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Golder Associates

REPORT ON

INITIAL PHASES IN THE DEVELOPMENT OF A GROUNDWATER PROTECTION PLAN DISTRICT OF PEACHLAND

P052694

Submitted to:

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EXECUTIVE SUMMARY

Golder Associates Ltd. ("Golder") is pleased to present the results of our investigation, which was conducted in order to initiate the process of developing a Groundwater Protection Plan ("GWPP") for the Municipality of the District of Peachland ("DOP" or "Peachland"). The GWPP is being developed in response to the requirements of the Interior Health Authority ("IHA"), as a condition of the District's water system operating permit. In addition, it is understood this document may be utilized as a supporting document for an application by the DOP for an Infrastructure Planning Grant to be submitted to the Ministry of Community Services ("MCS"), to aid in funding of future phases of the GWPP.

Background

Currently, the DOP's municipal water is derived from both groundwater and surface water sources. Surface water from Deep Creek supplies the southern part of Peachland, while surface water from Trepanier Creek supplies the northern part of Peachland. Groundwater, collected from two water wells located within Peachland's municipal boundary, supplies much of the central part of Peachland. A brief summary of the DOP's two wells is provided as follows:

- *Well No. 1:* Located at 4179 Ponderosa Rd., along the main access to Peachland Heights, at an elevation of approximately 384 m above sea level. Well No.1 was drilled in the mid 1970's and consists of a 200 mm (8 inch) diameter casing installed to a depth of 55.5 m. A 7.9 m length of screen was installed within the well between the depths of 55.5 m and 63.4 m. There is no record of subsurface conditions encountered during drilling on the well log. At the time of drilling, a static water level of 40.2 mbgs was measured.

- *Well No. 2:* Located at 4171 Ponderosa Rd., on the north side of the road, approximately 30 m to the northwest of Well No. 1, at an elevation of approximately 387 m above sea level. Well No. 2 was drilled in 1981 and consists of 200 mm (8 inch) diameter casing. According to the well log, subsurface conditions consist of interlayered sand and/or gravel and cemented sand and gravel, with a variable content of silt, clay and boulders throughout, underlain with bedrock. A well screen was installed between 56.4 m and 66.1 m, within a sand deposit. The static groundwater level was measured at a depth of 44.3 m.

Time of Travel Zone Results

For the purpose of this study, Golder Associates carried out a *preliminary analysis* of the time of travel zones for the water supply wells operated by the DOP. The time of travel zones were estimated for the two existing wells; Well No.1 and Well No.2. under maximum pumping rates (660 L/min or 145 Imp gpm) for each well. The results of this analysis indicate that the individual time-of-travel zone for Well No.1 and Well No.2 each covers an area of approximately 21,000 m^2. Due to the close proximity of these wells to each other, and as both wells are pumped simultaneously during portions of the year, the 60-day time of travel zones are anticipated to intersect each other. As such, the time of travel zone was also estimated assuming that the total volume of groundwater pumped from the wells combined is approximately 1,320 L/min (290 Imp gpm). The 60-day time of travel zone for the combined pumping rate covers an area of approximately 42,000 m^2 (Figure 5).

Preliminary Contaminant Inventory

The following areas of potential environmental concern were noted within the DOP wells' 60-day time of travel zones:

- A major transportation route (Highway 97); and
- Residential homes discharging septic effluent into the ground surface.

In addition, the following potential environmental concerns were noted just outside the 60-day time of travel zone.

- An existing service station handling gasoline and diesel fuels;
- An existing golf course applying pesticides, herbicides and fertilizers,
- Older residential homes are present, with the potential existing for former or existing underground heating oil tanks to be present.

Conclusions

Based on the results of this Study, the following conclusions are made;

- The aquifer that supplies the DOP community wells appears to be located within the Trepanier Creek fan deposits, and is semi confined in the area of the wells, but unconfined in the area closer to Okanagan Lake.

- Groundwater flow in the area of the DOP wells is generally in a southerly direction, under nonpumping conditions. However, the flow direction appears to change once the DOP wells are pumping, potentially inducing flow from Okanagan Lake to the DOP wells.

- The estimated volume of groundwater used in 2004 was approximately 220,000 m^3 (48,400,000 Imperial gallons), which represents an average flow of approximately 600 m^3/day.

- The 60-day time-of-travel zone covers an area of approximately 42,000 m^2, based on a combined pumping rate of 1,320 L/min (290 Imp gpm).

- A preliminary review of potential environmental concerns within the 60-day time of travel zone includes a major transportation route and the ground disposal of domestic effluent (septic fields).

Recommendations

The recommendations to move forward with the development of the DOP's groundwater protection plan are dependant on whether or not the two groundwater wells will continue to be used to provide potable water to District residents. It is understood that the long term viability of the District of Peachland wells may be in question, as both wells are over 25 years old, and as they provide a limited volume of water to the Peachland water system. As such, the following recommendations are provided regarding the continuation of the groundwater protection planning process, and given that the long term viability of the existing groundwater wells may be in question.

1. Well Assessment

As both groundwater wells are over 25 years old, with very infrequent well maintenance conducted in the past, it is recommended that the conditions of the well screens be assessed using a down hole camera. The assessment of the screen conditions will aid in the determination of whether or not the wells should be rehabilitated, either using chemicals or redevelopment. Should it be determined that rehabilitation is feasible, consideration should be given to conducting a short term duration pumping test to assess the specific capacity of each well.

2. Confirmation of Hydraulic Gradient and Flow Direction

Although there are several data gaps regarding hydraulic parameters, such as gradient in the area surrounding the wells, a detailed analyses of one-year, five-year and ten-year time of travel zones is not considered necessary at this time, as the long term viability of the DOP wells is in question. However, it is recommended that an analyses of existing

water wells (consisting of a one-time well and lake elevation survey and a one time manual recording of water level measurements on a given day) be conducted to confirm the estimated aquifer conditions on which the 60-day time of travel zones were based. This will allow for a more accurate picture of the direction of groundwater flow and gradient, as the original water level measurements used were based on water levels recorded on different dates.

2. Conduct a Contaminant Inventory

As the area of the DOP is relatively small and there are no major industries within the community, the level of effort for a contaminant inventory will not be substantial and can be completed by DOP staff. However, the inventory is still important, as the community wells are the only source of water supplying the Ponderosa area. As such, a detailed contaminant inventory of the 60-day time of travel zones should be carried out, and should include the following.

- documentation of all septic tanks and disposal fields ;
- the identification of transportation routes where dangerous goods are transported;
- documentation of the DOP's storm water disposal systems, specifically where the points of discharge are located; and
- a detailed review of the MOE database for waste and spill information, as well as a review of properties registered within the contaminated sites database.

The major contaminant risks associated with the 60-day time of travel zone should be evaluated through a subjective risk evaluation.

3. Water Quality Monitoring Program

It is recommended that the current groundwater monitoring program utilized by the DOP be assessed, and that the historical water quality data be reviewed. The purpose of the review would be to identify any outstanding water quality issues and to identify additional monitoring that may be required to address risks identified by the contaminant inventory.

4. Designate Groundwater Protection Areas

Following the confirmation of the 60-day time of travel zone for the DOP wells, the DOP should consider designating the 60-day time of travel zone as a formal groundwater protection area. This should be conducted with other stakeholders such as IHA. As the long term viability of the wells is in question, it is our opinion that the initial designation

of the 60-day time of travel zone is appropriate for designation as a groundwater protection area.

5. Develop Groundwater Protection Measures

Once designated groundwater protection areas have been established and additional potential contaminant sources (if any) have been identified, the DOP can consider embarking on the development of groundwater protection measures. Groundwater protection measures can be implemented at the municipal/regional level through both regulatory and non-regulatory measures. In our opinion, while non-regulatory measures, such as public education and best management practices can be highly effective, some degree of regulatory control may be required to ensure the protection of the groundwater resources. These regulatory strategies often involve the use of municipal land use planning and zoning bylaws to restrict certain high-risk land use activities within protection areas. However, the DOP will need to consider the time required to develop regulatory control versus the long term viability of the DOP wells.

6. Develop a Contingency Plan

Contingency planning consists of developing a plan for the location and provision of alternative drinking water supplies in the event that one or both of the existing wells cannot be used. Disruptions to wells may be related to either contamination or non-contamination effects. The contingency plan should identify short-term alternatives in the event of a minor disruption, and long-term alternatives in the event of a complete loss of groundwater supply. It is recommended that if one is not already in existence, a contingency plan for alternative water supplies be developed.

7. Develop an Emergency Response Plan

The goal of groundwater protection is to prevent the contamination of underground drinking water supplies. Even under the best prevention plans, a scenario that threatens to contaminate the aquifer may occur. When this happens, an emergency response plan directing a coordinated and timely response is an effective tool for assuring a continued supply of potable water. Many communities' emergency response plans do not include specific provisions for the protection of groundwater resources in the event of a spill or accident. For example, it may be prudent for emergency response personnel to restrict the use of fire retardant chemicals in sensitive groundwater areas. We recommend that the DOP existing emergency response plan be evaluated and revised, if necessary, to allow for the protection of sensitive groundwater resources.

Should it be determined that the District of Peachland will continue to operate the wells long term (for more than five to ten years), it is recommended that additional work to that noted above recommendations be conducted to fill in the data gaps, such that the time of travel zones can be refined. The development of a Groundwater Protection Plan should be considered an on-going process, which is revisited every year or two, and revised as necessary. As the District of Peachland continues to grow, so too will the need to revisit the Groundwater Protection Plan.

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1.0 INTRODUCTION

Golder Associates Ltd. ("Golder") is pleased to present the results of our investigation, which was conducted in order to initiate the process of developing a Groundwater Protection Plan ("GWPP") for the Municipality of the District of Peachland ("DOP" or "Peachland"). The study area is shown on Figure 1. The project was carried out in accordance with our workplan and cost estimate dated July 23, 2004.

The GWPP is being developed in response to the requirements of the Interior Health Authority (IHA), as a condition of the District's water system operating permit. In addition, it is understood this document may be utilized as a supporting document for an application by the District for an Infrastructure Planning Grant to be submitted to the Ministry of Community, Aboriginal and Women's Services (MCAWS). The purpose of the grant would be to aid in funding of future phases of the GWPP.

Currently, the DOP's municipal water is derived from both groundwater and surface water sources. Surface water from Deep Creek supplies the southern part of Peachland, while surface water from Trepanier Creek supplies the northern part of Peachland. Groundwater, collected from two water wells located within Peachland's municipal boundary, supplies much of the central part of Peachland. The approximate boundary for the three water supply areas (Southern, Central and Northern portions of Peachland) are shown on Figure 2.

A brief summary of the DOP's two wells is provided as follows, with well locations shown on Figure 2:

- *Well No. 1 (Well Tag No. 25834):* Located at 4179 Ponderosa Rd., along the main access to Peachland Heights, at an elevation of approximately 384 m above sea level.

- *Well No. 2 (Well Tag No. 48727):* Located at 4171 Ponderosa Rd., on the north side of the road, approximately 30 m to the northwest of Well No. 1, at an elevation of approximately 387 m above sea level.

The aquifer/s in the area of Peachland could be under threat of contamination from a variety of sources, including septic systems, golf courses, leaking underground storage tanks and some agricultural activities. Based on available well log information for Well No. 2, it appears that subsurface conditions in the area of the DOP wells consists of varying deposits of sand and gravel, to depths of up to approximately 67 m below ground surface ("mbgs"), underlain by bedrock. Due to the coarse nature of the subsurface deposits, the DOP wells could be described as having the potential to be vulnerable to surface contamination. As such, the development of a Groundwater Protection Plan is

important. Implementation of groundwater protection measures will not only help to protect public health, but will protect ecosystems associated with streams and lakes that rely on groundwater as a source of recharge.

The work to conduct the GWPP was authorized by Mr. Joe Mocilac of the District of Peachland, in response to Golder's initial proposal submitted on July 23, 2004.

2.0 METHODOLOGY

The Ministry of Environment's ("MOEs") Well Protection Toolkit[1] was used as a guide for work related to groundwater protection planning for the District of Peachland. The Well Protection Toolkit ("WPT") was developed jointly by MOE and the Ministry of Health in 2000, and consists of a six-step process to assist communities that utilize groundwater to better manage and protect their drinking water sources.

The six steps outlined in the WPT are as follows:

1. Form a Community Planning Team;
2. Define the Well Protection Areas
3. Identify Potential Contaminants;
4. Develop Management Strategies;
5. Develop Contingency Plans; and,
6. Monitor Results and On-going Evaluation of the Plan.

Based on our experience, the process of completing the six steps of the WPT needs to be customized to meet the unique needs of each community and ensure the investment delivers the maximum protection of their water supply. For this study, the first two steps (Steps 1 and 2) of the WPT were followed, with more emphasis placed on wellhead characterization than aquifer characterization. Wellhead characterization was emphasized by assessing subsurface conditions in the area of the DOP wells, as opposed to the entire aquifer. It is understood that further progress in the development of the District's GWPP (the completion of Steps 3, 4, 5 and 6) will be a function of funding availability.

