OOTISCHENIA IMPROVEMENT DISTRICT

Capital Expenditure Charge (CEC) Report, April 2007

WARD ENGINEERING AND
LAND SURVEYING LTD.

WARD ENGINEERING AND
LAND SURVEYING LTD.

OOTISCHENIA IMPROVEMENT DISTRICT (OID)

CAPITAL EXPENDITURE CHARGE (CEC) REPORT, APRIL 2007

DRAFT

Ward Engineering and Land Surveying
Suite 1, 609 Baker Street, Nelson, B.C. V1L 4J3 Tel: (250)-354 1660 Fax: (250) 354-1670

EXECUTIVE SUMMARY

This report has been based on the procedures outlines in the Ministry of Community Services – Improvement District Manual. We have used a timeline for the next 20 years and have assumed that the Ootischenia Improvement District boundaries will not be expanded during that time.

We have also assumed that the number of connections on the system will increase from 324 to 1200 as land within the OID is subdivided into minimum ½ acre (2025m^2) lots. Based on the cost of the improvements required to service 1200 lots, we have calculated that the Capital Expenditure Charge should be increased from $4000 per lot connection to **$7350 per lot connection**.

Based on existing development conditions the current average taxation rate is approximately $330 per lot connection. Of this, $165 (50%) is allocated to capital improvements to the system. As more connections are added to the OID at an assumed rate of 60 connections per year the tax rate allocated to capital improvements can be reduced from an average of $165 to $100 (based on full build-out of 1200 lots).

DRAFT

DRAFT

DRAFT

LIST OF FIGURES

DRAFT

1. PURPOSE OF REPORT

1.1. Purpose of Report, Sources of Information and Design Guidelines Used

The purpose of this report is to provide the Ootischenia Improvement District (OID) with a sound basis for the calculation of Capital Expenditure Charges (CECs) to be applied to future developments within the present OID Service Area.

Information used in the preparation of this report includes the following

I. Comprehensive Water System Study (CWSS), dated January 2002, by Urban Systems
II. Well Pump flow data supplied by the OID
III. Ootischenia Planning Review (in progress) - documents supplied by the Regional District of Central Kootenay (RDCK)
IV. The British Columbia "Improvement District Manual", dated March 2006, by the BC Ministry of Community Services

Design Guidelines used include the following:

I. Ootischenia Improvement District – Water System Design and Construction Specifications, June 1999
II. Design Guidelines for Rural Residential Community Water Systems, 2000
III. Handbook of Public Water Systems, Second Edition
IV. Master Municipal Construction Documents (MMCD)

1.2. Summary of Report Procedure

This report examines the existing development conditions of the OID service area and the existing OID water system, utilizing up to date information from the OID, RDCK, the Ministry of Community Services, and information from the 2002 Comprehensive Water System Study (CWSS). Then, following the Ootischenia Planning Review, a development projection is made to establish the maximum possible density of the OID, within its current boundaries.

Next, the existing water system is analyzed to determine capital improvements required to upgrade the system as development occurs. A list of all proposed capital improvements required is established. A detailed cost estimate of all proposed capital improvements is prepared, and costs are allocated to either existing users or to new users via the Capital Expenditure Charge (CEC).

The proposed capital improvements are then sorted into a "Works Plan" based on a prioritized list of improvements. This works plan recommends improvements over time. All of this information is gathered into a Capital Expenditure Program in which taxation and CECs are applied to the anticipated development. This information, along with current taxation figures, is used to establish appropriate taxation rates.

Finally, a chart of the anticipated CEC fund balance and the anticipated taxation fund balance is created as a guide for future capital improvement budgeting.

DRAFT

1.3. Summary of Report Findings & Recommendations

The following is a summary of the recommendations found in this report:

I. We recommend that the Ootischenia Improvement District verify the accuracy of all existing system well flow data used in the preparation of this report with data recorded through the summer of 2007 using the new SCADA system. It is then recommended that this report and the resultant CEC Bylaw be reviewed to determine whether the CEC calculations require revision.

II. A total of 1200 lots at full build-out of the OID service area has been used for all future projection calculations. We have assumed a time period of 20 years for this development to take place. We recommend that the OID review the Ootischenia Planning Review currently being undertaken by the RDCK to verify the proposed zoning that will allow for ½ acre lots within the OID service area is implemented.

III. The following is a list of all capital improvements recommended in this report:
   i. 3 New Wells @ 280 USGPM each
   ii. 2200 l.m. of 200mm Diameter Raw Water Supply Pipe
   iii. 950 l.m. of 150mm Diameter Raw Water Supply Pipe
   iv. 2 new reservoirs @ 575,000 USGal each
   v. 2 – Chlorine (Cl_2) Treatment Facilities
   vi. 17,100 l.m. of 200mm DIA Water Distribution Pipe
   vii. 29 new hydrants
   viii. 87 new 200mm gate valves
   ix. 2 new Pressure Reducing Stations (PRVs)

IV. The above capital improvements present the following costs, allocated to the existing users group and the Capital Expenditure Charge:
   i. Cost of all proposed capital improvements = $7,959,495
   ii. Cost of proposed capital improvements allocated to existing users group = $1,521,416
   iii. Cost of proposed capital improvements allocated to the CEC = **$6,438,079**

V. We recommend that the following Capital Expenditure Charge be applied to all new lot connections:
   i. **$6,438,079** (total CEC cost) / **876** (total new services) = **$7350 per new lot connection**

DRAFT

2. EXISTING OID LAND USE

2.1. Location & Area

The OID Service Area is located approximately 2km east of the City of Castlegar, on the east bank of the Columbia River. It is comprised of three benches of land and is located adjacent to the Castlegar Golf Course. Map 3.0 in Appendix B shows the OID Service Area.
The RDCK has split the OID into the following planning sub-areas:

- Highway 3A – Airport Bench
- Bridgeview Subdivision – Waterloo Road Bench
- Hwy 3A – RDCK Landfill Bench

2.2. Existing Development Conditions

The OID Service Area comprises a total land area of approximately 480 ha (1190 Ac.). The majority of the land within this area is zoned Agriculture 4 (AG4), with a minimum lot size of 2 ha (5 Ac.). Pockets of residential zoning with greater densities have been allowed. The Bridgeview Subdivision being the primary example.

The RDCK is currently in the process of revising the zoning and official community plan (OCP) bylaws for areas within and surrounding the OID. The RDCK has placed a moratorium on rezoning applications pending completion of the OCP & Zoning review. Likewise, the OID will not grant any further water connections to newly subdivided lots until a new CEC Bylaw is in place. The planning process has established that the ability to have ½ acre lots within the OID service area is the desire of the majority of residents. Therefore, the developable land within the OID will be rezoned to ½ acre. This ½ acre proposed density forms the basis of this report with respect to number of future service connections that will be included in the OID.

DRAFT

3. EXISTING WATER SYSTEM INFRASTRUCTURE

3.1. Summary of Comprehensive Water System Study Investigations

In 2002 Urban Systems Ltd completed a report *Analysis, of the 2002 Comprehensive Water System Study (CWSS).*

Urban Systems completed the following work:

- *a topographic survey was completed to locate precise elevations and general locations of wells, reservoir, pressure reducing stations, pumphouses, hydrants and general ground elevations along the watermain alignments.*
- *all five wells were flow tested by a hydrogeological engineer and assessed for general performance and capacity.*
- *all five well pumphouses, reservoir and two pressure reducing stations were inspected by a civil engineer and an electrical engineer and assessed for conformance to current electrical codes and for conformance to accepted municipal standards.*
- *all twenty three fire hydrants were flow tested.*
- *Wells No. 2, No. 3, No. 4 and No. 5 pumps were flow tested to determine the present pumping rates of each well pump.*
- *the water usage was measured in the reservoir in late November, 2000 between 12:01 a.m. and 4:30 a.m. to determine the night – winter system demand and potential system leakage.*
- *the Ootischenia Improvement District as-built drawing records were reviewed in order to compile a composite map of existing watermain sizes and material types. The water system operator and previous Ootischenia Improvement District Trustees were consulted.*
- *a computer water model was prepared and calibrated to simulate existing system conditions.*

Ward Engineering has reviewed the Urban Systems findings and has compared them with up-to-date data supplied by the OID. We conclude the following:

I. The flow tests mentioned above have been replaced with more up-to-date flow information as supplied by the OID. See Supporting Documents S.D. 1 – 3 in Appendix A for basic details of well capacities used in this report.
II. Information in regards to the pumphouses, reservoirs, and pressure reducing valves, were reviewed by Ward Engineering and analysed against up-to-date information.
    i. The pumphouses are currently bunker style.
    ii. The storage capacity of the existing reservoir has not changed since the 2002 report. And the reservoir is deemed to be in the same general condition as stated in the 2002 report.
    iii. PRV #2 has been replaced, as recommended in the 2002 report. PRV #1 remains in the same general condition it was in at the time of the 2002 report.
III. The Digital Mapping included in the 2002 report has been used as the foundation for information on the overall existing water system.

DRAFT

3.2. Summary of Existing Water System Infrastructure

3.2.1. Water Supply

Four wells currently supply all water to the OID residents. Three of these wells (2, 3 & 4) are located on the HWY3A – RDCK Landfill bench, and one (#5) is located above the existing reservoir. Well #1 is not currently in operation. Map 3.0 in Appendix B shows the locations of all five wells.

Existing Well Flow Data, as provided by the OID, takes into consideration a certain amount of interference between wells. Because existing wells # 2, 3 & 4 currently tie directly into the distribution piping, flow is reduced due to friction loss in the pipes from the simultaneous operation of the well pumps. Wells # 3 & 4 experience a particularly large amount of friction loss due to their close proximity to each other. Currently, the only well directly connected to the existing reservoir is well #5. Supporting Document #1 (S.D #1) in Appendix A shows a comparison of the resulting well flow capacities depending on the combination of wells in operation.
Below is a summary of the existing well capacities. All individual well supply capacities have been calculated based on a maximum of 18 hours of operation per day of any well pump.

I. Maximum Pump Capacities:
(including friction loss from simultaneous operation of pumps)
(See Supporting Document S.D. 1 in Appendix 'A')
Well #2 @ 320 USGPM
+ Well #4 @ 340 USGPM
+ Well #5 @ 250 USGPM
= 910 USGPM

II. Existing Average Peak Day Usage
(See Supporting Document S.D. 2 in Appendix 'A')
= 667,309 USGal/Day

III. Existing Average Peak Day Usage per Service
(See Supporting Document S.D. 3 in Appendix 'A')
= 667,309 USGal/Day
296 *Active* Services
= 2254 USGal/Day

IV. Maximum Day Supply Available:
(Wells # 2, 4 & 5 in operation for 18 hours per day)
= 910 USGPM x 60 x 18
= 982,800 USGal/Day

V. Maximum Day Supply per Service Connection
= 982,000 USGal/Day
324 Available Services
= 3033 USGal/Day

From this information it is concluded that the existing system capacity of 3033 USGal/Day is in excess of the existing system demand of 2254 USGal/Day. Therefore, the existing wells as they are presently configured are adequate for the existing condition.

Note:
The information provided by the OID, upon which these numbers are based, was derived from manually recording the flow meter and hour meter readings of each well pump through the summer and fall of 2006. The meters were recorded sporadically, during some periods on a daily basis, and during others at weekly or even monthly intervals. It is recommended that this data be reviewed and compared with SCADA system information obtained during the upcoming summer of 2007. Critical information to be verified is the existing peak day usage per service, which may have specific peak days above the data recorded in 2006. It is then recommended that this report and the resultant CEC Bylaw be reviewed to determine whether the CEC calculations need revision.

