 1070	not. est.	-	not est.	Stage I Sec. 8.2
Osoyoos Southwest	Connect to Osoyoos	187,000	No	62.2	$ 3000	CGS	$ 510	$ 90(±)	$600	$ 500	Stage I Sec. 6.3
Subtotals		**$2,991,000**		**346.5**							
TOTALS		**$5,715,000**		**1039.4**							

(1) Reported in kg/year.

(2) Collection System Type: CGS - Conventional Gravity Sewer;
LPS - Low Pressure Septic Tank Effluent; GSTE - Gravity Septic Tank Effluent

(3) Capital Cost Debt Retirement With 0% Senior Government Contribution

(4) Includes homeowner costs for pump and septic tank maintenance and operating authority O & M costs

(5) Includes connection fees and pump installation where required

(6) Section where detailed information is presented.