[1] Ministry of Environment, Well Protection Toolkit

The scope of work for this initial phase of the GWPP consisted of the following:

- Assist with the establishment of an aquifer protection planning committee with representation from the stakeholders of the aquifer, community members, government and technical experts, some to be added at a later date;
- Assist the planning committee with the establishment of goals, determining information needs and the development of an action plan;
- Gather and review available information on the aquifer, prepare maps of the aquifer extent to identify physical properties, including aquifer thickness and flow direction;
- Identify data gaps and complete a field reconnaissance visit;
- Identify aquifer recharge and discharge areas;
- Estimate the extent of wellhead time-of-travel zones for the large capacity municipal water wells at current pumping rates using the Calculated Fixed Radius (CFR) method; and
- Prepare a report summarizing Steps 1 and 2, with recommendations for work to be included in Steps 3, 4, 5 and 6.

Issues related to the ability of the local aquifer to sustain the current and future water supply requirements of the area were not addressed in this study. Similarly, the potential for well interference between existing or potential production wells and neighbouring wells was not addressed.

3.0 STUDY AREA

3.1 Location and Climate

The District of Peachland is located in the southern Interior of British Columbia, within the Okanagan Valley, along the eastern shores of Okanagan Lake (Figure 1). Although the Municipal boundary for Peachland extends approximately 5 km to the southwest of, and 6 km to the northeast of Peachland's Municipal centre, the Study Area considered for the preliminary steps in the development of this GWPP is considered to be the central portion of the DOP, shown on Figure 1 and 3.

Peachland is a primarily residential community, with some commercial businesses located in the central portion of the DOP, and some agricultural uses noted in the outer limits of the DOP.

The climate of Peachland can be classified as a semi-arid desert, with over 2,000 hours of sunshine every year. Based on data for a climate station located in Peachland (Climate ID 1126070)[2], the average annual daily temperature is 9.7° C, with daily mean temperatures ranging from –1.2° C in December to 21.1° C in July. Total annual precipitation for the Peachland weather station is approximately 401.3 mm.

3.2 Topography

Peachland is located within moderately steep mountainside slopes, along the eastern shore of Okanagan Lake. The elevation of Peachland ranges from approximately 342 m above sea level along the lakeshore to 840 m above sea level in the northern portion of Peachland. Mount Drought bounds Peachland's municipal boundary to the north, while Pincushion Mountain bounds Peachland to the northwest[3].

The main commercial centre of Peachland is located at the foothills of Pincushion Mountain (Figure 2), while the residential areas of Peachland extend both along the lakeshore and up along the mountainside.

[2] *"Canadian Climate Normals, 1971 – 2000 for BC"* (Environment Canada),
[3] Department of Energy Mines and Resources, Surveys and Mapping Branch, Peachland, BC, 82 E/13, Edition 2

Trepanier Creek, originating approximately 20 km to the northwest of Peachland's municipal boundary, flows through the District from the northwest to the southeast, eventually discharging into Okanagan Lake. Drought Creek, originating from Mount Drought, flows in a southerly direction through the northern portion of Peachland, also discharging into Okanagan Lake. Peachland Creek is located at the southern end of the DOP, and flows in a southerly to southeasterly direction, into Okanagan Lake. Other than Okanagan Lake, there are no lakes within the municipal boundary of the DOP.

The catchment area for the District of Peachland is shown on Figure 3 and covers an area of approximately 43,000 hectares. Runoff from rainfall and snowmelt is collected within the catchment area and contributes recharge water to the aquifer/s in the Peachland area. The catchment area for the DOP includes the catchment area for Trepanier Creek and Deep Creek, and the numerous smaller streams that flow into it. The DOP's two wells are located within the Trepanier Creek watershed area, which covers an area of approximately 27,150 hectares.

3.3 Surficial Geology

According to "Late Glacial History and Surficial Deposits of the Okanagan Valley, B.C."[4] the surficial deposits within the DOP consist of the following three categories:

1. *Kame terraces and meltwater channels:* These deposits generally consist of stratified drift materials, deposited by meltwater streams flowing along the edge of the ice. These deposits were identified to be present in the upland areas, near the mouth of Trepanier Creek and Peachland Creek. The DOP wells appear to be located within these drift deposits, near its outer extent of the northwestern edge of the deposits along Trepanier Creek.

2. *Glacial lake sediments:* These materials consist of thick deposits of sand, silt, and clay, which accumulated within the lake areas as ice lobes melted. These deposits are identified to be present in the area directly north of the mouth of Peachland Creek.

3. *Alluvial fans and deltas, and associated gully and stream channel deposits:* These are erosional and depositional features of the present-day streams. The deposits vary from fine silty sand to coarse bouldery gravel. The most significant of these deposits occurs at the mouth of Trepanier Creek and Peachland Creek.

[4] Nasmith, Hugh, Late Glacial History and Surficial Deposits of the Okanagan Valley, British Columbia, Bulletin 46, Ministry of Energy, Mines and Petroleum Resources, 1962 (reprinted 1981)

3.4 Bedrock Geology

Bedrock in the mountainous areas located to the north of the DOP (Mount Drought, Mount Law and Mount Miller) consist of the Kitley Lake Formation, comprised of Eocene aged trachyte, trachyandesite, plagioclase and biotite glomerophenocrysts. Bedrock in the area of Trepanier Creek consists of the Trepanier Rhyolite Formation. This formation is made up of mainly of rhyotite with quartz, horneblende and biotite phenocrystrs.[5]

According to the Geological Survey of Canada Sheet 82E (West Half)[6], an east to west trending fault is present within the bedrock, in the area on the DOP wells.

Based on the available bedrock information, it is anticipated that bedrock in the Study Area represents a negative boundary condition for the local aquifer, providing minimal recharge to the aquifer.

3.5 Hydrogeology

The MoE has not yet classified the aquifers within the DOP area in their BC Water Resource Atlas. However, based on a review of water well logs[7] and other boreholes within the Study Area, the following observations were made. It is important to note that the aquifer classification system utilized by the MOE is subjective and is based on a number of factors such as aquifer demand, productivity, size, soil types, water quality and vulnerability to surface contamination[8]. Based on available information, Golder has made some inferences as to the classification of the aquifers within the DOP.

- A shallow, unconfined sand and gravel aquifer overlies the bedrock along the margins of Okanagan Lake, in the central portion of Peachland, along Beach Avenue, and in the southern portion of Peachland, at the mouth of Deep Creek (Figure 4). Based on available information, the depth to water in the unconfined aquifer is within a few metres of ground surface, and generally corresponds to the elevation of the lake level. Although the unconfined aquifer has not been identified in the MoE aquifer database and has no classification number, it is inferred to be moderately developed. The aquifer is inferred to be highly vulnerable because of the shallow depth to groundwater and the absence of overlying low-permeability sediments.

[5] Geological Survey of Canada, Energy, Mines and Resources Canada, Penticton, West of Sixth Meridian, British Columbia, Sheet 1 of 6, 1969.
[6] Geological Survey of Canada, Map 15-1961, Geology Kettle River (West Half) BC, Sheet 82E, 1961.
[7] http://srmapps.gov.bc.ca/apps/wrbc/
[8] Ministry of Environment, An Aquifer Classification System for Ground Water Management in BC, walpwww.gov.bc.ca/wat/aquifers/Aq_Classification/Aq_Class.html

- A semi-confined aquifer appears to be present in the area of Trepanier Creek, along Highway 97 (Figure 4). According to well logs for wells completed in this aquifer, subsurface conditions consist of sand and gravel deposits interlayered with cemented sand and gravel, silt and till, to depths of up to approximately 110 m below ground surface ("mbgs"). Static water levels were reported to be approximately 40 m to 80 mbgs, which is near the elevation of Lake Okanagan. It is anticipated that this aquifer is more confined in its upper reaches along Trepanier Creek, and unconfined in the lower reaches near the mouth of Trepanier Creek, and along Beach Avenue. Although this aquifer has not been identified in the MWLAP aquifer database and has no classification number, it is inferred to be lightly to moderately developed and can be classified as having a low to high vulnerability, depending on the location within the aquifer. The DOP's two water wells are located within this aquifer, just north of Highway 97. Specific details of the DOP wells are provided in the section below.

- Several bedrock aquifers are present in the DOP, and are located in the northern, central and southern portions of Peachland (Figure 4). In general, bedrock aquifer systems have limited storage and can be very susceptible to seasonal fluctuations in the groundwater level. Water level measurements recorded within these bedrock wells were noted to range from 20 m to 60 mbgs. Although the bedrock aquifers have not been identified in the MOE aquifer database and have no classification number, they can be classified as highly vulnerable, with a low demand and productivity.

The aquifers within the area of Peachland are recharged by precipitation that falls on the valley floor, runoff from the uplands on the west side of the valley, and leakage from local creeks flowing from the upland areas into the valley bottom. Groundwater flow is typically towards the valley bottom, with groundwater flow in the area of the DOP wells inferred to be generally in a southerly direction.

A lack of detailed water level and well elevation information for the water wells located in the various aquifers precludes Golder from accurately determining the hydraulic gradient and/or groundwater flow direction within this area. However, based on i) a preliminary review of the water levels within the DOP's two wells, ii) wellhead elevations of the DOP wells and iii) the topographic elevation of the lake level, the estimated hydraulic gradient (at prepumping conditions) between the DOP wells and the lake is estimated to be on the order of approximately 0.005.

3.6 Overview of Water Supply for the District of Peachland

According to the District of Peachland's website, the BC Statistics, as of December 2004, indicated the population of Peachland is 5,077. The population is serviced by the District's water supply system, which collects and distributes potable water from two surface water sources and one groundwater source, as described below.

1. *Surface water source from Trepanier Creek:* The intake for surface water collected from Trepanier Creek is located approximately 5 km outside the Municipal boundary, along the creek. This intake has the ability to supply approximately 11,000 L/min (2,400 Imp gpm), storing water within one reservoir able of holding a total capacity of 2,050 m^3 (450,000 gallons). This surface water source supplies approximately 700 users within the Trepanier area and downtown Peachland.

2. *Surface water source from Deep Creek:* This intake is located at 5447 Pierce Street. This surface water system utilizes two reservoirs storing a total of approximately 2,300 m^3 (500,000 Imp gallons) of water. Deep Creek supplies water to approximately 900 users in the area south and west of downtown. In addition, this source services nine holes of the Ponderosa Golf Course.

3. *Groundwater source from two water wells:* Two water wells are located within the Ponderosa Pines area, on the north side of Highway 97, north of the DOP's centre. According to Mr. Joe Mocilac, Director of Operations for the DOP, both wells are used year around and pump water at a rate of approximately 660 L/min (145 Imperial gpm) each. Water from the wells is pumped into a reservoir, which supplies approximately 200 users in the Ponderosa area, including a portion of the Ponderosa Golf Course. More details regarding the water wells is provided in the following section.

3.7 Water Balance

3.7.1 Recharge

For the purpose of this investigation, estimates of recharge to the semi-confined aquifer in which the DOP wells are located were calculated using climatic data for the area and estimations regarding infiltration contributions to recharge.

In using climatic data, it was assumed that recharge to the aquifer was primarily via infiltration from precipitation within the catchment area of Trepanier Creek Watershed that contributes surface flow to Trepanier Creek, upgradient of the DOP wells. Based on previous studies, as outlined in the following table, an assumption of 7% of total precipitation was used to estimate the recharge to the aquifer.

Location	Recharge Rate	Reference
Semi-arid Lillooet, B.C., alluvial fan (low angle)	24% (397 mm/yr)	Golder, confidential report
Prince George, B.C., valley bottom	17% (614.6 mm/yr)	Golder, confidential report
Semi-arid, West Texas, USA	2% (330 mm/yr – 560 mm/yr)	Wood and Sanford, 1995
Florida sub tropical, USA	0.2% to 0.3% (1400 mm/yr)	Fetter, 1988
High Plains (Colorado, Kansas, Nebraska, New-Mexico, Oklahoma, South Dakota, Texas, Wyoming; USA)	3.5%-6% (410 mm/yr -710 mm/yr) (average for entire area)	Fetter, 1988

As seen in the table above, a wide range of recharge rates can occur, from fractions of a percent of total precipitation in arid and semi-arid areas (where evaporation is high) to approximately 25% in some higher alpine areas and on flat lying alluvial fans. In the catchment area for Trepanier Creek there is a combination of steep mountain slopes and a valley bottom, hence 7% was used as a median number between the higher infiltration rates of low-angle, semi-arid Lillooet to the low infiltration rate of the semi-arid area in West Texas.

It was also assumed that the majority of the infiltration (approximately 80%) is concentrated in the alluvium sediments within the base of the valley. It is anticipated that the remainder of the infiltration (20%) recharges localized bedrock aquifer systems.

The watershed catchment area for Trepanier Creek upgradient of the District's two wells, as shown in Figure 3, is approximately 27,150 hectares. As previously stated in Section 3.1, the total annual precipitation for the Peachland weather station is approximately 401.3 mm. However, it should be noted that the total annual precipitation is likely greater, as a large majority of the catchment area is located at higher elevations than the District of Peachland.

Assuming that approximately 7% of this precipitation, or 28.1 mm/yr, is available as recharge, and of this, approximately 80% is directed to the alluvium sediments along the Trepanier Creek valley (an area of 27,150 hectares), a preliminary estimate of annual recharge to the aquifer in which the DOP wells are completed is 6.1×10^6 m^3/yr (1.7×10^4 m^3/day).