DRAFT

3.2.2. Water Storage

The existing reservoir storage capacity is approximately 73,000 US Gallons. It is located in close proximity to Well #5, which supplies raw water directly to the reservoir. As stated in the 2002 Comprehensive Water System Study, this reservoir is undersized for existing usage.

3.2.3. Water Distribution

The source of information on the existing distribution system has primarily been the 2002 Comprehensive Water System Study. No major upgrades to the distribution piping, hydrants, or gate valves have been undertaken since this study was completed. As such, these items have been assumed to be in the same general conditions stated in section 3.5.3 of the 2002 Report.

PRV #2 has been replaced and PRV #1 is in the same general condition as stated in the 2002 Report. PRV #1 is operational, but in sub-standard condition. PRV #2 is in adequate condition for current system requirements.

3.2.4. Service Connections

I. Active Services = 278 + 18 (2nd Temporary) = 296
   i. 2nd Temporary Services are the second service to one of the 278 actively serviced lots
   ii. This number (296) was used in calculating the existing system flows per service in 2006
II. Dormant Services = 15
   i. Lots with service connections that remain unused as of 2007
III. Vacant Lots = 31
   i. Lots with no service connection constructed.

IV. Total Existing Services = 296 + 15 **= 324**

DRAFT

4. PROPOSED OID LAND USE

4.1. Summary of the Ootischenia Planning Review

The Ootischenia Planning Review is in the process of instituting a new zoning bylaw and a new official community plan bylaw for lands within and surrounding the OID.

The most current draft of the "Bylaw to amend the Kootenay-Columbia Rivers Official Community Plan Bylaw No. 1157, 1996" states:

3.10.3.1.2 Land Designated as Ootischenia Suburban Residential as shown on Schedule "B" shall be permitted for subdivision into lots less than 1 ha only where water service is provided by the Ootischenia Improvement District.

And,

3.10.3.1.4 In Support of the Ootischenia Improvement District the Regional District does not support the creation of independent community water systems intended to operate within the service area of the Ootischenia Improvement District.

The most current draft of the "Bylaw to amend Regional District of Central Kootenay Zoning Bylaw No. 1675, 2004" defines an additional zoning designation to be added to "Division 7, Suburban Residential (R1) zone". This new designation is named Ootischenia Suburban Residential (R1A), and, within the OID boundaries, coincides with the land designated as such in the official community plan amendment stated above. The following conditions apply to the R1A zone:

1 The minimum site area for the following uses shall be required as follows:

	LEVEL OF SERVICES PROVIDED	
	Community Water Supply	*On Site Servicing Only*
Single Detached Dwelling	*0.2 hectares*	*1 hectare*
Duplex Dwelling	*0.4 hectares*	*1 hectare*

Note: 0.2 hectares = 0.5 acres

Detailed information on the Ootischenia Planning Review, including draft bylaws and Maps, is available online at: http://www.rdck.bc.ca/development/planning/projects/ootischenia_planning_review.html

DRAFT

4.2. Development Projections

Under the amendments proposed in the Ootischenia Planning Review the OID will consist of approximately 380 hectares of land zoned R1A. It is this land use designation that is the primary source of development projections within the OID.

Other notable Land Uses within the OID boundaries include:

I. Little Bear Golf Course, consisting of approximately 12.2 ha
II. The Cemetery on Waterloo Road, consisting of approximately 10.5 ha
III. Commercial and Industrial sites along Highway 3A, consisting of approximately 8.75 ha
IV. Light Industrial sites along Highway 3A, consisting of approximately 3.4 ha
V. A large Open Space area on the east side of Highway 3A, consisting of approximately 60.7 ha

Utilizing the above information, the following Development Projections have been made:

I.	Total Area of land zoned R1A	= 380.06 ha
II.	Undevelopable Area (Roads, ROWs, etc.) within land zoned R1A	- 40.35 ha
	i. consists of roads and right of ways within the R1A zoning	
III.	Undevelopable Lots within land zoned R1A	- 15.22 ha
	i. consists of miscellaneous lots (privately owned) that are undevelopable (i.e. greenspace lot between Columbia River & residential lots along Waterloo & Bridgeview, private lots currently sized at ½ acre, etc.)	
IV.	Total Area of Developable Lots within land zoned R1A	= 324.49 ha
V.	Road Allowance	- 64.90 ha
	i. allows for standard road r.o.w.'s within developable lots	
VI.	Slope Allowance	- 19.55 ha
	i. allows for undevelopable slopes within developable lots	
VII.	Total Future Lot Area	= 240.04 ha
VIII.	Future Lot Size	= 0.2 ha
IX.	**Total Number of Future Lots**	= 240.04 / 0.2 ha
		= 1200 lots

4.3. Additional Service Connections

I.	Total Number of Future Lot Services	= 1200
II.	Total Number of Existing Services	- 324
III.	**Total Number of Additional Services**	**= 876 new services**

DRAFT

5. PROPOSED WATER SYSTEM INFRASTRUCTURE

5.1. Analysis of Recommended Water System Upgrades

5.1.1. Water Supply

As per Section 3.2.1, the existing peak day usage per service connection is approximately 2254 USGal/Day. These services are un-metered.

Maximum day demand for metered services within arid climatic zones (as recommended in Table 2, Section 2.3 of the Design Guidelines for Rural Residential Community Water Systems), is 1400 Imperial Gallons per Day (1680 USGal/Day). It is recommended in this report that all future ½ acre lots within the OID be restricted to a flow no greater than this quantity.

These two sources of required flow capacity define two groups of users within the OID. The Existing Users Group, consisting of various sized lots and un-metered services, and the New Users Group, consisting of various sized lots (with ½ acre minimum size) and metered services. As development of the OID occurs the number of services in the existing users group will decrease, while the number of services in the new users group will increase. The balance of required flow capacity as a result of this shift is used to define the overall flow required over time, resulting in a final flow capacity required for full build-out (1200 lots). (See Supporting Document "S.D. 5" in Appendix 'A').

We have made the assumption that 60 ½ acre lots are developable in the OID service area each year over the next 20 years, for a total of: 60 lots/year X 20 years = 1200 lots.

To eliminate the interference between well pumps and allow the water supply to operate at its full potential capacity, it is recommended that dedicated raw water mains be constructed from all wells directly to the water storage in the proposed reservoirs. However, this improvement alone will not bring the existing system up to the required supply capacity that will be required in the next 20 years.

The following calculations show the total increase in system flow that will be required:

DRAFT

I. Required Supply at full build-out
= 1200 New Lots x 1680 USGal/Day (metered) = 2,016,000 USGal/Day

II. Existing Maximum Supply = 982,800 USGal/Day
(from OID well pump data)

III. Existing Supply with dedicated raw water mains = 1,177,200 USGal/Day
(from OID well pump data)

IV. Additional Supply Required = 2,016,000 – 982,800 = 1,033,200 USGal/Day
(under existing conditions)

V. Additional Supply Required with dedicated raw water mains
= 2,016,000 – 1,177,200 = 838,800 USGal/Day

Notes:

I. The wells and the pipelines to the wells are presently configured in such a way that when all wells are operating at the same time excess friction is built up in the pipe network that connects the wells to the reservoir and the well pumps are not able to pump at full capacity.

II. All well supply capacities have been calculated based on a maximum of 18 hours of operation per day for any well pump, existing or proposed.

DRAFT

5.1.2. Water Storage

Minimum requirements for water storage capacity for rural residential communities are defined in Section 7 of the Design Guidelines for Rural Residential Community Water Systems. To verify that these requirements will allow for adequate storage capacity for the specific conditions within the OID the "Handbook of Public Water Systems, Second Edition" was referenced. Using these sources the following calculations have been made:

Note: As calculated in Section 5.1.1 the Maximum Day Demand at full build-out of 1200 lots is 2,016,000 USGal/Day.

I. Required Storage at full build-out =
   i. 2,016,000 USGal (MDD) x 25% = 504,000 USGal – Operational Storage
   ii. 2,016,000 USGal (MDD) x 25% = 504,000 USGal – Balancing Storage
   iii. 2 hour fire @ 1000 USGPM = 120,000 USGal – Fire Flow Storage
   iv. Total = 1,128,000 USGal
II. Existing Storage = 73,000 USGal
III. **Additional Storage Required** **= 1,128,000 USGal ***

* The existing reservoir is vastly undersized. When additional storage is required due to additional system demand it is proposed that new reservoirs be constructed. Therefore the existing storage is not included in the additional storage required.

5.1.3. Water Distribution

The existing water distribution system is explained in detail in the Urban Systems 2002 Comprehensive Water System Study, and specific upgrades are recommended in order to bring the existing system to a reasonable standard based on the build-out of the OID under current zoning (primarily AG4). In order to bring the existing system up to a reasonable standard based on development under the proposed zoning (R1A), the recommendations from the 2002 report must be exceeded.

To determine reasonable upgrades to the distribution system, the Ootischenia Improvement District – Water System Design and Construction Specifications and the Design Guidelines for Rural Residential Community Water Systems were consulted.

Piping:

Following the OID Specifications a minimum 200mm diameter pipe is recommended for all future mainlines that supply fire hydrants & do not terminate at cul-de-sacs. It is proposed that, as the OID is developed to ½ acre lots, 200mm diameter pipe is constructed to replace the existing piping adjacent to each development. The system has also been analysed to define priority sections of pipe, which have been included in the works plan (See Section 7). The piping upgrades are designed such that at the time of full build-out all existing piping will have been abandoned, and all services and hydrants will have been connected to the new 200mm diameter piping system. Costs prepared for the installation of 200mm diameter distribution piping will include the transfer of existing services to the new piping.

DRAFT

Hydrants:

To define the necessary upgrades for hydrants three sources have been referenced.

I. A maximum hydrant spacing of 600m for existing development conditions is recommended in the 2002 Comprehensive Water System Study.
II. The Design Guidelines for Rural Residential Community Water Systems recommends a maximum hydrant spacing of 300m.
III. The OID Water System Design and Construction Specifications require a 150m maximum spacing through residential zones.

It is recommended that the 600m spacing from the CWSS be met as part of upgrading the existing system to a reasonable standard for existing development conditions. For the anticipated development conditions it is recommended that 300m maximum spacing be met. The 300m spacing is seen as a reasonable standard for the full build-out of the OID under the proposed zoning regulations.

Valves:

The OID Water System Design and Construction Specifications require a maximum in-line spacing of 200m for all gate valves on mainlines. It is recommended that this spacing be met along all proposed 200mm distribution piping. The exact locations of these valves shall be determined during the design of each section of distribution piping (See Section 7 for a more detailed distribution of valves).

Pressure Reducing Stations:

The existing system includes two pressure zones with two Pressure Reducing Valves (PRVs). PRV #2 has been recently replaced, as per the recommendation in the 2002 Comprehensive Water System Study. However, this PRV is has been sized for existing pipe sizes and flow conditions and is not adequate for final build-out of the OID. PRV #1 is in poor condition and is currently undersized. It is therefore recommended that both PRVs be replaced.

DRAFT

5.2. Proposed Capital Improvements

The following is a summary of all capital improvements recommended in this report. (See also Map 5.0 in Appendix 'B').

5.2.1. Wells & Raw Water Supply

The following Capital Improvements are required to provide the additional supply necessary for full build-out of the OID (see the works plan for phasing of these improvements):

I. 3 New Wells @ 280 USGPM each
   i. It is suggested that the proposed capital improvements include a total of three additional wells, to be constructed over time as the system demands warrants them.
   ii. (Additional Flow = 280 USGPM x 60 x 18 = 302,400 x 3 = 907,200 USGal/Day)

II. 2200 l.m. of 200mm Diameter Raw Water Supply Pipe
   i. The proposed connection of existing wells #3 & 4 to proposed reservoir #2 will require a dedicated 200mm diameter raw water supply pipe. The proposed pipe route is within the Highway 3A Right of Way and is approximately 2200 meters in length.