Note that this estimate of recharge is based on precipitation only and does not account for other sources of recharge to the aquifer such as return flow from septic fields, irrigation, distribution losses and run-off from surrounding uplands. Nor does it account for induced flow from Okanagan Lake into the aquifer. This is likely to occur during groundwater withdrawals from high-capacity wells located near the lake shoreline, as discussed in Section 4.1.

3.7.2 Extraction

According to Mr. Wayne Marceniuk, Water Mechanic for the DOP, the total volume of groundwater extracted from the DOP in 2004 was approximately 220,000 m^3 ($4.8x10^7$ Imperial gallons). The maximum daily pumping rate was noted to be approximately 1,600 m^3, and was observed in the month of August. Mr. Marceniuk indicated that the recorded maximum pumping hours for both wells combined was approximately 5,183 hours, which implies that the pumps were operating approximately 60% of the time throughout the year.

In addition to the DOP's groundwater extraction, the following groundwater and surface water extractions are noted within the Trepanier Creek watershed:

Groundwater

- There are a number of other wells outside the DOP, but within the Trepanier Creek watershed, located approximately 5 km to the northwest of the DOP's municipal centre. These wells are likely used for domestic purposes and/or irrigation of agricultural/pasture lands. It is anticipated that the domestic portion from the wells accounts for approximately 51,000 m^3/yr, based on an estimated population of approximately 200 people in the area outside the DOP municipal boundary. This is based on the BC Sewage Disposal Regulation[9], which states that the average domestic water use is in the range of 0.5 to 0.6 m^3/day per person, and allowing for an additional 20% to account for irrigation flows and potential losses from leaking water supply systems.

[9] Ministry of Environment, BC Sewage Disposal Regulation, BC Reg 411/85, 2002.

- Water used for agricultural purposes outside the DOP municipal boundary is estimated to range from 850,000 m^3/yr to 1,230,000 m^3/yr, and it has been assumed that this water is provided through groundwater sources. This estimate was based on an irrigated crop water demand ranging from 42 cm to 61 cm per year applied over an estimated 80 hectares of irrigated land to the northwest of the DOP, but within the Trepanier Creek watershed. The irrigated crop water demand was calculated using the "Guide to Irrigation System Design with Reclaimed Water"[10]. Note that this estimate does not take into account the potential recharge of irrigation water back into the subsurface.

Surface Water

- The DOP withdraws approximately 1,100,000 m^3 per year ($2.4x10^8$ Imperial gallons per year) of surface water from their intake along Trepanier Creek.

There are no industrial or other high capacity groundwater users noted within the Trepanier Creek watershed. Therefore, using the available data, the total groundwater extraction for the Trepanier Creek watershed area, by the DOP and other outside users is estimated to be within a range of 1.1×10^6 m^3/yr to 1.5×10^6 m^3/yr.

3.7.3 Surplus

The overall water balance in the area can be demonstrated from the following equation:

$$Q_{recharge} - Q_{extraction} = Q_{net\ surplus}$$

The aquifer recharge calculated in Section 3.6.1 was estimated to be approximately 6.1×10^6 m^3/yr (based on precipitation data).

The groundwater extraction from the Trepanier Creek watershed calculated in Section 3.6.2 was estimated to be within a range of 1.1×10^6 m^3/yr to 1.5×10^6 m^3/yr.

Based on these estimates, the amount of recharge not captured by groundwater withdrawals (net surplus) within the Trepanier Creek watershed ranges from 5×10^6 m^3/yr to 4.6×10^6 m^3/yr. It is unlikely that withdrawal of this volume of groundwater would be possible within the Peachland boundaries, as information for the area identifies shallow bedrock conditions and an insufficient thickness of suitable overburden materials to complete a large yielding water well. Also, the recharge estimate is based on recharge to

[10] British Columbia Ministry of Agriculture, Food and Fisheries, *Irrigation Fact Sheet, Guide to Irrigation System Design with Reclaimed Water*, February, 2001.

the aquifer consisting primarily of the infiltration of precipitation, and not pumping induced groundwater flow from Okanagan Lake into the aquifer.

4.0 GROUNDWATER USE

4.1 District of Peachland

4.1.1 Water Wells

Two water wells are currently utilized by the DOP to provide potable water to the residents of Peachland living in the Ponderosa area. Well logs for both Well No.1 and Well No.2 are provided in Appendix I. A description of the two water supply wells currently used by the DOP is presented below. In addition, the hydraulic parameters of the aquifer in which the wells are completed have been evaluated using pumping test data provided by the DOP. The aquifer thickness was generally estimated using two methods as follows:

- by subtracting the depth to the groundwater level from the depth to the top of bedrock, which resulted in an aquifer thickness of 23 m; and
- by subtracting the depth to the base of the confining deposit from the depth to the top of the bedrock, which resulted in an aquifer thickness of approximately 10 m.

The aquifer transmissivity was estimated using the results of pumping test conducted in Well No. 1 by Kala Groundwater Consulting Ltd. ("Kala") in 1986[11]. The drawdown recorded during this test in Well No. 1, and Well No. 2 (which was used as an observation well), was analyzed using AQTESOLV, a commercial software package for aquifer test analyses. The analysis utilized Theis solution and included the effects of Okanagan Lake, which was assumed to act as a constant head boundary. Plots showing observed drawdown and best-fit curves calculated using AQTESOLV are provided in Appendix II.

Well No.1 Construction Details

Well No.1 was drilled in the mid 1970's by Osoyoos Tile Works and Water Wells, and is located at 4179 Ponderosa Rd. According to the July 1986 Kala report entitled *"Peachland Heights Water System, Aquifer Testing Program"*, the well consists of a 200 mm (8 inch) diameter casing installed to a depth of 55.5 m. A 7.9 m length of screen was installed within the well between the depths of 55.5 m and 63.4 m. There is no

[11] Kala Groundwater Consulting Ltd., *"Peachland Heights Water System, Aquifer Testing Program"*, July 1986.

record of subsurface conditions encountered during drilling on the well log. However, based on Well No.1's close proximity (approximately 30 m to the northwest) to Well No. 2, it is likely that subsurface soil conditions are similar, and consist of interlayered sand and gravel, gravel and cemented sand and gravel. At the time of drilling, a static water level of 40.2 mbgs was measured.

Well No.2 Construction Details

Well No. 2 was drilled in 1981 by Quality Water Well Ltd. using a cable tool drill rig. This well is located at 4171 Ponderosa Rd., in Peachland, BC, and consists of 200 mm (8 inch) diameter casing. According to the well log, subsurface conditions consist of interlayered sand and/or gravel and cemented sand and gravel, with a variable content of silt, clay and boulders throughout. These interlayered deposits were encountered to a depth of approximately 67.2 mbgs, and were underlain with bedrock. A well screen was installed between 56.4 m and 66.1 m, within a sand deposit. The static groundwater level was measured at a depth of 44.3 m. Based on a review of this well log, this well appears to be screened in a semi-confined to confined aquifer.

24-Hour Pumping Test Results

In June 1986, Kala conducted a 24-hour constant rate pumping test on Well No.1, measuring drawdown in both Well No.1 and Well No.2 during the test, the results of which were summarized in their July 1986 report entitled *"Peachland Heights Water System, Aquifer Testing Program"*. During the test, Well No.1 was pumped at a constant rate of approximately 700 L/min (155 Igpm). A total of approximately 8.1 m of drawdown was observed within Well No.1, while a total of approximately 0.2 m of drawdown was noted at Well No. 2, located approximately 30 m to the east of Well No.1. Subsequent to the 24-hour pumping test conducted in June, another 24-hour pumping test was conducted in July of 1986, at which times both Wells No.1 and No.2 were pumped simultaneously, at respective rates of approximately 700 L/min (155 Igpm) and 900 L/min (196 Igpm). Based on the results of the pumping tests, Kala recommended that the long-term safe yield was 770 L/min (170 Igpm) for Well No.1 and 860 L/min (190 Igpm) for Well No.2, for a total yield of approximately 1,600 L/min (360 Igpm).

The drawdown data collected from Well No. 2 (observation well) are not complete as the readings were not collected between 40 and 200 minutes after the pumping test was started. Nevertheless, these results suggest that the aquifer in which both wells are screened is likely unconfined. In addition, a boundary response is apparent approximately 150 minutes after start of the pumping, at which time the rate of drawdown decreased, suggesting a positive boundary condition. This boundary could represent Lake Okanagan, located approximately 350 m to the south of the wells. Although it is inferred that a bedrock boundary is present to the northwest of the wells

(based on observed bedrock outcroppings), a negative boundary condition was not observed during the pumping test.

An approximate 8 m drawdown in Well No.1 was noted at the end of the pumping test. As the groundwater elevation at Well No.1 was approximately 342.2 m above sea level prior to the start of the pumping test, and as the elevation of Okanagan Lake was approximately 341.7 m above sea level, it is possible that pumping from this well reversed the direction of groundwater flow between the well and the shoreline, which resulted in lake water recharging the aquifer. .

Kala did not estimate the transmissivity or hydraulic conductivity of the aquifer using data collected during the pumping test in Well No. 1. The data were re-analyzed by Golder and the transmissivity of the aquifer in the vicinity of the pumping wells was estimated to be approximately 1,100 m^2/day. This value is based on an analyses of data from the observation well (Well No.2), as it is inferred to provide more representative information of aquifer properties. Transmissivity values estimated from the drawdown recorded in Well No. 1 was lower, on the order of 200 m^2/day, however, due to well-loss and well-bore storage effects it is likely that the actual transmissivity is greater than this value. Based on the transmissivity of 1,100 m^2/day and an aquifer thickness of approximately 23 m, the hydraulic conductivity of the aquifer in the area of the well is approximately $6x10^{-4}$ m/sec, which is within the published range of hydraulic conductivities for these soil conditions.

4.1.2 Future Groundwater Development

Based on conversations with the DOP, it is understood that consideration is being given to developing an additional/alternate groundwater supply well/s to meet future growth demands. Golder completed a preliminary groundwater availability assessment for the DOP in September 2005, and revised in 2006[12]. The focus of the study area for the assessment was located in the downtown area of Peachland, encompassing the area between Highway 97 and Okanagan Lake, and bounded by 11th Street to the east and 1st Street to the west.

Based on the results of the preliminary groundwater availability assessment, it appears feasible for the District of Peachland to collect up to 5,700 L/min (1,250 Imp gpm) from a groundwater well/s located within the study area. Groundwater can be collected using either a large-bore collector well or several smaller-bore conventional wells.

[12] Golder Associates Ltd., *"Revised Preliminary Assessment of Groundwater Availability, District of Peachland, British Columbia"*, November 24, 2006

The upland areas to the west of Peachland were not considered to represent a good potential for groundwater supply, as there are limited alluvium conditions and poor groundwater development potentials in bedrock.

4.2 Other Groundwater Users

A comprehensive inventory of private water wells other than those operated by the DOP was beyond the scope of this study. However, Golder assembled some information concerning regional groundwater use.

A search of water well records identified a total of approximately 30 private water wells within the municipal boundary of the DOP (see Figure 4 and Appendix III). Some of these wells supply water to property owners located within the municipal boundary, but outside the area serviced by the DOP's municipal system, while other wells are located in areas now supplied by the municipal system and have likely been abandoned. Presumably, some older wells located in rural/agricultural areas now serviced by municipal supplies may be maintained by property owners for irrigation purposes. According to Mr. Marceniuk (DOP Water Mechanic), there are 22 properties located within the DOP municipal boundaries which have in-use private water supply wells. These 22 properties are listed as follows:

- 6711 Hardy Street and 6663 Highway 97S (both located in the southern portion of Peachland, along Highway 97);
- 6691, 6709, 6727, 6743, 6757, 6769, 6785, 6787 and 6789 Thorne Road (all located in the southern portion of Peachland);
- 5309, 5207, 5206, 5205, 5204, 5103, 5102 and 5101 Law Street (located in the southwestern portion of Peachland); and
- 3658, 3642 and 5151 Walker Road (all located on the east side of Trepanier Creek, near Drought Hill).

According to available information, none of these water wells are located within the same aquifer as the DOP wells.

In addition, two properties on Robinson Lane and four properties of Drought Road pump water from Okanagan Lake.

Enquiries were made to Mr. Ron Johnston and Mr. John Beaupre, both of the Interior Health Authority, to obtain information regarding the other smaller public water supply systems sourced by groundwater in the area that service local communities such as trailer parks. Both Mr. Johnston and Mr. Beaupre have not responded to our request for information at the time of this report.

5.0 WELL PROTECTION TOOLKIT

5.1 Step 1 - Community Planning

5.1.1 Development of Community Planning Team/Technical Committee

The development and implementation of the GWPP should be carried out with input from a wide range of community members. Local government bodies, citizens, business owners and community groups all have an interest in protecting groundwater in the area for domestic and agricultural use. At this point, the primary focus in the development of the initial stages of the groundwater protection plan is technical, and does not require the input from the general public. However, input from the public would be solicited following the completion of Steps 2 and 3, with additional members added to the community planning team at a later date.