III. 950 l.m. of 150mm Diameter Raw Water Supply Pipe
   i. The proposed connections of existing well #2 and the proposed wells (#6 & #7) will require 3 separate 150mm raw water supply pipes, for a total length of approximately 950m.
   ii. At this time the location of proposed well #8 is unknown. This will need to be reviewed when the system demands require this addition, and the CEC revised to include the appropriate length of raw water supply pipe.

5.2.2. Treatment Facilities & Reservoirs

The following Capital Improvements are required to provide the additional storage capacity necessary for full build-out of the OID:

I. 2 new reservoirs @ 575,000 USGal each
   i. The proposed additional storage required will be provided by two reservoirs, built with the same surface water elevations so as to operate in tandem, essentially acting as one reservoir. Proposed Reservoir #1 is to be constructed at a location above Hillview Road (see 2002 CWSS) that will be constructed at an equal elevation to the existing reservoir. Proposed Reservoir #2 is to be constructed at or near the location of the existing reservoir, which can be deactivated or left in operation at that time.

II. 2 – Chlorine (Cl_2) Treatment Facilities
   i. For well water that is not under the direct influence of surface water provincial regulations require chlorine disinfection only. A Chlorination facility must be supplied at each proposed reservoir to allow for proper disinfection of all distribution water.

DRAFT

5.2.3. Distribution Piping, Hydrants & Valves

The following Capital Improvements are required to provide the distribution system necessary for full build-out of the OID:

I. 17,100 l.m. of 200mm DIA Water Distribution Pipe
   i. The existing system currently includes sections of twinned pipe along certain roadways. To establish the overall length of distribution pipe to be upgraded the existing routes of all piping was measured such that all twinned pipes would be abandoned in favour of single 200mm diameter pipes.

II. 29 new hydrants
   i. It is estimated that 5 new hydrants will be required to reach a 600m maximum spacing.
   ii. It is estimated that 24 new hydrants will be needed to reach a 300m maximum spacing.

III. 87 new 200mm gate valves
   i. It is estimated that a total of 87 new gate valves will be required over the 17,100 lineal meters of proposed distribution pipe.

IV. 2 new PRVs

DRAFT

5.3. Capital Improvements - 2002 Comprehensive Water System Study (CWSS)

The capital improvement items & costs from the Urban Systems 2002 comprehensive water system study have been reviewed by Ward Engineering. Below is a summary of the "essential" capital improvements from the 2002 report that have been either included or excluded from the CEC.

Items included are part of the proposed capital improvements in Section 5.2. Items excluded have either been completed prior to this report or are not applicable to the CEC calculations. All "Optional" Improvements stated in the 2002 report have been included in the proposed capital improvements in Section 5.2.

5.3.1. 2002 CWSS Items Included Within the CEC

I. Increase Water Supply (CWSS Item # 4.1.5)
   i. Included within Item 5.2.1
II. Increase Reservoir Storage (CWSS Item # 4.1.6)
   i. Included within Item 5.2.2
III. Additional Watermain Valving (CWSS Item # 4.1.7)
   i. Included within Item 5.2.3

5.3.2. 2002 CWSS Items Excluded from the CEC

I. Demand Management (CWSS Item # 4.1.1)
   i. Not Applicable to CEC
II. Increase Reliability of Wells, Pump Stations and Reservoirs (CWSS Item # 4.1.2)
   i. Completed prior to CEC Report
III. SCADA Communications System (CWSS Item # 4.1.3)
   i. Completed prior to CEC Report
IV. Construct Above Ground Pumphouse and Relocate Controls, Electrical & Piping (CWSS Item # 4.1.4)
   i. Not Applicable to CEC
V. As-Constructed Records (CWSS Item # 4.1.9)
   i. Not Applicable to CEC
VI. Operator Certification (CWSS Item # 4.1.10)
   i. Not Applicable to CEC
VII. Operation and Maintenance Policies (CWSS Item # 4.1.11)
   i. Not Applicable to CEC
VIII. Emergency Preparedness Plan (CWSS Item # 4.1.12)
   i. Not Applicable to CEC
IX. Well Head Protection Plan (CWSS Item # 4.1.13)
   i. Not Applicable to CEC
X. Replace PRV No. 2 (CWSS Item # 4.1.14)
   i. Completed prior to CEC Report

DRAFT

6. PROPOSED WATER SYSTEM INFRASTRUCTURE - COST ESTIMATE

6.1. Allocation of Costs

Allocation of costs between existing and new developments will be done using either a population increase percentage or a project cost basis. The population percentage method was deemed to be a fair means of allocation for the majority of capital improvement costs. However, certain improvements covered in the 2002 CWSS report presented a more accurate means of allocation, and so the project cost basis was used for these items.

6.1.1. Allocation Type 1: Population Percentage Basis

The population increase percentage, where applicable, will use the following calculation:

I. Number of services at total build-out = 1200
II. Number of existing services = 324
III. Number of additional services due to development = 1200-324=876
IV. Cost percentage allocated to the CEC = 876 / 1200 = 73%
V. Cost percentage allocated to water system users = 324 / 1200 = 27%

6.1.2. Allocation Type 2: Project Cost Basis

Where items covered in the 2002 CWSS have been included within an item covered in section 5.2, a project cost calculation can be used to determine the most accurate allocation of costs. Below is a summary of those "2002 CWSS" items that have been included in section 5.2, along with an explanation of how these project costs were allocated:

I. Increase Water Supply (CWSS Item # 4.1.5)
   i. Included within Item 5.2.1
   ii. The "CWSS" item calls for the construction of one additional well for existing development conditions. Ward Engineering and the OID have used more up-to-date information to assess the flow requirements for existing development conditions. Using this information it is apparent that the existing wells can supply beyond what is required for the existing land use conditions. Therefore, the cost of all new wells have been allocated entirely to the CEC. Refer to Section 3.2.1 for calculations of existing demand and available supply.
II. Increase Reservoir Storage (CWSS Item # 4.1.6)
   i. Included within Item 5.2.2
   ii. To calculate the Project Cost Allocation for this item the storage capacity of the proposed reservoirs stated in the "CWSS" item have been compared with the storage capacity of the proposed reservoirs stated in section 5.2.2. Below is an explanation of this allocation:

Reservoir	2002 CWSS Report	CEC Report	% to CEC
R-1	122,000 USGal	575,000 USGal	78.8%
R-2	50,000 + 76,000 (ex.) = 126,000 USGal	575,000 USGal	78.1%

DRAFT

III. Additional Watermain Valving (CWSS Item # 4.1.7)
   i. Included within Item 5.2.3
   ii. Project cost allocation for this item takes the $30,000 allowance stated in the "CWSS" item and allocates it to the water system users, while the remaining cost of additional in-line gate valves is allocated to the CEC.

6.2. Cost Estimate

A detailed construction cost estimate has been prepared for all proposed capital improvements to be included in the CEC.

Figure 6.2 – Infrastructure Improvement Cost Estimate

Schedule 6.2.1 – Wells & Water Supply						Allocation of Costs		
Item	**Description**	**Quant**	**Units**	**Unit Price**	**Gross Cost**	**Type of Allocation**	**Cost to Water System Users**	**Cost to CEC**
I	Raw Water Source:							
	New Well @ 280 USGPM	3	Ea.	$300,000	$900,000	Total to CEC	$0	$900,000
	Raw Water Supply (from Wells to New Reservoirs):							
II	200mmØ Raw Water Supply Pipe	2,200	l.m.	$200	$440,000	Percentage	$118,800	$321,200
III	150mmØ Raw Water Supply Pipe	950	l.m.	$190	$180,500	Percentage	$48,735	$131,765
	TOTAL OF SCHEDULE 5.2.1				**$1,520,500**		**$167,535**	**$1,352,965**

Schedule 6.2.2 – Treatment Facilities & Reservoirs						Allocation of Costs		
Item	**Description**	**Quant**	**Units**	**Unit Price**	**Gross Cost**	**Type of Allocation**	**Cost to Water System Users**	**Cost to CEC**
I	New Reservoirs (Full Construction c/w valves and piping):							
	a) Reservoir #1 (Hillview Road Location)	575,000	USGal	$1.25	$718,750	Project Cost	$152,375	$566,375
	b) Reservoir #2 (Adjacent to Existing Reservoir)	575,000	USGal	$1.25	$718,750	Project Cost	$157,406	$561,344
II	Chlorination Disinfection of Groundwater:							
	Treatment Facility #1							
	a) Chlorination System		L.S.		$50,000	Percentage	$13,500	$36,500
	b) Building materials and construction		L.S.		$50,000	Percentage	$13,500	$36,500
	c) Building plumbing and electrical		L.S.		$20,000	Percentage	$5,400	$14,600
	Treatment Facility #2							
	a) Chlorination System		L.S.		$50,000	Percentage	$13,500	$36,500
	b) Building materials and construction		L.S.		$50,000	Percentage	$13,500	$36,500
	c) Building plumbing and electrical		L.S.		$20,000	Percentage	$5,400	$14,600
	TOTAL OF SCHEDULE 5.2.2				**$1,677,500**		**$374,581**	**$1,302,919**

DRAFT

Schedule 6.2.3 – Distribution Piping, Hydrants & Valves						Allocation of Costs		
Item	**Description**	**Quant**	**Units**	**Unit Price**	**Gross Cost**	**Type of Allocation**	**Cost to Water System Users**	**Cost to CEC**
I	Supply & Install Watermain, c/w Bends, Thrust Blocks & Pipe Restrainers							
	a) 200mmØ Water Distribution Pipe	17,100	l.m.	$200	$3,420,000	Percentage	$923,400	$2,496,600
	b) Highway #3A Crossing		L.S.		$20,000	Percentage	$5,400	$14,600
II	Supply & Install Hydrant Assemblies (incl. valve & tee)							
	For 600m Spacing	5	Ea.	$4,100	$20,500	Total to Ex.	$20,500	$0
	For 300m Spacing	24	Ea.	$4,100	$98,400	Total to CEC	$0	$98,400
III	200mm Gate Valves	87	Ea.	$1,200	$104,400	Project Cost	$30,000	$74,400
IV	Supply & Install Pressure Reducing Valves (PRVs)	2	Ea.	$30,000	$60,000	Total to CEC	$0	$60,000
	TOTAL OF SCHEDULE 5.2.3				**$3,723,300**		**$979,300**	**$2,744,000**

Summary of Totals						Allocation of Costs		
	Description				**Gross Cost**	Avg. % of Allocation	**Cost to Water System Users**	**Cost to CEC**
	Schedule 6.2.1 – Wells & Water Supply				$1,520,500	11%	$167,535	$1,352,965
	Schedule 6.2.2 – Treatment Facilities & Reservoirs				$1,677,500	22%	$374,581	$1,302,919
	Schedule 6.2.3 – Distribution Piping, Hydrants & Valves				$3,723,300	26%	$979,300	$2,744,000
	OID Administration Fees (5%)				$346,065	0%	$0	$346,065
	Engineering Fees (10%)				$692,130	0%	$0	$692,130
	Total of Capital Improvement Costs				**$7,959,495**	19%	**$1,521,416**	**$6,438,079**

DRAFT

7. PROPOSED WATER SYSTEM INFRASTRUCTURE - WORKS PLAN

7.1. Item Sets for Distribution Piping, Hydrants & Valves

Items from "Schedule 6.2.3 – Distribution Piping, Hydrants & Valves" of the cost estimate have been grouped into the following Item Sets to be included in the Infrastructure Improvement Phasing section of the Works Plan.

Note:
The Urban Systems 2002 Comprehensive Water System Study stated six (6) "Optional System Improvements" in reference to Water Distribution Piping. The locations of these items represent the most pressing distribution system improvements necessary. Therefore, these items have been suggested as priority improvements below. The remaining items, shown as secondary items, have been established as part of this report, in addition to the CWSS report recommendations.

Figure 7.1 – Item Sets for Distribution Piping, Hydrants & Valves

Schedule #	*Pipe Lenth*	*Hydrants*	*Gate Valves*	*PRVs*	*Location*
CEC Report Priority Items (Established in conjunction with Optional Items in the 2002 Comprehensive Water System					
6.2.3	1200	2+(2) = 4	6		Waterloo Road South of Mailbox Road Intersection
6.2.3	380	0	2	1	Waterloo Road from Corner near PRV #1 to Bridgeview Road (via PRV#1)
6.2.3	1060	2	6		Bridgeview Subdivision
6.2.3	1250	1	6		Hillview Road
6.2.3	2350	3+(3) = 6	12		Ootischenia Road from Fire Hall to North of Intersection with Columbia Road
6.2.3	1700	3	9		Columbia Road from Lark Road to Ootischenia Road
Sub-Total	**7940**	**16**	**41**	**1**	

continued on next page

DRAFT

Schedule #	*Pipe Lenth*	*Hydrants*	*Gate Valves*	*PRVs*	*Location*
CEC Report Secondary Items (established from the CEC Report only):					
6.2.3	750	1	3	1	Waterloo Crescent (including cul-de-sac to Intersection with Waterloo Road - via PRV #2)
6.2.3	460	1	3		Columbia Road from North Intersection with Hillview Road to Waterloo Road
6.2.3	200	0	1		McPhee Road from Ootischenia Road to Columbia Road
6.2.3	610	1	4		Columbia Road from Waterloo Road to McPhee Road (including HWY 3A Crossing)
6.2.3	660	2	3		Columbia Road from McPhee Road to Lark Road
6.2.3	350	0	2		From Columbia Road (between lots 4 & 5, Plan 4882) to Waterloo Crescent cul-de-sac
6.2.3	620	0	4		Reservoir #2 to Columbia Road via McPhee Road
6.2.3	650	1	3		Waterloo Road from Columbia Road to Corner near PRV #1
6.2.3	560	2	2		Waterloo Road from Corner near PRV #1 to Bridgeview Road
6.2.3	780	1	4		Columbia Road from Prairie Road to North Intersection with Hillview Road
6.2.3	870	1	4		McPhee Road from South Intersection with Columbia Road to Lark Road
6.2.3	800	1	4		McPhee Road from Lark Road to Railway
6.2.3	850	1	5		Bridgeview Road from Waterloo Road to Bridgeview Subdivision
6.2.3	260	0	1		Lark Road
6.2.3	400	0	1		Prairie Road (south of Hillview Road)
6.2.3	220	1	1		Ironhill Road
6.2.3	120	0	1		Hipwell Road
Sub-Total	**9160**	**13**	**46**	**1**	
Total	**17100**	**29**	**87**	**2**	

Notes:

I. Hydrant Numbers in brackets represent 600m spacing hydrants

7.2. Detailed Infrastructure Improvements & Phasing

A detailed works plan has been established to provide guidance for required Capital Improvements over time. The timing of the capital improvements shown in Figure 7.2 are defined by the following information:

I. In the case of the additional wells and the raw water supply mains the timing is defined by when the total system water usage requires an increase in capacity (See Supporting Document S.D. 5)
II. The reservoirs and treatment facilities have been given the highest priority of any capital improvement. However, it has been scheduled at a time when the CEC fund can support such an improvement.
III. In the case of the Item Sets defined in Figure 7.1, the timing is defined by the priority of the improvement in regards to the overall working condition of the system and according to when the CEC fund can support such an improvement, taking into consideration the timing of the upgrades already covered.

According to the Improvement District Manual the maximum time period for the calculation of CECs is 20 years. A timeline of 20 years has been applied to our phasing plan to allow for the creation of a Capital Expenditure Program, which will take into consideration the state of the taxation fund in regards to improvements over time. We have assumed a steady development of 60 new lots per year to reach 1200 lots over the 20 year timeline.

The Works Plan for all capital improvements covered in this report is as follows:

DRAFT

Figure 7.2 – Infrastructure Improvement Phasing

Years	No. of Services	Schedule / Item #	Description of Capital Improvement	Cost Allocation	
				Cost to Water System Users	Cost to CEC
0	324	0	Existing System	$0	$0
1	364	6.2.3	Waterloo Road South of Mailbox Road Intersection	$75,069	$224,778
2	408	6.2.1-I	1 new Well @ 280 USGPM (Well #6)	$0	$357,679
3	452	6.2.3	Waterloo Road from Corner near PRV #1 to Bridgeview Road (via PRV#1)	$21,210	$103,954
4	496	6.2.2-I	Reservoir #1 - 575,000 USGal (Hillview Road Location)	$152,375	$675,268
4	496	6.2.1-III	250m of 150mm Raw Water Supply Main (Well #2 to Reservoir #1)	$12,825	$41,342
5	540	6.2.3	Bridgeview Subdivision	$59,309	$200,409
6	584	6.2.1-II	2200m of 200mm Raw Water Supply Main (Wells #3 & 4 to Reservoir #1)	$118,800	$382,955
7	628	6.2.1-III	600m of 150mm Raw Water Supply Main (New Well (#6) to Reservoir #1)	$30,780	$99,220
7	628	6.2.2-II	1 new Chlorination Treatment Facility (Hillview Road Location)	$32,400	$104,442
8	672	6.2.2-II	1 new Chlorination Treatment Facility (Existing Reservoir - to be transferred to New Reservoir #2 (25% item cost))	$8,100	$26,111
8	672	6.2.3	Hillview Road	$69,569	$228,594
9	716	6.2.3	Ootischenia Road from Fire Hall to North of Intersection with Columbia Road	$143,338	$435,965
10	760	6.2.3	Columbia Road from Lark Road to Ootischenia Road	$94,903	$319,761
11	804	6.2.3	Waterloo Crescent (including cul-de-sac to Intersection with Waterloo Road - via PRV #2)	$41,534	$174,268
12	848	6.2.1-I	1 new Well @ 280 USGPM (Well #7)	$0	$357,679
12	848	6.2.1-III	100m of 150mm Raw Water Supply Main (New Well (#7) to Reservoir #2)	$5,130	$16,537

13	892	6.2.3	Columbia Road from North Intersection with Hillview Road to Waterloo Road	$25,874	$88,019
13	892	6.2.3	McPhee Road from Ootischenia Road to Columbia Road	$11,145	$35,834
14	936	6.2.3	Columbia Road from Waterloo Road to McPhee Road (including HWY 3A Crossing)	$39,719	$132,557
15	980	6.2.2-I	Reservoir #2 - 575,000 USGal (Adjacent to Existing Reservoir)	$157,406	$669,269
15	980	6.2.2-II	1 new Chlorination Treatment Facility (New Reservoir #2 - To Replace Existing Reservoir (remaining 75% of item cost))	$24,300	$78,332
16	1024	6.2.1-I	1 new Well @ 280 USGPM (Well #8)	$0	$357,679
17	1068	6.2.3	Columbia Road from McPhee Road to Lark Road	$36,674	$127,722
17	1068	6.2.3	From Columbia Road (between lots 4 & 5, Plan 4882) to Waterloo Crescent cul-de-sac	$19,590	$62,964
17	1068	6.2.3	Reservoir #2 to Columbia Road via McPhee Road	$34,859	$112,002
18	1112	6.2.3	Waterloo Road from Columbia Road to Corner near PRV #1	$36,134	$121,093
18	1112	6.2.3	Waterloo Road from Corner near PRV #1 to Bridgeview Road	$30,930	$109,295
18	1112	6.2.3	Columbia Road from Prairie Road to North Intersection with Hillview Road	$43,499	$144,741
19	1156	6.2.3	McPhee Road from South Intersection with Columbia Road to Lark Road	$48,359	$160,408
19	1156	6.2.3	McPhee Road from Lark Road to Railway	$44,579	$148,223
20	1200	6.2.3	Bridgeview Road from Waterloo Road to Bridgeview Subdivision	$47,624	$157,946
20	1200	6.2.3	Lark Road	$14,385	$46,278
20	1200	6.2.3	Prairie Road (south of Hillview Road)	$21,945	$70,648
20	1200	6.2.3	Ironhill Road	$12,225	$44,203
20	1200	6.2.3	Hipwell Road	$6,825	$21,908
				$1,521,416	**$6,438,079**

Notes:

I. Costs to CEC include a 5% administration fee and a 10% engineering fee – As per Section 6.2 – Cost Estimate.

.

8. CAPITAL EXPENDITURE CHARGES & RECOMMENDATIONS

8.1. Summary of Anticipated Future Development Conditions

As per Section 4.3, the build-out of the Ootischenia Improvement District, based on ½ acre lots throughout all developable land zoned R1A, is as follows:

I. Number of Existing Services = 324
II. Number of Proposed Future Services = 1200
III. Additional Services = 1200 – 324 = **876 New Services**

8.2. Summary of CEC Improvement Costs

As per Sections 6.2 & 7.2, the Capital Improvement Costs to be allocated to the CEC are as follows:

I. Cost of all proposed capital improvements = $7,959,495
II. Cost of proposed capital improvements allocated to existing residences = $1,521,416
III. Cost of proposed capital improvements allocated to the CEC = **$6,438,079**

8.3. CEC Calculation

The CEC calculation is as follows:

I. **$6,438,079** (total CEC cost) **/ 876** (total new services) = **$7350 per new lot connection**

DRAFT

9. CAPITAL EXPENDITURE PROGRAM

9.1. Taxation & Tolls

Taxes:
The Improvement District Manual defines taxes as:
…property charges fixed and payable by all landowners in the improvement district to which service (or services) is provided, or can be provided in the future, if the property owner requests it. Monies raised through taxes are generally used to meet the annual debt costs, capital out of revenue and reserve fund allocations.

Tolls:
The improvement District Manual defines tolls as:
… user charges fixed and payable by all landowners in the improvement district to which service is provided. Revenue raised from tolls is generally used to meet administrative and operating costs for a service.

In the Ootischenia Improvement District the taxes and tolls are allocated in the following way:

I.	Tolls:	100% to administration & operational costs
II.	Taxes:	50% to administration & operational costs
		50% to capital improvements

9.2. Taxation Available for Improvements – Existing Users Group

The existing users group is currently taxed on a lot size calculation (See supporting Document S.D 6, in appendix 'A'). On average the taxation amount collected for capital improvements from each service connection is approximately $165 per year. These existing figures have been analyzed against the cost allocations to existing users shown in the above cost estimate, and it has been concluded that this rate of taxation towards capital improvements *for existing users* is adequate for all projected costs involved in the works plan.
As the prices given in the above cost estimate and works plan do not include inflation factors this taxation amount will need to be reviewed periodically.

9.3. Taxation Available for Improvements – New Users Group

Existing ½ acre lots within the OID are currently taxed at approximately $296 per year, with approximately $149 of this available for capital improvements. However, as these services are unmetered and all services belonging to the new users group will be metered, it is proposed that a new taxation amount be established for all future lots, using a similar lot size calculation.