At this time, it is proposed that the technical committee would consist of the following persons:

Mr. Dave Gold, Director of Operations - District of Peachland
Mr. Wayne Radomski, Interior Health Authority
Mr. Greg Bucholz, Urban Systems Ltd.
Mr. Des Anderson, Ministry of Water, Land and Air Protection (Kamloops)
Mrs. Jacqueline Foley, Golder Associates Ltd.

The objective of the initial planning committee is to understand the technical aspects of the aquifer/s in the Study Area, prior to embarking on public workshops to solicit stakeholder input.

5.1.2 Action Plan and Objectives

Action items carried out during the initial stages of the groundwater protection plan consisted of the characterization of the aquifer systems underlying the District of Peachland and delineation of preliminary time of travel zones for the municipal wells. It is important to first characterize the aquifer/s and groundwater flow to the municipal wells before approaching the public, to enable officials to be confident in answering the public's questions during the process.

The general objective of the GWPP will be to protect groundwater quality and quantity. More specific objectives and an action plan will be determined once the initial phase of the Study was completed and the aquifer/s characterized. Tools that would be examined in the future to assist in the protection of the groundwater source would likely focus on public education, control of land use (bylaws, rezoning, etc.), and more detailed analysis of Best Management Practices in the agricultural and industrial community.

5.2 Step 2 - Define Well Protection Area Based on Time of Travel Zone Analyses

5.2.1 General

During the pumping of a water production well, groundwater is removed from a finite volume of the aquifer. In the initial phases of pumping, the drawdown cone created by the well expands and groundwater is removed from storage within the aquifer (due to pore drainage, aquifer matrix compression, and water compressibility). In later stages, once the drawdown cone attains sufficient dimensions and/or intersects a water body, groundwater flows radially towards the production well and the aquifer is replenished by recharge from precipitation and/or leakage from streams, rivers, and geologic units bounding the aquifer.

To efficiently manage and protect a groundwater supply, an understanding of the well "capture zone" and the "time of travel" zones is required. A "capture zone" is the area of an aquifer from which all groundwater will eventually arrive at the production well, even after a considerable amount of time. A "time of travel" zone is the area of an aquifer from which groundwater will be derived in a predefined amount of time. For example, if the contaminant is released within the 1-year time of travel zone, it can be expected to arrive at the production well in approximately 1 year. Once the time of travel zones are estimated, protective measures can be implemented within the zones to ensure the safety of the water supply.

For the purpose of this study, Golder Associates carried out a *preliminary analysis* of the time of travel zones for the water supply wells operated by the DOP. The time of travel zones were estimated for the two existing wells; Well No.1 and Well No.2. under maximum pumping rates (660 L/min or 145 Imp gpm) for each well. The following section outlines the methodology used in the time of travel zone analyses, the results of the analyses, and the limitations of the analyses.

5.2.2 Modeling Methodology

Several methods of time-of-travel zone analysis exist including: 1) calculated fixed radius method, 2) analytical groundwater flow models (e.g. type curves and analytical solutions), and 3) numerical flow and transport models. The methods vary in their accuracy and applicability, with Methods 1 and 2 being restricted to relatively simple groundwater regimes, and Method 3 being capable of addressing scenarios with more complicated hydrostratigraphy, hydrogeologic boundaries, and variable pumping scenarios.

Based on the hydrogeological regime in the area of the DOP, Golder relied on the calculated fixed radius (CFR) method to estimate the time of travel zones for the DOP wells. The CFR method depicts a circular time of travel area, not taking into account the hydraulic gradient or boundary conditions, and as such, provides for a conservative (likely larger than actual conditions) estimate of the time of travel zones' extent in the direction downgradient from the well. However, it may underestimate its extent in the upgradient direction. The CFR method assumes the aquifer is infinite in extent and homogeneous in nature, and allows the time of travel zone to extend beyond positive and negative boundary conditions in a circular pattern. Detailed (three-dimensional, transient flow) modeling would be required for more accurate delineation. Nevertheless, time-of-travel zones based on the CFR method are considered sufficient for preliminary delineation of wellhead protection zones.

The CFR method was based on the following equation:

$$r = \sqrt{\frac{10038 * Q * t}{n * b}}$$

Where:

r = calculated fixed radius around the pumping well (m)
Q = pumping rate (L/s)
t = travel time (usually in years)
n = aquifer porosity (for sand and gravel aquifer - assumed to be 0.25[13])
b = aquifer thickness or screen length (m)

For the purpose of this estimation, the pumping rate was 11 L/sec (provided by the DOP), and the travel time was 60 days. An aquifer thickness of 10 m (the thickness of the aquifer sand and gravel deposit) was used, as opposed to a thickness of 23 m (based on height of water in the well to the base of the aquifer), as it provides a more conservative (larger) estimation of the time of travel zone.

[13] C.W. Fetter, Applied Hydrogeology, Third Edition, Prentice-Hall, Inc., 1994

Limitations of Analysis - Calculated Fixed Radius

It should be noted that the calculated fixed radius method used to estimate the time-of-travel zones is a calculation that is based on simple physical assumptions of the aquifer system. The CFR method assumes the aquifer is uniform and that the groundwater velocity prior to pumping is nil. This method is generally applicable when: 1) the hydraulic gradient is relatively small; 2) the aquifer is relatively homogeneous; 3) the pumping rate is relatively high; and 4) the pumping well is located at a significant distance from hydrogeologic boundaries. Considering this, the CFR method is considered to be fairly accurate for travel times up to 60 days. Estimates of zones of travel in excess of one year are typically a poor representation of travel time zones. As such, one-year, five-year and ten-year travel time zones have not been estimated.

In addition, the calculated fixed radius method does not take into consideration potential interactions of the time of travel zones with large boundaries. However, for the purpose of this assessment, Golder has applied the anticipated effects that the inferred bedrock boundary and Okanagan Lake will have on the time of travel zone, if any.

5.2.3 Time of Travel Zone Results

Estimates of the extent of a 60-day time-of-travel zones were completed for the DOP's two wells, using a maximum pumping rate of 660 L/min for each well. These zone are shown on Figure 5 The results of this analysis indicate that the individual time-of-travel zone for Well No.1 and Well No.2 each covers an area of approximately 21,000 m^2. Due to the close proximity of these wells to each other, and as both wells are pumped simultaneously during portions of the year, the 60-day time of travel zones are anticipated to intersect each other. As such, the time of travel zone was also estimated assuming that the total volume of groundwater pumped from the wells combined is approximately 1,320 L/min (290 Imp gpm). The 60-day time of travel zone for the combined pumping rate covers an area of approximately 42,000 m^2 (Figure 5).

A negative (no flow) boundary that could be associated with nearby bedrock outcrops was not apparent in the response observed during the pumping test. If the affect of this boundary on groundwater flow near the DOP wells is significant, it is possible that the actual 60-day time of travel zone could extend farther from the wells than the zone shown on Figure 5. Additional hydrogeologic data are needed to evaluate potential influence of this boundary.

6.0 PRELIMINARY COMMENTS ON CONTAMINANT INVENTORY

As the DOP is considering the development of further groundwater sources to supplement their existing water supply system, and as a value added initiative, the following provides some comments regarding a Contaminant Inventory (Step 3 of the groundwater protection planning process) for the DOP wells.

The following areas of potential environmental concern were noted within the DOP wells' 60-day time of travel zones:

- A major transportation route (Highway 97); and
- Residential homes discharging septic effluent into the ground surface.

In addition, the following potential environmental concerns were noted just outside the 60-day time of travel zone.

- An existing service station handling gasoline and diesel fuels;
- An existing golf course applying pesticides, herbicides and fertilizers,
- Older residential homes are present, with the potential existing for former or existing underground heating oil tanks to be present.

7.0 CONCLUSIONS

Based on the results of this Study, the following conclusions are made;

- The aquifer that supplies the DOP community wells appears to be located within the Trepanier Creek fan deposits, and is semi confined in the area of the wells, but unconfined in the area closer to Okanagan Lake.
- Groundwater flow in the area of the DOP wells is generally in a southerly direction, under nonpumping conditions. However, the flow direction appears to change once the DOP wells are pumping, potentially inducing flow from Okanagan Lake to the DOP wells.
- The estimated volume of groundwater used in 2004 was approximately 220,000 m^3 (48,400,000 Imperial gallons), which is represents an average flow rate of approximately 600 m^3/day.
- A preliminary estimate of annual recharge to the aquifer in which the DOP wells are completed in is 6.1×10^6 m^3/yr (1.7×10^4 m^3/day).

- The groundwater extraction from the Trepanier Creek watershed was estimated to be within a range of 1.1×10^6 m^3/yr to 1.5×10^6 m^3/yr.

- The total net surplus of the aquifer within the Trepanier Creek watershed ranges from 5×10^6 m^3/yr to 4.6×10^6 m^3/yr.

- The 60-day time-of-travel zone covers an area of approximately 42,000 m^2, based on a combined pumping rate of 1,320 L/min (290 Imp gpm).

- A preliminary review of potential environmental concerns within the 60-day time of travel zone includes a major transportation route and the ground disposal of domestic effluent (septic fields). Other potential environmental concerns were noted just outside the 60-day time of travel zone and included a service station, older homes potentially containing heating oil underground storage tanks and a golf course.

8.0 ACTION PLAN TO COMPLETE GROUNDWATER PROTECTION PLAN

The recommendations to move forward with the development of the DOP's groundwater protection plan are dependant on whether or not the two groundwater wells will continue to be used to provide potable water to District residents. As such, the following recommendations are provided regarding the continuation of the groundwater protection planning process, and given that the long term viability of the existing groundwater wells may be in question.

The proposed action plan to complete the development of a groundwater protection plan for the District of Peachland is dependant on whether or not the wells will continue to be used to provide potable water to District residents. As both wells are over 25 years old, and as they provide a limited volume of water to the Peachland water system, the long term viability of the District of Peachland wells may be in question. As such, the following recommendations regarding the completion of the GWPP process for the District of Peachland are made with this in mind.

1. Well Assessment

   As both groundwater wells are over 25 years old, with very infrequent well maintenance conducted in the past, it is recommended that the conditions of the well screens be assessed using a down hole camera. The assessment of the screen conditions will aid in the determination of whether or not the wells should be rehabilitated, either using chemicals or redevelopment. Should it be determined that rehabilitation is feasible, consideration should be given to conducting a short term duration pumping test to assess the specific capacity of each well.

2. Confirmation of Hydraulic Gradient and Flow Direction

Although there are several data gaps regarding hydraulic parameters, such as gradient in the area surrounding the wells, a detailed analyses of one-year, five-year and ten-year time of travel zones is not considered necessary at this time, as the long term viability of the DOP wells is in question. However, it is recommended that a detailed analyses of existing water wells (consisting of a one-time well and lake elevation survey and a one time manual recording of water level measurements on a given day) be conducted to confirm the estimated aquifer conditions on which the 60-day time of travel zones were based. This will allow for a more accurate picture of the direction of groundwater flow and gradient, as the original water level measurements used were based on water levels recorded on different dates.

3. Conduct a Contaminant Inventory

As the area of the DOP is relatively small and there are no major industries within the community, the level of effort for a contaminant inventory will not be substantial and can be completed by DOP staff. However, the inventory is still important, as the community wells are the only source of water supplying the Ponderosa area. As such, a detailed contaminant inventory of the 60-day time of travel zones should be carried out, and should include the following.

- documentation of all septic tanks and disposal fields ;
- the identification of transportation routes where dangerous goods are transported;
- documentation of the DOP's storm water disposal systems, specifically where the points of discharge are located; and
- a detailed review of the MOE database for waste and spill information, as well as a review of properties registered within the contaminated sites database.

The major contaminant risks associated with the 60-day time of travel zone should be evaluated through a subjective risk evaluation.

4. Water Quality Monitoring Program

It is recommended that the current groundwater monitoring program utilized by the DOP be assessed, and that the historical water quality data be reviewed. The purpose of the review would be to identify any outstanding water quality issues and to identify additional monitoring that may be required to address risks identified by the contaminant inventory.

5. Designate Groundwater Protection Areas

Following the confirmation of the 60-day time of travel zone for the DOP wells, the DOP should consider designating the 60-day time of travel zone as a formal groundwater protection area. This should be conducted with other stakeholders such as IHA. As the long term viability of the wells is in question, it is our opinion that the initial designation of the 60-day time of travel zone is appropriate for designation as a groundwater protection area.

6. Develop Groundwater Protection Measures

Once designated groundwater protection areas have been established and additional potential contaminant sources (if any) have been identified, the DOP can consider embarking on the development of groundwater protection measures. Groundwater protection measures can be implemented at the municipal/regional level through both regulatory and non-regulatory measures. In our opinion, while non-regulatory measures, such as public education and best management practices can be highly effective, some degree of regulatory control may be required to ensure the protection of the groundwater resources. These regulatory strategies often involve the use of municipal land use planning and zoning bylaws to restrict certain high-risk land use activities within protection areas. However, the DOP will need to consider the time required to develop regulatory control versus the long term viability of the DOP wells.

Golder would be pleased to assist with the development of specific groundwater protection measures once some of the preceding work has been carried out. Some examples of groundwater protection measures that may be considered are presented in Appendix IV.