The following Table shows the proposed taxation amounts for service connections in the new users group:

DRAFT

Figure 9.2 – Taxation & Metering of the New Users Group

Taxation - Parcels	Total Taxation	Taxation Available for Capital Improvements	Metered Water Usage (USGal/Day)
A - 1 acre or less	$ 200.00	$ 100.00	1680
B - Larger than 1 acre up to 2 acres	$ 203.40	$ 101.70	1840
C - Larger than 2 acres up to 4 acres	$ 206.80	$ 103.40	2000
D - Larger than 4 acres	$ 212.20	$ 106.10	2160
E - 1 acres or less with dormant connection	$ 223.00	$ 111.50	1680
F - Larger than 1 acre up to 2 acres with a dormant connection	$ 228.40	$ 114.20	1840
G - Larger than 2 acres up to 4 acres with a dormant connection	$ 231.80	$ 115.90	2000
H - Larger than 4 acres with a dormant connection	$ 236.00	$ 118.00	2160

The base *minimum* amount of $100 for parcels 1 acre or less was established by projecting the proposed capital improvement costs over time (see Figure 7.2) and determining the amount of taxation required to meet those costs. From this base amount the taxation for the remaining parcel size ranges was determined using the same percentage increase as is currently used for the existing taxation rates.

DRAFT

9.4. CECs Funds Available for Capital Improvements

As determined in Section 8, a Capital Expenditure Charge of $7350 will be charged to all new development lots. These funds must be kept in a separate account specifically for CECs collected, to be used solely for capital improvements identified in the above cost estimate and works plan.

Figure 9.0, below, shows the allocation of the cost of capital improvement items to water system users and to the CEC. It then uses a projection of both; the taxation of the existing and new users groups over time; and the collection of CECs through development, and determines the overall fund balances of both.

This chart can be used as a rough guide for capital improvement budgeting over the development period covered in this report. However, the taxation amounts collected will need to be reviewed annually against the number of lots developed in any fiscal year to determine any adjustments made to the development projections in this report.

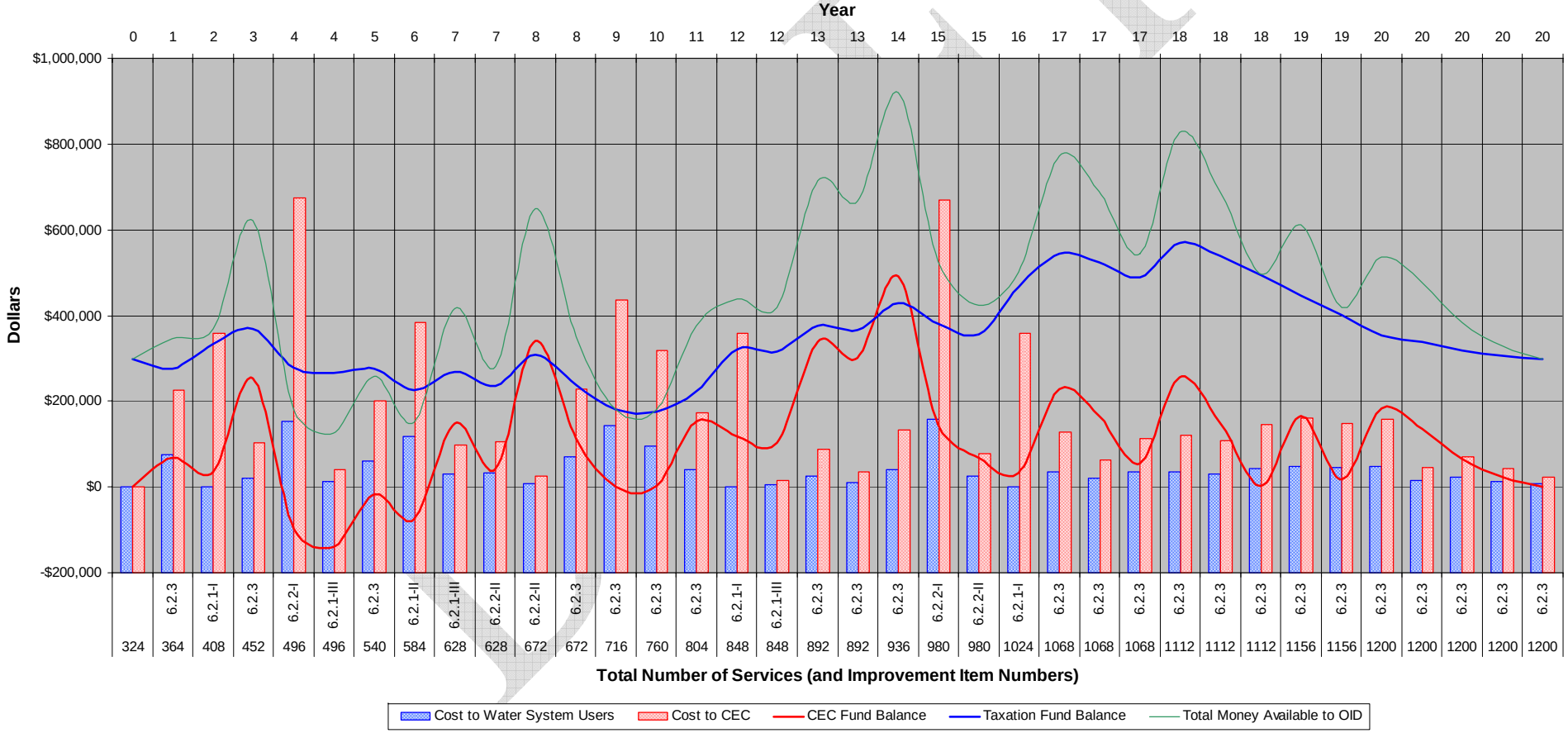
9.5. Taxation & Water Consumption

As shown in Figure 9.2, it is proposed that the metering of all services within the new users group be linked to the parcel size and the taxation amount. The base metered flow of 1680 USGal/Day for parcels 1 acre or less has been established as per Section 5.1.1. From this base amount the proposed metered flows for the remaining parcel size ranges was determined.

In the interest of Best Management Practices for water consumption it is suggested that the OID could utilize the lower new users group taxation rate to encourage existing users to voluntarily transfer to the new users group without subdivision of their property. This would include the voluntary installation of a water meter on their existing service and agreement to abide by a water metering bylaw, which can be written based on the information in this section.

DRAFT

Figure 9.0 – Capital Expenditure Program Chart



APPENDIX "A" – SUPPORTING DOCUMENTS

DRAFT

S.D. 1 – Existing Well Capacities

OID Well Running Combinations						
	Well #	**2**	**3**	**4**	**5**	**Total**
Capacity USGPM	Least		180		250	430
		320			250	570
				340	250	590
			93	272	250	615
		320	180		250	750
		280	93	272	250	895
	Most	320		340	250	**910**

Notes:

I. Capacities Recorded and Supplied by the OID

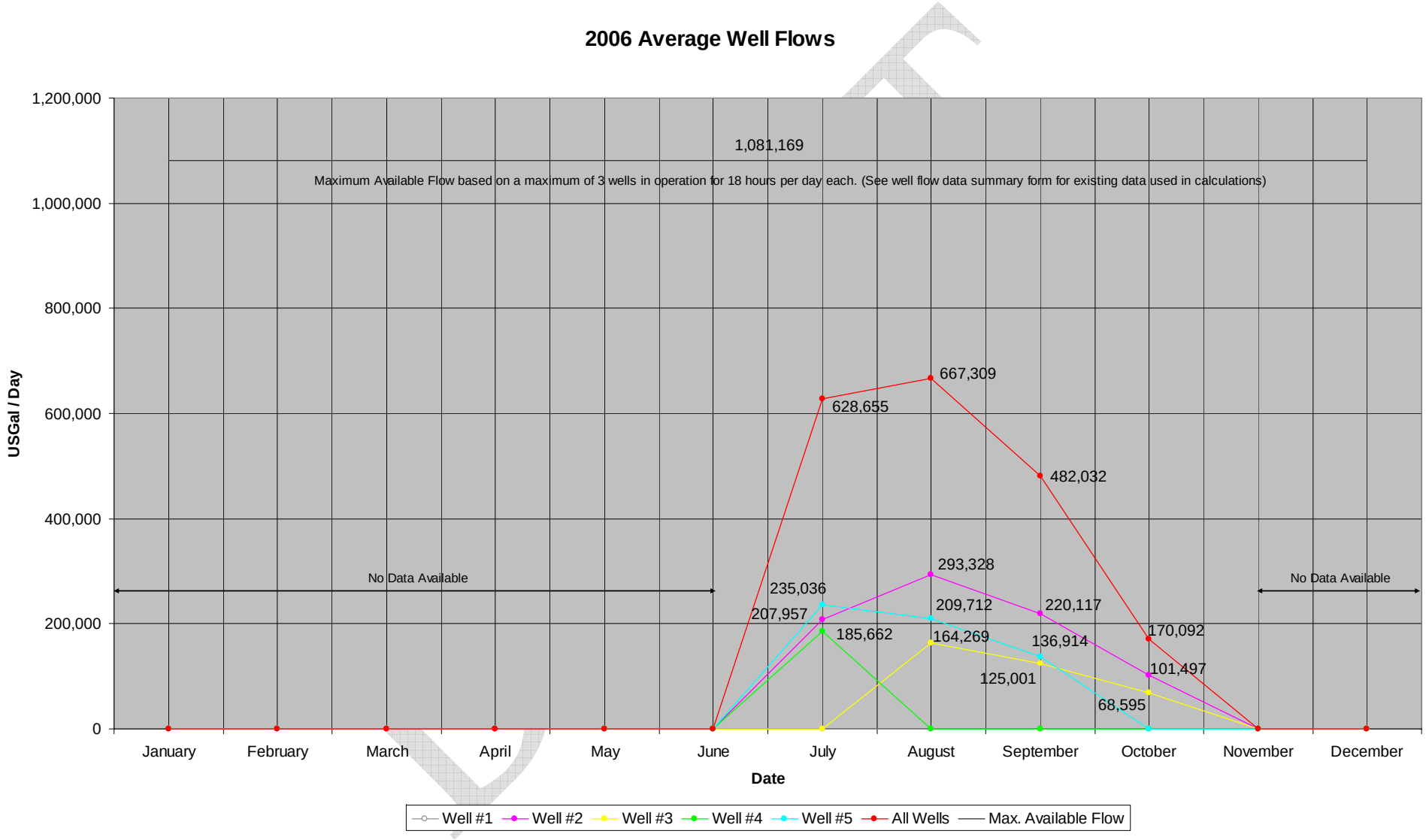
Calculations:

I. Existing System Well Capacity = 910 (USGPM) x 60 (Mins) x 18 (Hours)
= **982,800 USGal / Day**

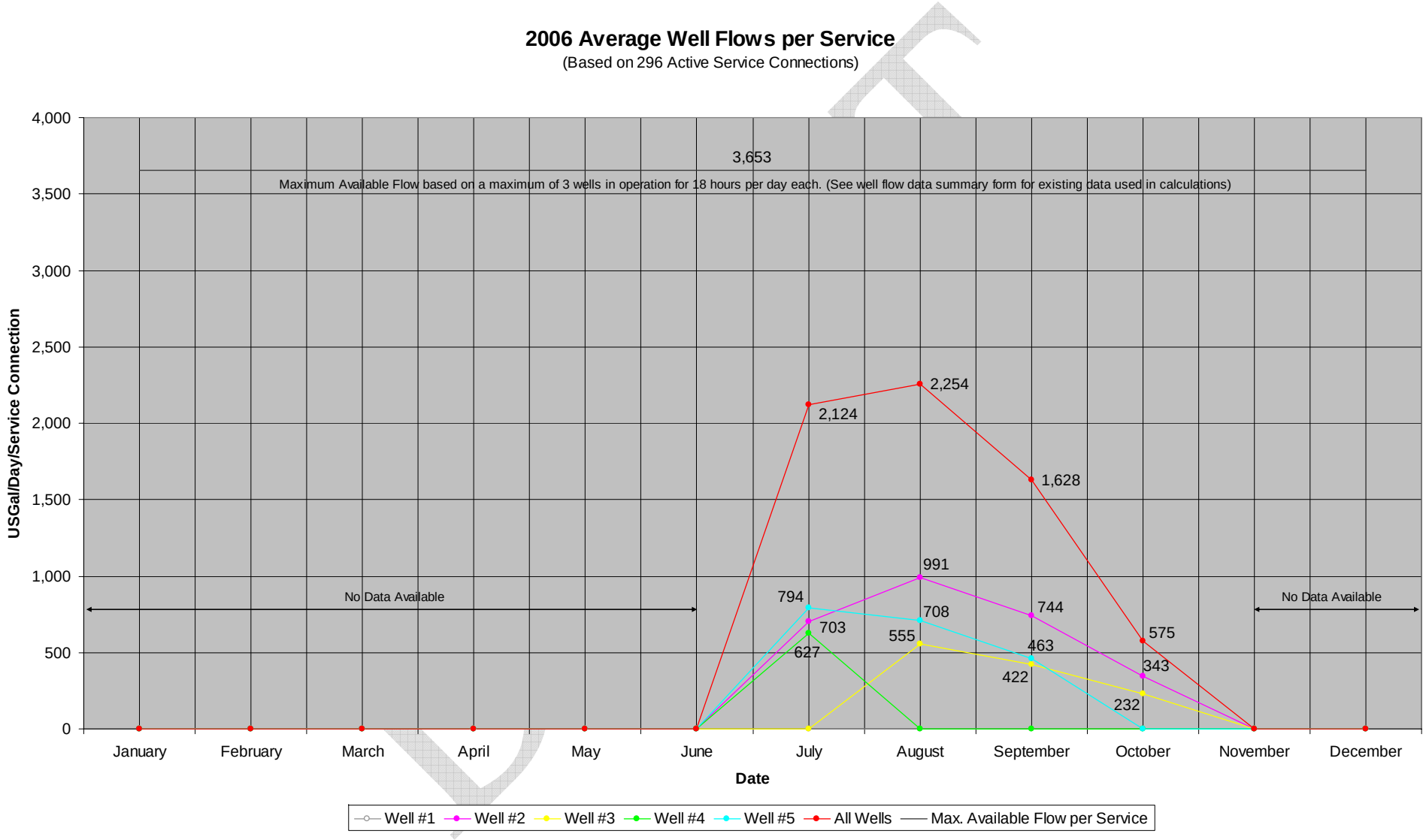
II. Existing System Well Capacity (with dedicated raw water mains)
= 320 + 180 + 340 + 250 = 1090 (USGPM) x 60 (Mins) x 18 (Hours)
= **1,177,200 USGal / Day**

DRAFT

S.D. 2 – Existing Well Flow Data (Full System Flows)



S.D. 3 – Existing Well Flow Data (Flows Per Existing Service)



S.D. 4 – Development Projections

SUB-AREA NAME & NUMBER	TOTAL AREA (ha)	UNDEVELOPABLE AREA (ha)	AREA OF PRIVATE LOTS (ha)	AREA OF UNDEVELOPABLE LOTS (ha)	AREA OF DEVELOPABLE LOTS (ha)	*ROAD ALLOWANCE (ha)*	*SLOPE ALLOWANCE (ha)*	FUTURE LOT AREA (ha)	FUTURE LOT SIZE (ha)	NUMBER OF FUTURE LOTS
	(ZONE "R1A" ONLY)	(ROADS, ROWS, ETC.)		R1A Lots with no development potential	R1A Lots with development potential	*(20% OF TOTAL)*	*(% Varies)*			
SUB-AREA #1 (WARD) PART OF... BRIDGEVIEW SUBDIVISION - WATERLOO RD. BENCH (RDCK)	96.55	16.19	80.36	10.16	**70.20**	*14.0*	*0.0*	**56.16**	0.2	**281**
SUB-AREA #2 (WARD) PART OF... HWY 3A - RDCK LANDFILL BENCH (RDCK)	114.65	7.33	107.32	0.00	**107.32**	*21.5*	*10.7*	**75.12**	0.2	**376**
SUB-AREA #3 (WARD) PART OF... HWY 3A - AIRPORT BENCH (RDCK)	168.86	16.83	152.04	5.06	**146.97**	*29.4*	*8.8*	**108.76**	0.2	**544**
TOTALS	**380.06**	**40.35**	**339.71**	**15.22**	**324.49**	**64.90**	**19.55**	**240.04**	0.2	**1200**

DRAFT

S.D. 5 – Water Consumption Rate over Proposed Development Rate

Table S.D. 5A:

The following table projects the reduction in flow used by the exiting users group as development proceeds over the next 20 years and as the existing users group gets smaller.

Years	Existing Users Group				
	Service Connections	Lot Area (ha)	Avg. Lot Size (ha)	Avg. Flow per Service (unmetered) (USGal / Day)	Total Flow (unmetered) (USGal / Day)
0	324	240.00	0.75	2,254	730,296
1	*304*	*228.00*	0.75	2,254	*685,216*
2	*288*	*216.00*	0.75	2,254	*649,152*
3	*272*	*204.00*	0.75	2,254	*613,088*
4	*256*	*192.00*	0.75	2,254	*577,024*
5	*240*	*180.00*	0.75	2,254	*540,960*
6	*224*	*168.00*	0.75	2,254	*504,896*
7	*208*	*156.00*	0.75	2,254	*468,832*
8	*192*	*144.00*	0.75	2,254	*432,768*
9	*176*	*132.00*	0.75	2,254	*396,704*
10	*160*	*120.00*	0.75	2,254	*360,640*
11	*144*	*108.00*	0.75	2,254	*324,576*
12	*128*	*96.00*	0.75	2,254	*288,512*
13	*112*	*84.00*	0.75	2,254	*252,448*
14	*96*	*72.00*	0.75	2,254	*216,384*
15	*80*	*60.00*	0.75	2,254	*180,320*
16	*64*	*48.00*	0.75	2,254	*144,256*
17	*48*	*36.00*	0.75	2,254	*108,192*
18	*32*	*24.00*	0.75	2,254	*72,128*
19	*16*	*12.00*	0.75	2,254	*36,064*
20	0	0.00	-		0

DRAFT

S.D. 5 – Water Consumption Rate over Proposed Development Rate (cont.)

Table S.D. 5B:

The following table projects the increase in flow by the new users group as development proceeds over the next 20 years and the new users group gets larger.

Years	New Users Group				
	Service Connections	Lot Area (ha)	Lot Size (ha)	Avg. Flow per Service (metered) (USGal / Day)	Total Flow (metered) (USGal / Day)
0	0	0.00	0.00	-	0
1	*60*	*12.00*	0.20	1,680	*100,800*
2	*120*	*24.00*	0.20	1,680	*201,600*
3	*180*	*36.00*	0.20	1,680	*302,400*
4	*240*	*48.00*	0.20	1,680	*403,200*
5	*300*	*60.00*	0.20	1,680	*504,000*
6	*360*	*72.00*	0.20	1,680	*604,800*
7	*420*	*84.00*	0.20	1,680	*705,600*
8	*480*	*96.00*	0.20	1,680	*806,400*
9	*540*	*108.00*	0.20	1,680	*907,200*
10	*600*	*120.00*	0.20	1,680	*1,008,000*
11	*660*	*132.00*	0.20	1,680	*1,108,800*
12	*720*	*144.00*	0.20	1,680	*1,209,600*
13	*780*	*156.00*	0.20	1,680	*1,310,400*
14	*840*	*168.00*	0.20	1,680	*1,411,200*
15	*900*	*180.00*	0.20	1,680	*1,512,000*
16	*960*	*192.00*	0.20	1,680	*1,612,800*
17	*1020*	*204.00*	0.20	1,680	*1,713,600*
18	*1080*	*216.00*	0.20	1,680	*1,814,400*
19	*1140*	*228.00*	0.20	1,680	*1,915,200*
20	1200	240.00	0.20	1,680	2,016,000

DRAFT

S.D. 5 – Water Consumption Rate over Proposed Development Rate (cont.)

Table S.D. 5C:

The following table combines the reduction in flow from Table S.D. 5A with the increase in flow from Table S.D. 5B to produce the total estimated flow as development proceeds over the next 20 years.

Years	Additional Service Connections	Total Number of Service Connections	Total System Flow (USGal / Day)
0	0	324	730,296
1	*40*	*364*	*786,016*
2	*44*	*408*	*850,752*
3	*44*	*452*	*915,488*
4	*44*	*496*	*980,224*
5	*44*	*540*	*1,044,960*
6	*44*	*584*	*1,109,696*
7	*44*	*628*	*1,174,432*
8	*44*	*672*	*1,239,168*
9	*44*	*716*	*1,303,904*
10	*44*	*760*	*1,368,640*
11	*44*	*804*	*1,433,376*
12	*44*	*848*	*1,498,112*
13	*44*	*892*	*1,562,848*
14	*44*	*936*	*1,627,584*
15	*44*	*980*	*1,692,320*
16	*44*	*1024*	*1,757,056*
17	*44*	*1068*	*1,821,792*
18	*44*	*1112*	*1,886,528*
19	*44*	*1156*	*1,951,264*
20	44	1200	2,016,000

DRAFT

S.D. 5 – Water Consumption Rate over Proposed Development Rate (cont.)

Table S.D. 5D:

The following table summarizes the upgrades that are required to increase the water supply available over the next 20 years. It also identifies when and at what flow rate the upgrades will be required.

CEC Infrastructure Improvements Related to Water Supply & Storage				
Years	Total Number of Service Connections	CEC Upgrades	Available Flow Increase	Total Available System Flow
0	324	-	-	982,800
1	*364*			982,800
2	*408*	Item 6.2.1-I: 1 new Well @ 280	302,400	1,285,200
3	*452*			1,285,200
4	*496*	*Item 6.2.2-I: Reservoir #1 - 575,000 USGal (Hillview Road Location) & Item 5.2.1-I: 250m of 150mm Raw Water Supply Main (Well #2 to Reservoir #1)*	*0*	1,285,200
5	*540*			1,285,200
6	*584*	Item 6.2.1-II: 2200m of 200mm	194,400	1,479,600
7	*628*	*Item 6.2.1-III: 600m of 150mm Raw Water Supply Main (New Well (#6) to Reservoir #1) & Item 5.2.2-II: 1 new CL2 Treatment Facility (Hillview Road Location)*	*0*	1,479,600
8	*672*	*Item 6.2.2-II: 1 new CL2 Treatment Facility (Existing Reservoir - to be transferred to New Reservoir #2 (25% of item cost)*	*0*	1,479,600
9	*716*			1,479,600
10	*760*			1,479,600
11	*804*			1,479,600
12	*848*	Item 6.2.1-I: 1 new Well @ 280 USGPM & Item 5.2.1-III: 100m of 150mm Raw Water Supply Main (New Well (#7) to Reservoir #2)	302,400	1,782,000
13	*892*			1,782,000
14	*936*			1,782,000
15	*980*	*Item 6.2.2-I: Reservoir #2 - 575,000 USGal (Adjacent to Existing Reservoir) & Item 5.2.2-II: 1 new CL2 Treatment Facility (Existing Reservoir - to be transferred to New Reservoir #2 (25% of item cost)*	*0*	1,782,000
16	*1024*	Item 6.2.1-I: 1 new Well @ 280	302,400	2,084,400
17	*1068*			2,084,400
18	*1112*			2,084,400
19	*1156*			2,084,400
20	1200			2,084,400

DRAFT

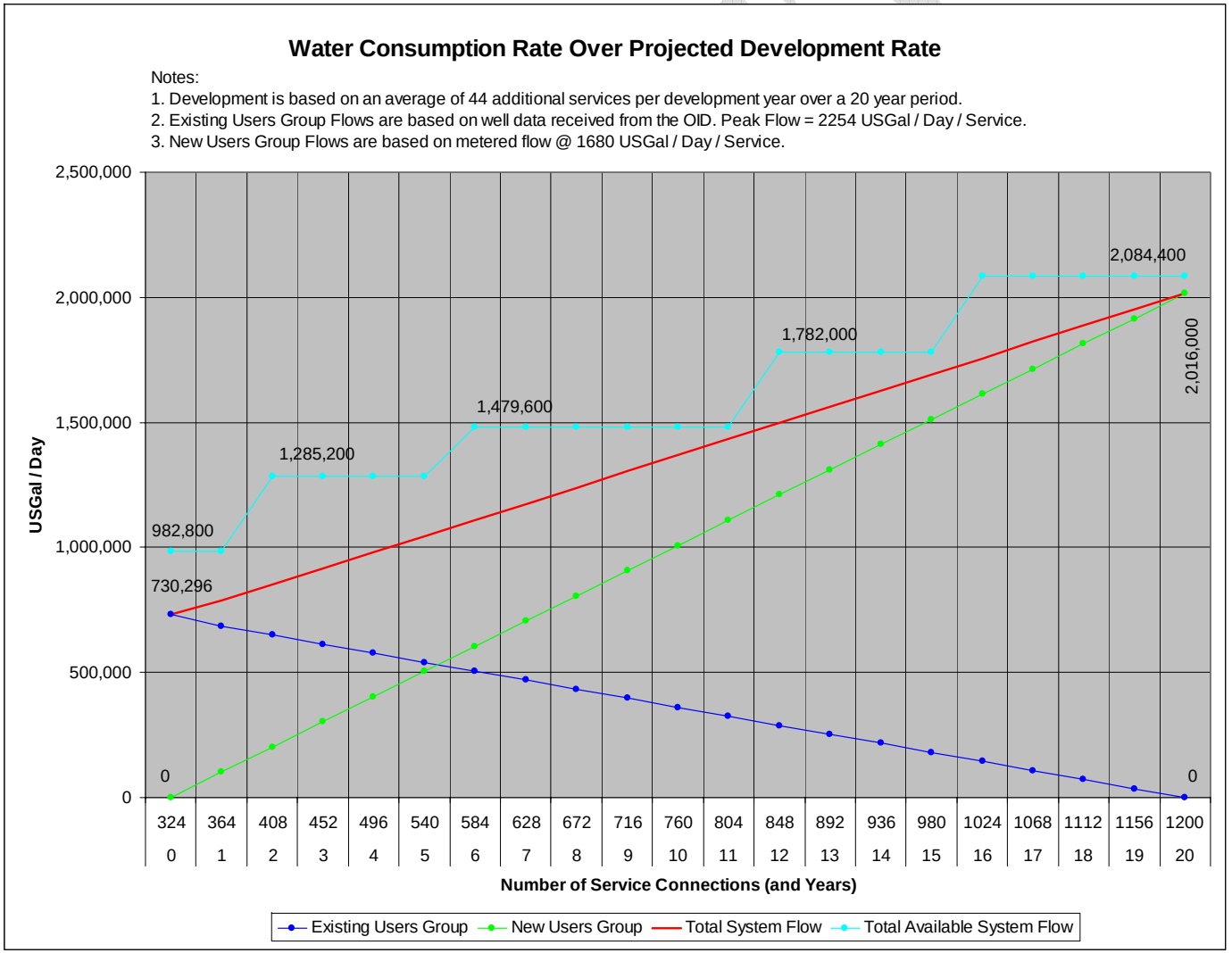
S.D. 5 – Water Consumption Rate over Proposed Development Rate (cont.)

Graph S.D. 5E:

The following graph plots:

I. The decrease in flow by the existing users group (see Table S.D. 5A), the increase in flow by the new users group (see Table S.D. 5B), and the cumulative increase in flow (see Table S.D. 5C).

II. The available capacity in the system for the next 20 years



S.D. 6 – 2007 Taxation Rates for Existing Users Group

Taxation -Parcels	
A - 1 acre or less	$ 296.00
B - Larger than 1 acre up to 2 acres	$ 301.00
C - Larger than 2 acres up to 4 acres	$ 306.00
D - Larger than 4 acres	$ 314.00
E - 1 acres or less with dormant connection	$ 330.00
F - Larger than 1 acre up to 2 acres with a dormant connection	$ 338.00
G - Larger than 2 acres up to 4 acres with a dormant connection	$ 343.00
H - Larger than 4 acres with a dormant connection	$ 349.00
J - Groups A to D inclusive with more than one water connection	$ 286.00/connect
Grade A - Land irrigated from works held under licence by the District	$ 60.00
Tolls	
single family dwelling	$ 300.00
Duplex, apartment	$ 300.00
School - per classroom	$ 300.00
Second temporary dwelling	$ 300.00
Commercial including bed and breakfast, day-care business	$ 600.00
Light industrial	$ 852.00

Notes:

I. The current portion of existing taxation allocated to capital improvements is approximately 50%. Based on existing development conditions this results in an average of approximately $165 per connection.

II. The water tolls and the remaining 50% of the water taxation go directly to administration & operation costs (see Section 9.1).

DRAFT

S.D. 7 – Capital Expenditure Program Calculations

Works Plan								Capital Expenditure Program								
Infrastructure Improvement Costs								CEC Fund			Taxation Fund					
Years	Ex. Users Group	New Users Group	No. of Services	Item #	Description of Capital Improvement	Cost Allocation		CECs Collected	NET CEC Fund	CEC Fund Balance	Average Taxation Amount for Improvements (Existing Users Group)	Taxation Amount Collected (Existing Users Group)	Taxation Amount for Improvements (New Users Group)	Taxation Amount Collected (New Users Group)	Total Taxation Amount Collected	NET Taxation Fund	Taxation Fund Balance
						Cost to Water System Users	Cost to CEC										
0	324	0	324	0	Existing System	$0	$0	$0	$0	$0	*$165*	$0	$0	$0	**$0**	$0	***$298,000***
1	304	60	364	5.2.3a	Waterloo Road South of Mailbox Road Intersection	$75,069	$224,778	$293,976	$69,198	$69,198	$165	$53,460	$100	$0	**$53,460**	-$21,609	**$276,391**
2	304	60	408	5.2.1-I	1 new Well @ 280 USGPM (Well #6)	$0	$357,679	$323,374	-$34,305	$34,893	$165	$50,160	$100	$6,000	**$56,160**	$56,160	**$332,551**
3	272	180	452	5.2.3b	Waterloo Road from Corner near PRV #1 to Bridgeview Road (via PRV#1)	$21,210	$103,954	$323,374	$219,420	$254,313	$165	$50,160	$100	$6,000	**$56,160**	$34,950	**$367,501**
4	256	240	496	5.2.2-I	Reservoir #1 - 400,000 USGal (Hillview Road Location)	$152,375	$675,268	$323,374	-$351,894	-$97,581	$165	$44,880	$100	$18,000	**$62,880**	-$89,495	**$278,006**
4	240	300	496	5.2.1-III	250m of 150mm Raw Water Supply Main (Well #2 to Reservoir #1)	$12,825	$41,342	$0	-$41,342	-$138,923	$0	$0	$0	$0	**$0**	-$12,825	**$265,181**
5	240	300	540	5.2.3c	Bridgeview Subdivision	$59,309	$200,409	$323,374	$122,965	-$15,958	$165	$39,600	$100	$30,000	**$69,600**	$10,291	**$275,472**
6	224	360	584	5.2.1-II	2200m of 200mm Raw Water Supply Main (Wells #3 & 4 to Reservoir #1)	$118,800	$382,955	$323,374	-$59,581	-$75,538	$165	$39,600	$100	$30,000	**$69,600**	-$49,200	**$226,272**
7	224	360	628	5.2.1-III	600m of 150mm Raw Water Supply Main (New Well (#6) to Reservoir #1)	$30,780	$99,220	$323,374	$224,154	$148,615	$165	$36,960	$100	$36,000	**$72,960**	$42,180	**$268,452**
7	192	480	628	5.2.2-II	1 new CL2 Treatment Facility (Hillview Road Location)	$32,400	$104,442	$0	-$104,442	$44,173	$0	$0	$0	$0	**$0**	-$32,400	**$236,052**
8	224	360	672	5.2.2-II	1 new CL2 Treatment Facility (Existing Reservoir - to be transferred to New Reservoir #2 (25% item cost))	$8,100	$26,111	$323,374	$297,263	$341,436	$165	$31,680	$100	$48,000	**$79,680**	$71,580	**$307,632**
8	160	600	672	5.2.3d	Hillview Road	$69,569	$228,594	$0	-$228,594	$112,843	$0	$0	$0	$0	**$0**	-$69,569	**$238,063**
9	144	660	716	5.2.3e	Ootischenia Road from Fire Hall to North of Intersection with Columbia Road	$143,338	$435,965	$323,374	-$112,591	$251	$165	$26,400	$100	$60,000	**$86,400**	-$56,938	**$181,126**
10	144	660	760	5.2.3f	Columbia Road from Lark Road to Ootischenia Road	$94,903	$319,761	$323,374	$3,613	$3,864	$165	$23,760	$100	$66,000	**$89,760**	-$5,143	**$175,982**
11	112	780	804	5.2.3g	Waterloo Crescent (including cul-de-sac to Intersection with Waterloo Road - via PRV #2)	$41,534	$174,268	$323,374	$149,106	$152,971	$165	$23,760	$100	$66,000	**$89,760**	$48,226	**$224,208**
12	160	600	848	5.2.1-I	1 new Well @ 280 USGPM (Well #7)	$0	$357,679	$323,374	-$34,305	$118,666	$165	$18,480	$100	$78,000	**$96,480**	$96,480	**$320,688**
12	160	600	848	5.2.1-III	100m of 150mm Raw Water Supply Main (New Well (#7) to Reservoir #2)	$5,130	$16,537	$0	-$16,537	$102,129	$0	$0	$0	$0	**$0**	-$5,130	**$315,558**
13	96	840	892	5.2.3h	Columbia Road from North Intersection with Hillview Road to Waterloo Road	$25,874	$88,019	$323,374	$235,354	$337,483	$165	$26,400	$100	$60,000	**$86,400**	$60,526	**$376,083**
13	80	900	892	5.2.3i	McPhee Road from Ootischenia Road to Columbia Road	$11,145	$35,834	$0	-$35,834	$301,650	$0	$0	$0	$0	**$0**	-$11,145	**$364,938**
14	48	1020	936	5.2.3j	Columbia Road from Waterloo Road to McPhee Road (including HWY 3A Crossing)	$39,719	$132,557	$323,374	$190,817	$492,467	$165	$13,200	$100	$90,000	**$103,200**	$63,481	**$428,419**