7. Develop a Contingency Plan

   Contingency planning consists of developing a plan for the location and provision of alternative drinking water supplies in the event that one or both of the existing wells cannot be used. Disruptions to wells may be related to either contamination or non-contamination effects. The contingency plan should identify short-term alternatives in the event of a minor disruption, and long-term alternatives in the event of a complete loss of groundwater supply. It is recommended that if one is not already in existence, a contingency plan for alternative water supplies be developed.

8. Develop an Emergency Response Plan

   The goal of groundwater protection is to prevent the contamination of underground drinking water supplies. Even under the best prevention plans, a scenario that threatens to contaminate the aquifer may occur. When this happens, an emergency response plan directing a coordinated and timely response is an effective tool for assuring a continued supply of potable water. Many communities' emergency response plans do not include specific provisions for the protection of groundwater resources in the event of a spill or accident. For example, it may be prudent for emergency response personnel to restrict the use of fire retardant chemicals in sensitive groundwater areas. We recommend that the DOP existing emergency response plan be evaluated and revised, if necessary, to allow for the protection of sensitive groundwater resources.

Should it be determined that the District of Peachland will continue to operate the wells long term (for more than five to ten years), the following recommendations are made:

- A detailed analyses of existing water wells (including a well and lake elevation survey and recording of water level measurements) be conducted to provide an overall depiction of aquifer conditions and reassessment of the groundwater flow direction and gradient.

- Consideration could be given to conducting a 72-hour pumping test at Well No.1, such that boundary conditions (bedrock, lake) can be more accurately evaluated. This additional information will allow for a refinement of the time of travel zones associated with each well. Following the confirmation of the time of travel zones for the DOP wells, the DOP should designate a formal groundwater protection area.

- Consideration could also be given to undertaking a drilling program to supplement available water well information to fill in data gaps in areas where there are no or limited water well information. It is likely that some of the wells constructed as part of the recommended drilling program could also be used to supplement a groundwater monitoring program, and be used as sentinel wells. Particular areas where additional subsurface information would be beneficial are i) the area directly topographically downgradient of the Peachland Golf Course, and ii) the area of the Ponderosa development.

- Conduct a more detailed contaminant inventory, including an analysis of the types and quantities of chemicals used within each time of travel zone (chemical inventory). The major contaminant risks associated with each time of travel zone should be evaluated through a subjective risk evaluation.

The development of a Groundwater Protection Plan should be considered an on-going process, which is revisited every year or two, and revised as necessary. As the District of Peachland continues to grow, so too will the need to revisit the Groundwater Protection Plan.

9.0 LIMITATIONS AND USE OF REPORT

This report was prepared for the exclusive use of the District of Peachland. In evaluating the requirements for groundwater protection, Golder Associates Ltd. has relied in good faith on information provided by sources noted in this report. We accept no responsibility for any deficiency, misstatements or inaccuracy contained in this report as a result of omissions, misstatements or fraudulent acts of others.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Golder Associates Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

10.0 CLOSURE

We trust that this report meets your current requirements. Should you have any questions or comments please do not hesitate to call.

Yours truly,

GOLDER ASSOCIATES LTD.

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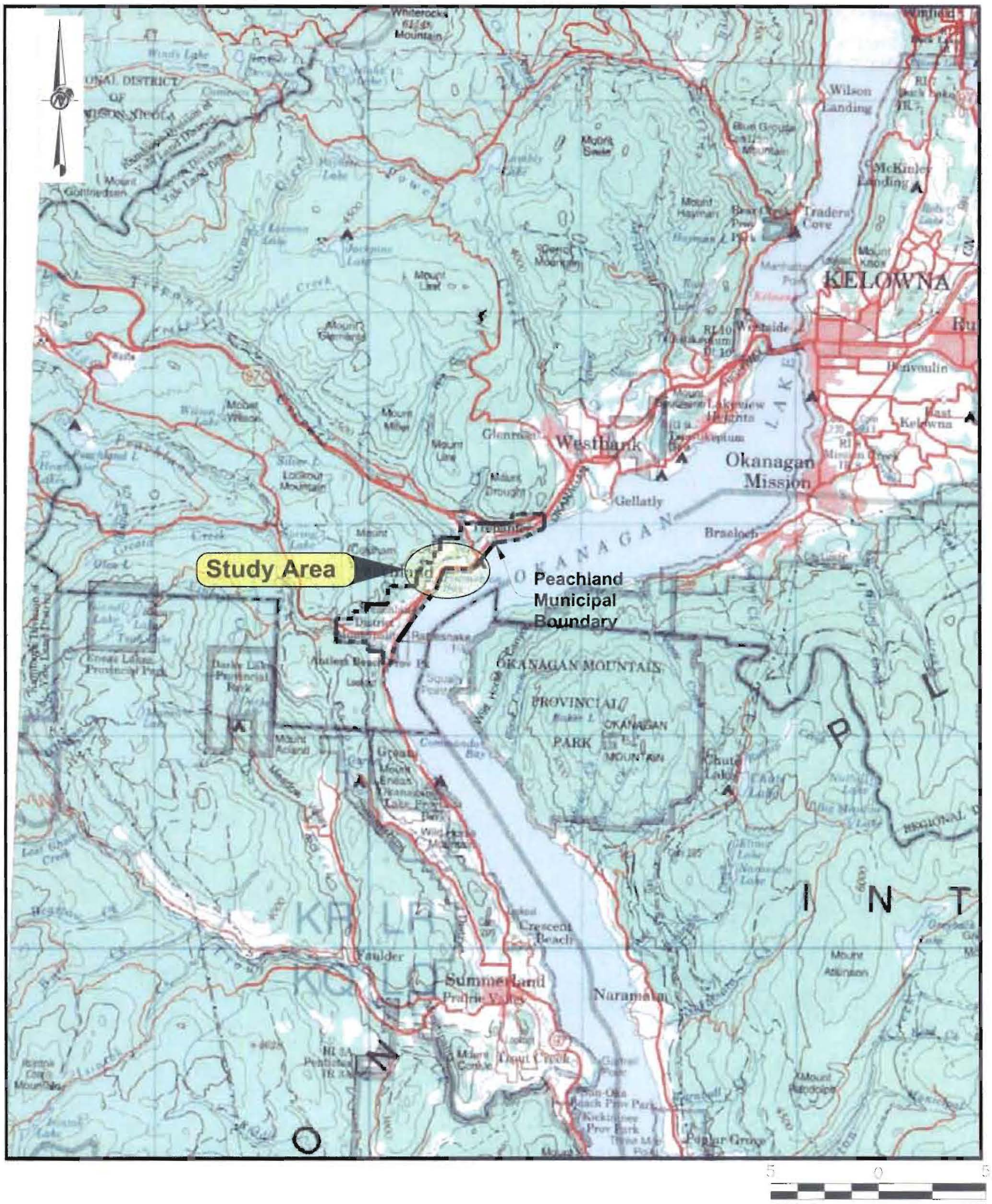

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Golder Associates
Kelowna, B.C.

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REVIEW	Groundwater Protection Plan - District of Peachland, B.C.	FIGURE 1

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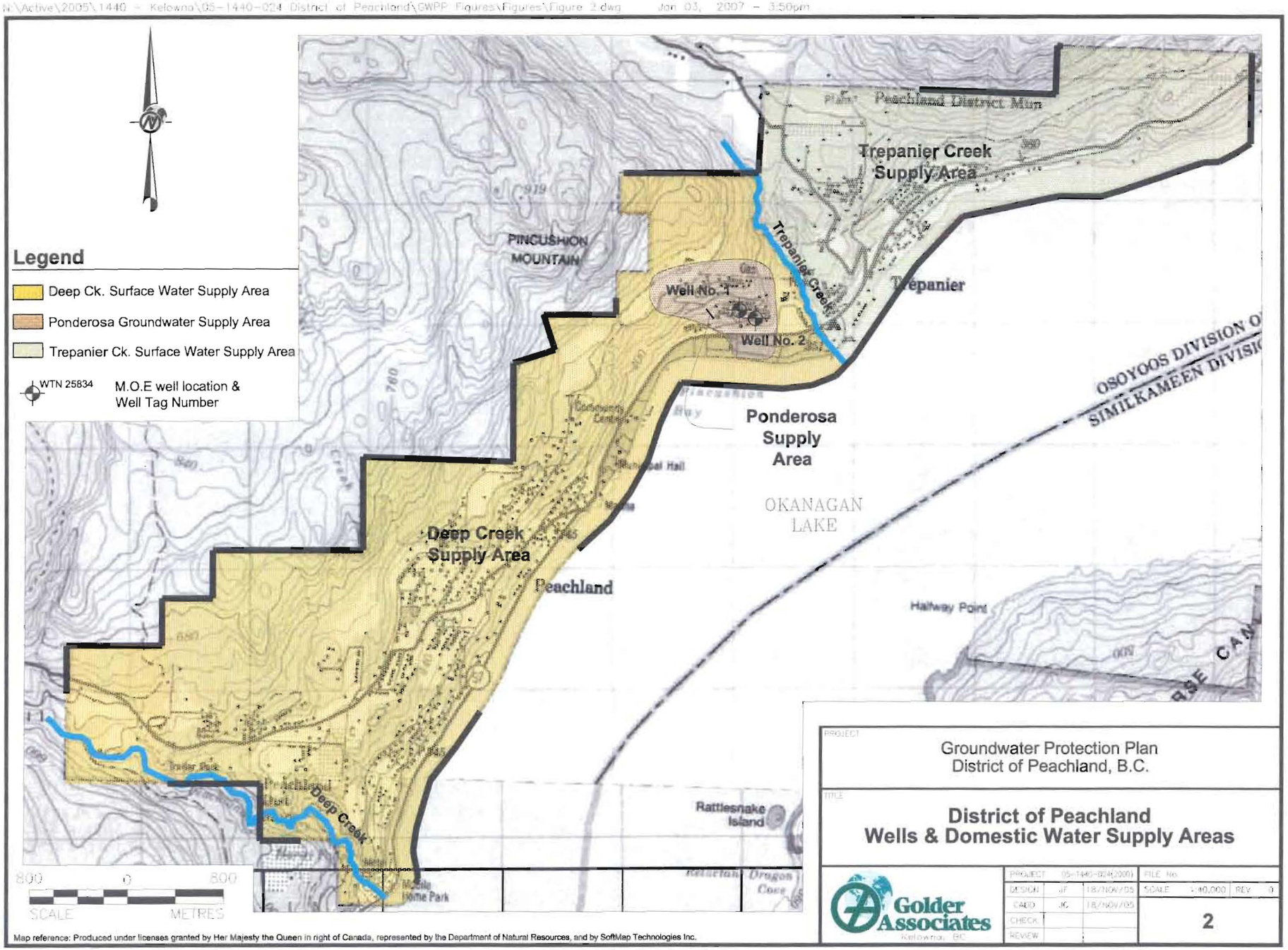

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Groundwater Protection Plan
District of Peachland, B.C.

TITLE
District of Peachland
Wells & Domestic Water Supply Areas

Golder Associates
Kelowna, BC

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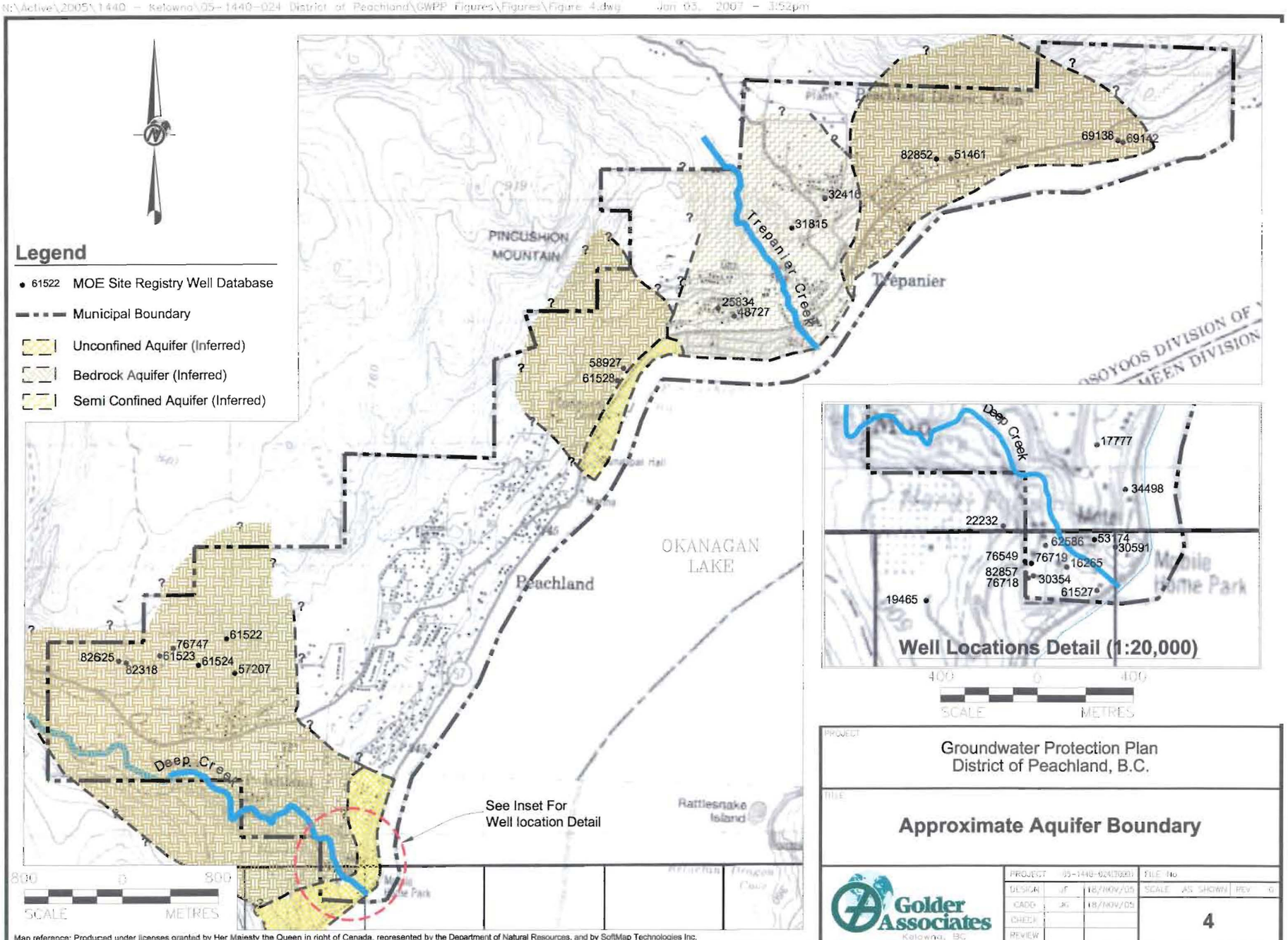
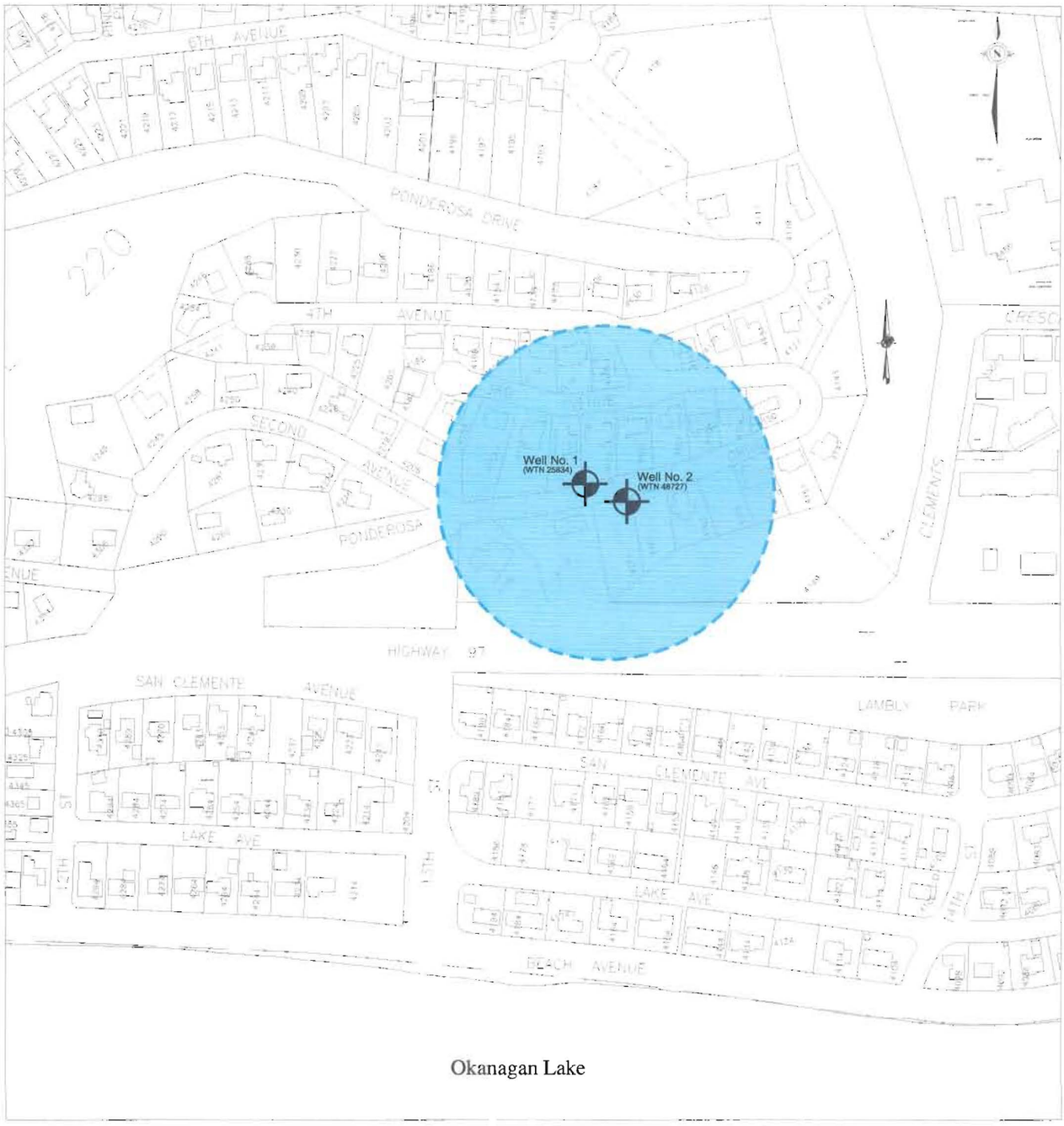


PROJECT
Groundwater Protection Plan
District of Peachland, B.C.

TITLE
Approximate Aquifer Boundary

Golder Associates
Kelowna, BC

PROJECT	05-1440-024(2000)		TITLE No.	
DESIGN	JF	18/NOV/05	SCALE AS SHOWN	REV 0
CADD	JG	18/NOV/05	4	
CHECK				
REVIEW				



Legend

- MOE Water Well Database
- Combined Calculated Fixed Radius 60-Day Time of Travel Zone (Based on Pumping Rate of 1320 L/min)

80 0 80
SCALE METRES

Map reference: Data provided by Urban Systems.

Golder Associates
Kelowna, B.C.

SCALE	1:4,000
DATE	18/NOV/05
DESIGN	JF
CADD	JG
CHECK	
REVIEW	

FILE No.

PROJECT 05-1440-024 (2000) REV. 0

TITLE

EXTENT OF PRELIMINARY TIME OF TRAVEL ZONE
District of Peachland Well No. 1 & 2

Groundwater Protection Plan - District of Peachland, B.C.

FIGURE 5

N:\Active\2005\1440 - Kelowna\05-1440-024 District of Peachland\GWPP Figures\Figure 5.dwg Jan 03, 2007 - 1:53pm

APPENDIX I

MUNICIPAL WATER WELL LOGS

BRITISH COLUMBIA

Peachland Well No. 1

Report 1 - Detailed Well Record

Well Tag Number: 25834 Owner: PEACHLAND HEIGHTS PR Address: PEACHLAND Area: PEACHLAND WELL LOCATION: OSOYOOS (ODYD) Land District District Lot: 220 Plan: 21426 Lot: Township: Section: Range: Indian Reserve: Meridian: Block: Quarter: Island BCGS Number (NAD 27): 082E072342 Well: Class of Well: Subclass of Well: Orientation of WEll: Status of Well: New Well Use: Unknown Well Use Observation Well Number: Observation Well Status: Construction Method: Drilled Diameter: 8.0 inches Well Depth: 208.0 feet Elevation: 0 Bedrock Depth: UNK feet	Construction Date: 1972-01-01 00:00:00.0 Driller: Osoyoos Tile Works Well Identification Plate Number: Plate Attached By: Where Plate Attached: PRODUCTION DATA AT TIME OF DRILLING: Well Yield: 0 (Driller's Estimate) Artesian Flow: Static Level: 131 feet Water Utility: Water Supply System Name: Water Supply System Well Name: Surface Seal Flag: Surface Seal Material: Surface Seal Method: Surface Seal Depth: Surface Seal Thickness: Lithology Info Flag: Pump Test Info Flag: Y File Info Flag: Sieve Info Flag: Screen Info Flag: Water Chemistry Info Flag: Field Chemistry Info Flag: Site Info (SEAM): Site Info Details: Other Info Flag: Other Info Details:
GENERAL REMARKS: From 0 to 0 Ft. No log given.	

- Return to Main

BRITISH COLUMBIA

Peachland Well No. 2

Report 1 - Detailed Well Record

Well Tag Number: 48727

Owner: PEACHLAND HEIGHTS PE

Address: BOX 170 SUMMERLAND

Area: SUMMERLAND

WELL LOCATION:
OSOYOOS (ODYD) Land District
District Lot: 220 Plan: A1166 Lot:
Township: Section: Range:
Indian Reserve: Meridian: Block:
Quarter:
Island
BCGS Number (NAD 27): 082E072342 Well: 2

Class of Well:
Subclass of Well:
Orientation of WEll:
Status of Well: New
Well Use: Unknown Well Use
Observation Well Number:
Observation Well Status:
Construction Method: Drilled
Diameter: 8.0 inches
Well Depth: 221.0 feet
Elevation: 0
Bedrock Depth: 221 feet

Construction Date: 1981-08-01 00:00:

Driller: Quality Well Drilling
Well Identification Plate Number:
Plate Attached By:
Where Plate Attached:

PRODUCTION DATA AT TIME OF DRILLING:
Well Yield: 300 (Driller's Estima
Artesian Flow: gal/min
Static Level: 145 feet

Water Utility:
Water Supply System Name:
Water Supply System Well Name:

Surface Seal Flag:
Surface Seal Material:
Surface Seal Method:
Surface Seal Depth:
Surface Seal Thickness:

Lithology Info Flag:
Pump Test Info Flag:
File Info Flag:
Sieve Info Flag:
Screen Info Flag:
Water Chemistry Info Flag:
Field Chemistry Info Flag:
Site Info (SEAM):
Site Info Details:
Other Info Flag:
Other Info Details:

GENERAL REMARKS:
DEC. 14/83 - "SPOKE WITH PEACHLAND HTS. MANAGER, THIS WELL IS NOT IN USE, AS PROPEI

From	0	to	6 Ft.	sand and gravel with big rocks
From	6	to	14.6 Ft.	big cobb. and sand, sm. grvl, big bould-
From	0	to	0 Ft.	er
From	14.6	to	21 Ft.	cemented sand and gravel, tight
From	21	to	60 Ft.	brn sand and grvl with big cobb.
From	60	to	80 Ft.	lrg and sm gravel with sand, little
From	0	to	0 Ft.	tight
From	80	to	83 Ft.	cemented sand and grvl, tight, drilled
From	83	to	100 Ft.	brn sand with grvl and lrg cobb.
From	100	to	110 Ft.	coarse grvl, lrg and sm. with brn sand
From	110	to	120 Ft.	brn sand with big cobb, cemented and
From	0	to	0 Ft.	grey clay
From	120	to	130 Ft.	coarse sand and gravel, lrg and sm
From	130	to	132 Ft.	big cobb., drilled
From	132	to	140 Ft.	brn sand, coarse and clean
From	140	to	160 Ft.	loose sand and grvl (lrg and sm grvl)

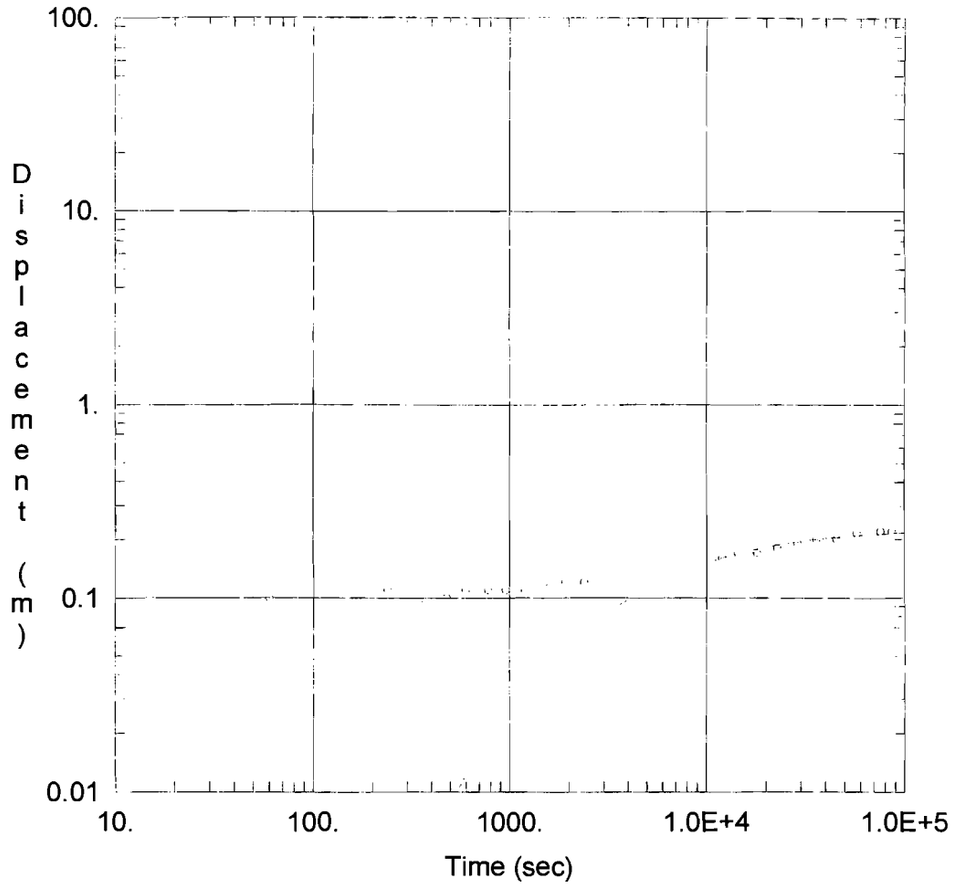
From	160	to	165	Ft.	brn sand, some rocks
From	165	to	170	Ft.	brn sand, clean with some fines
From	170	to	175	Ft.	tight sand and big cobb.
From	175	to	186	Ft.	tight sand (pasty) and some grvl with
From	0	to	0	Ft.	little clay, not making water
From	186	to	189	Ft.	sand and sm. sharp rock, dirty
From	189	to	192	Ft.	loose sand and grvl, making water
From	192	to	195	Ft.	brn sand, looser (casing moved easier),
From	0	to	0	Ft.	cleaner, making water
From	195	to	200	Ft.	brn sand, clean, some pebb.
From	200	to	210	Ft.	brn sand, clean, some fines
From	210	to	212	Ft.	brn sand, strips of cemented grvl and
From	0	to	0	Ft.	sand, mixed and drilled
From	212	to	216	Ft.	brn sand with broken rock, mixed in some
From	0	to	0	Ft.	big cobbles - little coarser with fines
From	216	to	220.6	Ft.	brn sand, clean coarser
From	0	to	220.6	Ft.	bedrock