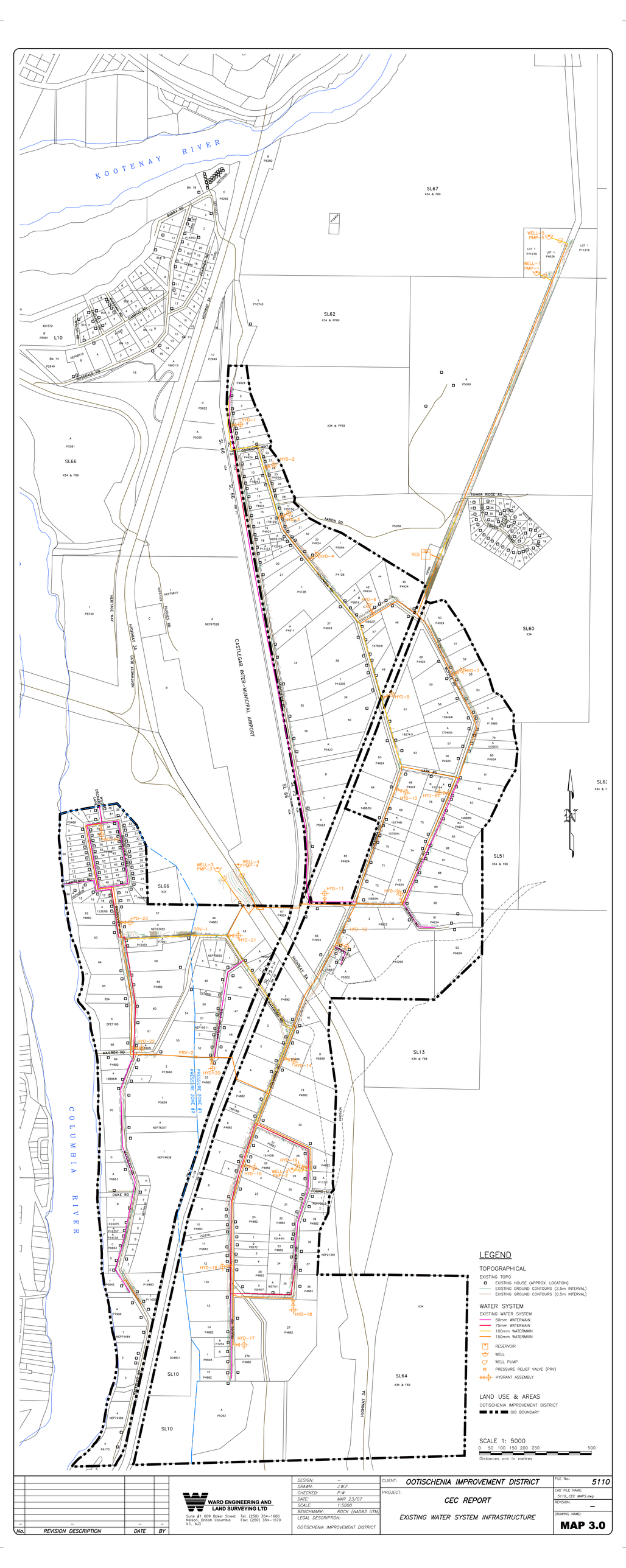
S.D. 7 – Capital Expenditure Program Calculations (cont.)

Works Plan								Capital Expenditure Program							
Infrastructure Improvement Costs								CEC Fund			Taxation Fund				
Years	Ex. Users Group	New Users Group	No. of Services	Item #	Description of Capital Improvement	Cost Allocation		CECs Collected	NET CEC Fund	CEC Fund Balance	Average Taxation Amount for Improvements (Existing Users Group)	Taxation Amount Collected (Existing Users Group)	Taxation Amount for Improvements (New Users Group)	Taxation Amount Collected (New Users Group)	Total Taxation Amount Collected	NET Taxation Fund	Taxation Fund Balance
						Cost to Water System Users	Cost to CEC										
15	48	1020	980	5.2.2-I	Reservoir #2 - 400,000 USGal (Adjacent to Existing Reservoir)	$157,406	$669,269	$323,374	-$345,895	$146,572	$165	$7,920	$100	$102,000	**$109,920**	-$47,486	**$380,933**
15	48	1020	980	5.2.2-II	1 new CL2 Treatment Facility (New Reservoir #2 - To Replace Existing Reservoir (remaining 75% of item cost))	$24,300	$78,332	$0	-$78,332	$68,240	$0	$0	$0	$0	**$0**	-$24,300	**$356,633**
16	32	1080	1024	5.2.1-I	1 new Well @ 280 USGPM (Well #8)	$0	$357,679	$323,374	-$34,305	$33,935	$165	$7,920	$100	$102,000	**$109,920**	$109,920	**$466,553**
17	16	1140	1068	5.2.3k	Columbia Road from McPhee Road to Lark Road	$36,674	$127,722	$323,374	$195,652	$229,587	$165	$5,280	$100	$108,000	**$113,280**	$76,606	**$543,158**
17	16	1140	1068	5.2.3l	From Columbia Road (between lots 4 & 5, Plan 4882) to Waterloo Crescent cul-de-sac	$19,590	$62,964	$0	-$62,964	$166,624	$0	$0	$0	$0	**$0**	-$19,590	**$523,569**
17	16	1140	1068	5.2.3m	Reservoir #2 to Columbia Road via McPhee Road	$34,859	$112,002	$0	-$112,002	$54,622	$0	$0	$0	$0	**$0**	-$34,859	**$488,709**
18	16	1140	1112	5.2.3n	Waterloo Road from Columbia Road to Corner near PRV #1	$36,134	$121,093	$323,374	$202,281	$256,903	$165	$2,640	$100	$114,000	**$116,640**	$80,506	**$569,215**
18	0	1200	1112	5.2.3o	Waterloo Road from Corner near PRV #1 to Bridgeview Road	$30,930	$109,295	$0	-$109,295	$147,608	$0	$0	$0	$0	**$0**	-$30,930	**$538,285**
18	0	0	1112	5.2.3p	Columbia Road from Prairie Road to North Intersection with Hillview Road	$43,499	$144,741	$0	-$144,741	$2,866	$0	$0	$0	$0	**$0**	-$43,499	**$494,786**
19	0	0	1156	5.2.3q	McPhee Road from South Intersection with Columbia Road to Lark Road	$48,359	$160,408	$323,374	$162,966	$165,832	$165	$0	$100	$0	**$0**	-$48,359	**$446,427**
19	0	0	1156	5.2.3r	McPhee Road from Lark Road to Railway	$44,579	$148,223	$0	-$148,223	$17,609	$0	$0	$0	$0	**$0**	-$44,579	**$401,847**
20	0	0	1200	5.2.3s	Bridgeview Road from Waterloo Road to Bridgeview Subdivision	$47,624	$157,946	$323,374	$165,428	$183,037	$165	$0	$100	$0	**$0**	-$47,624	**$354,223**
20	0	1200	1200	5.2.3t	Lark Road	$14,385	$46,278	$0	-$46,278	$136,759	$0	$0	$0	$0	**$0**	-$14,385	**$339,838**
20	0	1200	1200	5.2.3u	Prairie Road (south of Hillview Road)	$21,945	$70,648	$0	-$70,648	$66,111	$0	$0	$0	$0	**$0**	-$21,945	**$317,893**
20	0	1200	1200	5.2.3v	Ironhill Road	$12,225	$44,203	$0	-$44,203	$21,908	$165	$0	$100	$0	**$0**	-$12,225	**$305,669**
20	0	1200	1200	5.2.3w	Hipwell Road	$6,825	$21,908	$0	-$21,908	$0	$0	$0	$0	$0	**$0**	-$6,825	**$298,844**
						$1,521,416	**$6,438,079**	**$6,438,079**	**$0**	**$0**	**$0**	**$502,260**	**$0**	**$1,035,964**	**$1,522,425**	**$0**	**$298,844**

Note: The costs in this table are graphically represented in Figure 9.0

APPENDIX "B" – REPORT MAPS

DRAFT



LEGEND

TOPOGRAPHICAL

EXISTING TOPO

- EXISTING HOUSE (APPROX. LOCATION)
- EXISTING GROUND CONTOURS (2.5m INTERVAL)
- EXISTING GROUND CONTOURS (0.5m INTERVAL)

WATER SYSTEM

EXISTING WATER SYSTEM

- 50mm WATERMAIN
- 75mm WATERMAIN
- 100mm WATERMAIN
- 150mm WATERMAIN
- RESERVOIR
- WELL
- WELL PUMP
- PRESSURE RELIEF VALVE (PRV)
- HYDRANT ASSEMBLY

LAND USE & AREAS

OOTISCHENIA IMPROVEMENT DISTRICT

- OID BOUNDARY

No.	REVISION DESCRIPTION	DATE	BY
--	--	--	--

WARD ENGINEERING AND LAND SURVEYING LTD
Suite #1 609 Baker Street Tel: (250) 354-1660
Nelson, British Columbia Fax: (250) 354-1670
V1L 4J3

DESIGN:	--
DRAWN:	J.W.F.
CHECKED:	P.W.
DATE:	MAR 23/07
SCALE:	1:5000
BENCHMARK:	ROCK (NAD83 UTM)
LEGAL DESCRIPTION:	
	OOTISCHENIA IMPROVEMENT DISTRICT

CLIENT: OOTISCHENIA IMPROVEMENT DISTRICT

PROJECT:

CEC REPORT

EXISTING WATER SYSTEM INFRASTRUCTURE

FILE No.:	5110
CAD FILE NAME:	5110_CEC MAPS.dwg
REVISION:	--
DRAWING NAME:	MAP 3.0

LEGEND

WATER SYSTEM

EXISTING TOPO
- EXISTING HOUSE (APPROX. LOCATION)
- EXISTING GROUND CONTOURS (2.5m INTERVAL)
- EXISTING GROUND CONTOURS (0.5m INTERVAL)
- EXISTING ROAD CENTERLINE (APPROX. LOCATION)

EXISTING WATER SYSTEM
- 50mm WATERMAIN
- 75mm WATERMAIN
- 100mm WATERMAIN
- 150mm WATERMAIN
- RESERVOIR
- WELL
- WELL PUMP
- PRESSURE RELIEF VALVE (PRV)
- HYDRANT ASSEMBLY

PROPOSED WATER SYSTEM
- 150mm RAW WATER SUPPLY MAIN
- 150mm RAW WATER SUPPLY MAIN
- 200mm WATER DISTRIBUTION MAIN
- RESERVOIR
- WELL
- WELL PUMP
- PRESSURE RELIEF VALVE (PRV)
- HYDRANT ASSEMBLY (600m SPACING)
- HYDRANT ASSEMBLY (300m SPACING)

LAND USE & AREAS

OOTISCHENIA IMPROVEMENT DISTRICT
- OID BOUNDARY

OOTISCHENIA IMPROVEMENT DISTRICT DEVELOPMENT PROJECTIONS
- OID SUB-AREA #1
- OID SUB-AREA #2
- OID SUB-AREA #3
- UNDEVELOPABLE LAND (R.O.W.s WITHIN "R1A" ZONE)
- UNDEVELOPABLE LAND (UNUSABLE LAND WITHIN THE OID & ZONED R1A)
- UNDEVELOPABLE RESIDENTIAL LOTS (UNDIVIDABLE LOTS WITHIN THE OID & ZONED R1A)

OOTISCHENIA PLANNING REVIEW – PRELIMINARY ZONING
- OOTISCHENIA SUBURBAN RESIDENTIAL (R1A)

No.	REVISION DESCRIPTION	DATE	BY
--	--	--	--

WARD ENGINEERING AND LAND SURVEYING LTD
Suite #1 609 Baker Street Tel: (250) 354-1660
Nelson, British Columbia Fax: (250) 354-1670
V1L 4J3

DESIGN:	--
DRAWN:	J.W.F.
CHECKED:	P.W.
DATE:	MAR 23/07
SCALE:	1:5000
BENCHMARK:	ROCK (NAD83 UTM)
LEGAL DESCRIPTION:	
	OOTISCHENIA IMPROVEMENT DISTRICT

CLIENT: OOTISCHENIA IMPROVEMENT DISTRICT

PROJECT:

CEC REPORT

PROPOSED WATER SYSTEM INFRASTRUCTURE

FILE No.:	5110
CAD FILE NAME:	5110_CEC MAPS.dwg
REVISION:	--
DRAWING NAME:	MAP 5.0