- Return to Main

APPENDIX II

AQTESOLV PLOTS FOR DOP WELLS

AQTESLOV PLOT BASED ON DATA FROM OBS. WELL (WELL NO.2)



PUMPING TEST

Data Set: N:\...\b10mWell 1 Pump test with 1 image well wz.aqt
Date: 01/03/07 Time: 12:59:33

PROJECT INFORMATION

Company: Dist. of Peachland
Project: 05-1440-024
Location: Well No. 1
Test Well: Well No. 1
Test Date: June 18, 1986

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Well No. 1	0	0
ImgWell Lake	0	700

Observation Wells

Well Name	X (m)	Y (m)
Well No. 2	135	45

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 0.013 m^2/sec
S = 0.0018
Kz/Kr = 1.
b = 23. m

Data Set: N:\Active\2005\1440 - Kelowna\05-1440-024 District of Peachland\Aqtesolv\WZ Edits\b10mWell 1 Pu
Title: Pumping Test
Date: 01/03/07
Time: 12:59:27

PROJECT INFORMATION

Company: Dist. of Peachland
Project: 05-1440-024
Location: Well No. 1
Test Date: June 18, 1986
Test Well: Well No. 1

AQUIFER DATA

Saturated Thickness: 23. m
Anisotropy Ratio (Kz/Kr): 1.

PUMPING WELL DATA

No. of pumping wells: 2

Pumping Well No. 1: Well No. 1

X Location: 0. m
Y Location: 0. m

Casing Radius: 0.1 m
Wellbore Radius: 0.1 m

Fully Penetrating Well

No. of pumping periods: 1

Pumping Period Data

Time (sec)	Rate (cu. m/sec)
0.	0.012

Pumping Well No. 2: ImgWell Lake

X Location: 0. m
Y Location: 700. m

Casing Radius: 1. m
Wellbore Radius: 1. m

Fully Penetrating Well

No. of pumping periods: 1

Pumping Period Data

Time (sec)	Rate (cu. m/sec)
0.	-0.012

OBSERVATION WELL DATA

No. of observation wells: 1

Observation Well No. 1: Well No. 2

X Location: 135. m
Y Location: 45. m

Radial distance from Well No. 1: 142.3024947 m
Radial distance from ImgWell Lake: 668.7675231 m

Fully Penetrating Well

No. of Observations: 21

Observation Data

Time (sec)	Displacement (m)
60.	0.1
240.	0.11
360.	0.1
480.	0.1
600.	0.11
780.	0.11
960.	0.11
1200.	0.11
1500.	0.12
1920.	0.12
2400.	0.12
1.2E+4	0.16
1.44E+4	0.17
1.8E+4	0.17
2.28E+4	0.18
2.88E+4	0.19
3.6E+4	0.2
4.56E+4	0.2
5.76E+4	0.215
7.56E+4	0.22
8.64E+4	0.22

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

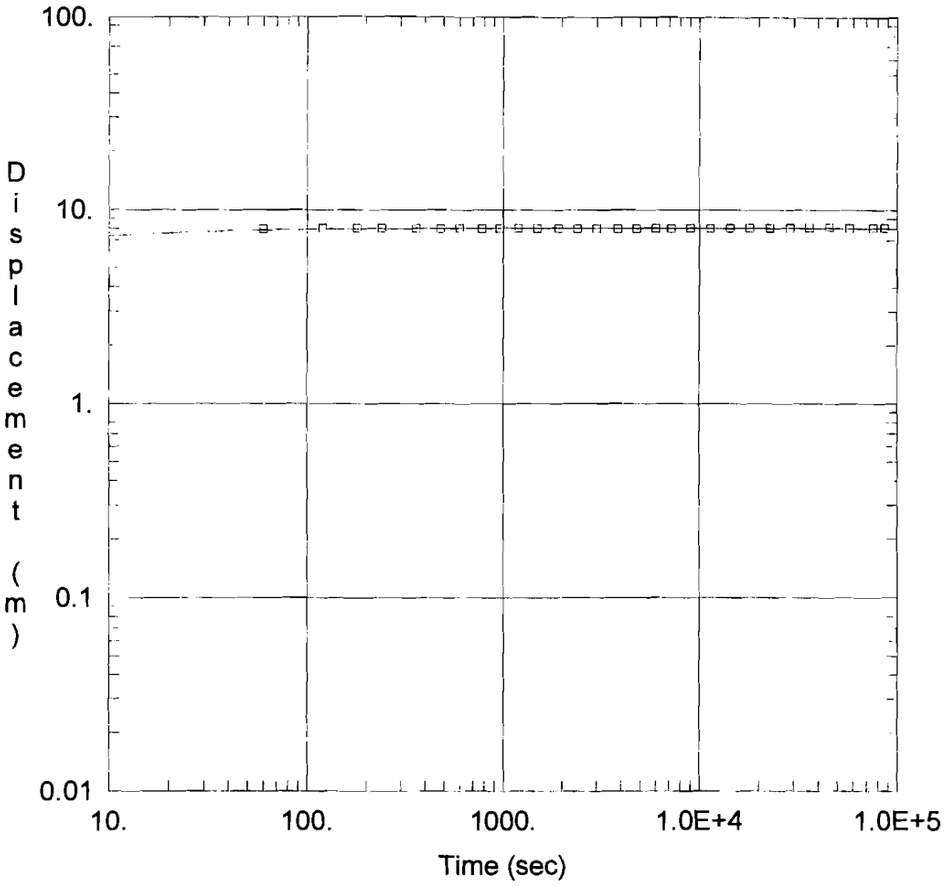
VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
T	0.013	m^2/sec
S	0.0018	
Kz/Kr	1.	
b	23.	m

K = T/b = 0.0005652 m/sec

AQTESLOV PLOT BASED ON DATA FROM PUMPING WELL (WELL NO.1)



PUMPING TEST

Data Set: N:\...\b10mWell 1 Pump test with 1 image well wz2.aqt
Date: 01/03/07 Time: 12:58:28

PROJECT INFORMATION

Company: Dist. of Peachland
Project: 05-1440-024
Location: Well No. 1
Test Well: Well No. 1
Test Date: June 18, 1986

WELL DATA

Pumping Wells

Well Name	X (m)	Y (m)
Well No. 1	0	0
ImgWell Lake	0	700

Observation Wells

Well Name	X (m)	Y (m)
Well No. 1	0	0.1

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

T = 0.0021 m^2/sec
S = 4.771E-7
Kz/Kr = 1.
b = 23. m

Data Set: N:\Active\2005\1440 - Kelowna\05-1440-024 District of Peachland\Aqtesolv\WZ Edits\b10mWell 1 Pu
Title: Pumping Test
Date: 01/03/07
Time: 12:58:49

PROJECT INFORMATION

Company: Dist. of Peachland
Project: 05-1440-024
Location: Well No. 1
Test Date: June 18, 1986
Test Well: Well No. 1

AQUIFER DATA

Saturated Thickness: 23. m
Anisotropy Ratio (Kz/Kr): 1.

PUMPING WELL DATA

No. of pumping wells: 2

Pumping Well No. 1: Well No. 1

X Location: 0. m
Y Location: 0. m

Casing Radius: 0.1 m
Wellbore Radius: 0.1 m

Fully Penetrating Well

No. of pumping periods: 1

Pumping Period Data

Time (sec)	Rate (cu. m/sec)
0.	0.012

Pumping Well No. 2: ImgWell Lake

X Location: 0. m
Y Location: 700. m

Casing Radius: 1. m
Wellbore Radius: 1. m

Fully Penetrating Well

No. of pumping periods: 1

Pumping Period Data

Time (sec)	Rate (cu. m/sec)
0.	-0.012

OBSERVATION WELL DATA

No. of observation wells: 1

Observation Well No. 1: Well No. 1

X Location: 0. m
Y Location: 0.1 m

Radial distance from Well No. 1: 0.1 m
Radial distance from ImgWell Lake: 699.9 m

Fully Penetrating Well

No. of Observations: 29

Observation Data

Time (sec)	Displacement (m)
60.	7.96
120.	8.04
180.	8.04
240.	8.04
360.	8.03
480.	8.035
600.	8.035
780.	8.035
960.	8.04
1200.	8.04
1500.	8.04
1920.	8.03
2400.	8.03
3000.	8.03
3840.	8.03
4800.	8.02
6000.	8.04
7200.	8.06
9000.	8.06
1.14E+4	8.06
1.44E+4	8.09
1.8E+4	8.08
2.28E+4	8.07
2.88E+4	8.07
3.6E+4	8.14
4.56E+4	8.15
5.76E+4	8.11
7.56E+4	8.12
8.64E+4	8.12

SOLUTION

Aquifer Model: Confined
Solution Method: Theis

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
T	0.0021	m^2/sec
S	4.771E-7	
Kz/Kr	1.	
b	23.	m

APPENDIX III

MINISTRY OF ENVIRONMENT
WATER WELL LOGS

BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 69142	Construction Date:
Owner:	Driller: Capri Drilling
Address: HWY 97@ DROUGHT RD	Well Identification Plate Number: Plate Attached By: Where Plate Attached:
Area: PEACHLAND	PRODUCTION DATA AT TIME OF DRILLING: Well Yield: 0 (Driller's Estimate) DR
WELL LOCATION: OSOYOOS (ODYD) Land District District Lot: 2690 Plan: 47213 Lot: A Township: Section: Range: Indian Reserve: Meridian: Block: Quarter: Island BCGS Number (NAD 27): Well: 0	Artesian Flow: 0 Static Level: 0 feet Water Utility: Y Water Supply System Name: Water Supply System Well Name:
Class of Well: Subclass of Well: Orientation of WEll: Status of Well: New Well Use: Abandoned Observation Well Number: Observation Well Status: Construction Method: Drilled Diameter: 6.0 inches Well Depth: 20.0 feet Elevation: 0 Bedrock Depth: 17 feet	Surface Seal Flag: Y Surface Seal Material: Surface Seal Method: Surface Seal Depth: Surface Seal Thickness: Lithology Info Flag: N Pump Test Info Flag: N File Info Flag: Y Sieve Info Flag: Y Screen Info Flag: Y Water Chemistry Info Flag: N Field Chemistry Info Flag: Site Info (SEAM): Y Site Info Details: Other Info Flag: Other Info Details:

GENERAL REMARKS:
STEEL CASING 0 TO 20, DRILLING SUSPENDED AT OWNER'S REQUEST, CASING PULLED

From	0	to	15 Ft.	SAND & GRAVEL
From	15	to	17 Ft.	GRAVEL & CLAY
From	17	to	20 Ft.	BEDROCK

- Return to Main

BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 69138	Construction Date:
Owner:	Driller: Capri Drilling
Address: HWY 97@ DROUGHT RD	Well Identification Plate Number:
Area: PEACHLAND	Plate Attached By:
WELL LOCATION:	Where Plate Attached:
OSOYOOS (ODYD) Land District	PRODUCTION DATA AT TIME OF DRILLING:
District Lot: 2690 Plan: 47218 Lot: A	Well Yield: (Driller's Estimate) DR
Township: Section: Range:	Artesian Flow: 0
Indian Reserve: Meridian: Block:	Static Level: 0 feet
Quarter:	
Island	Water Utility: Y
BCGS Number (NAD 27): Well: 0	Water Supply System Name:
	Water Supply System Well Name:
Class of Well:	
Subclass of Well:	Surface Seal Flag: Y
Orientation of WEll:	Surface Seal Material:
Status of Well: New	Surface Seal Method:
Well Use: Abandoned	Surface Seal Depth:
Observation Well Number:	Surface Seal Thickness:
Observation Well Status:	
Construction Method: Drilled	Lithology Info Flag: N
Diameter: 6.0 inches	Pump Test Info Flag: N
Well Depth: 80.0 feet	File Info Flag: Y
Elevation: 0	Sieve Info Flag: Y
Bedrock Depth: 57 feet	Screen Info Flag: Y
	Water Chemistry Info Flag: N
	Field Chemistry Info Flag:
	Site Info (SEAM): Y
	Site Info Details:
	Other Info Flag:
	Other Info Details:

GENERAL REMARKS:
STEEL CASING 0 TO 57, DRILLING SUSPENDED AT OWNER'S REQUEST, CASING PULLED

From	0	to	15 Ft.	SAND & CLAY
From	15	to	33 Ft.	SAND & GRAVEL
From	33	to	57 Ft.	CLAY & ROCK
From	57	to	80 Ft.	BEDROCK

- Return to Main

BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 51461	Construction Date: 1983-01-01 00:00:00.0
Owner: T PRICE (YELLOWKNIFE	Driller: Capri Drilling Well Identification Plate Number: Plate Attached By: Where Plate Attached:
Address: PEACHLAND	PRODUCTION DATA AT TIME OF DRILLING:
Area: PEACHLAND	Well Yield: 240 (Driller's Estimate) Ga Artesian Flow: Static Level: feet gal/hour
WELL LOCATION: OSOYOOS (ODYD) Land District District Lot: 449 Plan: 217 Lot: 17 Township: Section: Range: Indian Reserve: Meridian: Block: Quarter: Island BCGS Number (NAD 27): 082E072433 Well: 1	Water Utility: Water Supply System Name: Water Supply System Well Name: Surface Seal Flag: Surface Seal Material: Surface Seal Method: Surface Seal Depth: Surface Seal Thickness:
Class of Well: Subclass of Well: Orientation of WEll: Status of Well: New Well Use: Domestic Observation Well Number: Observation Well Status: Construction Method: Drilled Diameter: 6.0 inches Well Depth: 180.0 feet Elevation: 0 Bedrock Depth: 2 feet	Lithology Info Flag: Pump Test Info Flag: File Info Flag: Sieve Info Flag: Screen Info Flag: Water Chemistry Info Flag: Field Chemistry Info Flag: Site Info (SEAM): Site Info Details: Other Info Flag: Other Info Details:

GENERAL REMARKS:

From	0	to	2 Ft.	topsoil
From	2	to	3 Ft.	fractured bedrock
From	3	to	180 Ft.	bedrock

- Return to Mair

Information Disclaimer

The Province disclaims all responsibility for the accuracy of information provided. Information provided should not be used as a basis for making financial or any other commitments.

BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 82852

Owner: MEJIA

Address: WALKER RD

Area: PEACHLAND

WELL LOCATION:
OSOYOOS (ODYD) Land District
District Lot: 449 Plan: 5947 Lot: A
Township: Section: Range:
Indian Reserve: Meridian: Block:
Quarter:
Island
BCGS Number (NAD 27): 082E072433 Well: 2

Class of Well: Water Supply
Subclass of Well:
Orientation of WEll:
Status of Well: New
Well Use: Domestic
Observation Well Number:
Observation Well Status:
Construction Method: Drilled
Diameter: 6 inches
Well Depth: 300 feet
Elevation:
Bedrock Depth: feet

Construction Date: 2003-04-05 00:00:00.0

Driller: Cascade Drilling Ltd. & Capri Dri
Well Identification Plate Number:
Plate Attached By:
Where Plate Attached:

PRODUCTION DATA AT TIME OF DRILLING:
Well Yield: 10 (Driller's Estimate) Ga
Artesian Flow:
Static Level: 90 feet

Water Utility: N
Water Supply System Name:
Water Supply System Well Name:

Surface Seal Flag: N
Surface Seal Material:
Surface Seal Method:
Surface Seal Depth:
Surface Seal Thickness:

Lithology Info Flag: Y
Pump Test Info Flag: N
File Info Flag: N
Sieve Info Flag: N
Screen Info Flag: N
EMS ID:
Water Chemistry Info Flag: N
Field Chemistry Info Flag:
Site Info (SEAM): N
Site Info Details:
Other Info Flag:
Other Info Details:

GENERAL REMARKS:

From	0	to	26 Ft.	SAND & GRAVEL
From	26	to	30 Ft.	CLAY WITH WEATHERED BEDROCK
From	30	to	90 Ft.	BEDROCK
From	90	to	95 Ft.	BLACK SHALE
From	95	to	300 Ft.	BEDROCK WITH WATER BEARING FRACTURES @ 140' & 280'.

- Return to Main

BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 32416

Owner: SHERWIN GOERLITZ

Address: 321 ROBIN WAY KELOWNA

Area: KELOWNA

WELL LOCATION:
OSOYOOS (ODYD) Land District
District Lot: 1174 Plan: 17888 Lot: 6
Township: Section: Range:
Indian Reserve: Meridian: Block:
Quarter:
Island
BCGS Number (NAD 27): 082E072344 Well: 1

Class of Well:
Subclass of Well:
Orientation of WEll:
Status of Well: New
Well Use: Other
Observation Well Number:
Observation Well Status:
Construction Method: Drilled
Diameter: 8.0 inches
Well Depth: 354.0 feet
Elevation: 0
Bedrock Depth: UNK feet

Construction Date: 1975-05-01 00:00:00.0

Driller: A. C. Drillers
Well Identification Plate Number:
Plate Attached By:
Where Plate Attached:

PRODUCTION DATA AT TIME OF DRILLING:
Well Yield: 40 (Driller's Estimate) U.S. gal / min
Artesian Flow:
Static Level: 256 feet

Water Utility:
Water Supply System Name:
Water Supply System Well Name:

Surface Seal Flag:
Surface Seal Material:
Surface Seal Method:
Surface Seal Depth:
Surface Seal Thickness:

Lithology Info Flag:
Pump Test Info Flag: Y
File Info Flag: Y
Sieve Info Flag: Y
Screen Info Flag:
Water Chemistry Info Flag: Y
Field Chemistry Info Flag:
Site Info (SEAM):
Site Info Details:
Other Info Flag:
Other Info Details:

GENERAL REMARKS:

From	0	to	53 Ft.	compact bouldery gravelly till
From	53	to	73 Ft.	coarse sand and grvl
From	73	to	77 Ft.	boulder
From	77	to	137 Ft.	very fine silty tan sand
From	137	to	144 Ft.	coarse gravelly sand
From	144	to	149 Ft.	gravelly till
From	149	to	175 Ft.	interbedded silty sand and gravel
From	175	to	191 Ft.	blue coarse pebbly sand
From	191	to	203 Ft.	interbedded silty sand and gravel
From	203	to	218 Ft.	light grey compact till
From	218	to	247 Ft.	grey silty sand and gravel
From	247	to	250 Ft.	grey pebbly till
From	250	to	257 Ft.	tan silty sand and grvl, water at 255'
From	257	to	285 Ft.	interbedded soft tan silt and fine sand
From	285	to	315 Ft.	very fine tan silty sand
From	315	to	329 Ft.	soft tan silt

- Return to Main

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BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 31815

Owner: W HAINLE

Address: COLDHAM RD PEACHLAND

Area: PEACHLAND

WELL LOCATION:
OSOYOOS (ODYD) Land District
District Lot: 1174 Plan: 26480 Lot: 2
Township: Section: Range:
Indian Reserve: Meridian: Block:
Quarter:
Island
BCGS Number (NAD 27): 082E072344 Well: 2

Class of Well:
Subclass of Well:
Orientation of WEll:
Status of Well: New
Well Use: Domestic
Observation Well Number:
Observation Well Status:
Construction Method: Unknown Constru
Diameter: 0.0 inches
Well Depth: 0.0 feet
Elevation: 0
Bedrock Depth: UNK feet

Construction Date: 1975-01-01 00:00:00.0

Driller: A. C. Drillers
Well Identification Plate Number:
Plate Attached By:
Where Plate Attached:

PRODUCTION DATA AT TIME OF DRILLING:
Well Yield: 15 (Driller's Estimate) Ga
Artesian Flow: gpl/min
Static Level: feet

Water Utility:
Water Supply System Name:
Water Supply System Well Name:

Surface Seal Flag:
Surface Seal Material:
Surface Seal Method:
Surface Seal Depth:
Surface Seal Thickness:

Lithology Info Flag:
Pump Test Info Flag:
File Info Flag:
Sieve Info Flag:
Screen Info Flag:
Water Chemistry Info Flag:
Field Chemistry Info Flag:
Site Info (SEAM):
Site Info Details:
Other Info Flag:
Other Info Details:

GENERAL REMARKS:

From	0	to	36 Ft.	coarse sandy gravel w/few bldrs
From	36	to	100 Ft.	compact grvl w/tight layers & a few bldr
From	100	to	155 Ft.	coarse tan grvl w/tight layers
From	155	to	186 Ft.	compact coarse gravel (till?)
From	186	to	254 Ft.	coarse loose sand
From	254	to	286 Ft.	med. to coarse sand w/occasional silt
From	0	to	0 Ft.	and hard clay balls
From	286	to	296 Ft.	tan silt w/occas. sand layers
From	296	to	299 Ft.	interbedded silt and coarse sand
From	299	to	310 Ft.	med. gravel
From	310	to	315 Ft.	med. coarse sand
From	315	to	318 Ft.	fine silty sand

• Return to Main

Information Disclaimer
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BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 25834 Owner: PEACHLAND HEIGHTS PR Address: PEACHLAND Area: PEACHLAND WELL LOCATION: OSOYOOS (ODYD) Land District District Lot: 220 Plan: 21426 Lot: Township: Section: Range: Indian Reserve: Meridian: Block: Quarter: Island BCGS Number (NAD 27): 082E072342 Well: Class of Well: Subclass of Well: Orientation of WEll: Status of Well: New Well Use: Unknown Well Use Observation Well Number: Observation Well Status: Construction Method: Drilled Diameter: 8.0 inches Well Depth: 208.0 feet Elevation: 0 Bedrock Depth: UNK feet	Construction Date: 1972-01-01 00:00:00.0 Driller: Osoyoos Tile Works Well Identification Plate Number: Plate Attached By: Where Plate Attached: PRODUCTION DATA AT TIME OF DRILLING: Well Yield: 0 (Driller's Estimate) Artesian Flow: Static Level: 131 feet Water Utility: Water Supply System Name: Water Supply System Well Name: Surface Seal Flag: Surface Seal Material: Surface Seal Method: Surface Seal Depth: Surface Seal Thickness: Lithology Info Flag: Pump Test Info Flag: Y File Info Flag: Sieve Info Flag: Screen Info Flag: Water Chemistry Info Flag: Field Chemistry Info Flag: Site Info (SEAM): Site Info Details: Other Info Flag: Other Info Details:
GENERAL REMARKS: From 0 to 0 Ft. No log given.	

- Return to Main

BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 48727

Owner: PEACHLAND HEIGHTS PE

Address: BOX 170 SUMMERLAND

Area: SUMMERLAND

WELL LOCATION:
OSOYOOS (ODYD) Land District
District Lot: 220 Plan: A1166 Lot:
Township: Section: Range:
Indian Reserve: Meridian: Block:
Quarter:
Island
BCGS Number (NAD 27): 082E072342 Well: 2

Class of Well:
Subclass of Well:
Orientation of WEll:
Status of Well: New
Well Use: Unknown Well Use
Observation Well Number:
Observation Well Status:
Construction Method: Drilled
Diameter: 8.0 inches
Well Depth: 221.0 feet
Elevation: 0
Bedrock Depth: 221 feet

Construction Date: 1981-08-01 00:00:

Driller: Quality Well Drilling
Well Identification Plate Number:
Plate Attached By:
Where Plate Attached:

PRODUCTION DATA AT TIME OF DRILLING:
Well Yield: 300 (Driller's Estima
Artesian Flow: gal/min
Static Level: 145 feet

Water Utility:
Water Supply System Name:
Water Supply System Well Name:

Surface Seal Flag:
Surface Seal Material:
Surface Seal Method:
Surface Seal Depth:
Surface Seal Thickness:

Lithology Info Flag:
Pump Test Info Flag:
File Info Flag:
Sieve Info Flag:
Screen Info Flag:
Water Chemistry Info Flag:
Field Chemistry Info Flag:
Site Info (SEAM):
Site Info Details:
Other Info Flag:
Other Info Details:

GENERAL REMARKS:
DEC. 14/83 - "SPOKE WITH PEACHLAND HTS. MANAGER, THIS WELL IS NOT IN USE, AS PROPE

From	0	to	6 Ft.	sand and gravel with big rocks
From	6	to	14.6 Ft.	big cobb. and sand, sm. grvl, big bould-
From	0	to	0 Ft.	er
From	14.6	to	21 Ft.	cemented sand and gravel, tight
From	21	to	60 Ft.	brn sand and grvl with big cobb.
From	60	to	80 Ft.	lrg and sm gravel with sand, little
From	0	to	0 Ft.	tight
From	80	to	83 Ft.	cemented sand and grvl, tight, drilled
From	83	to	100 Ft.	brn sand with grvl and lrg cobb.
From	100	to	110 Ft.	coarse grvl, lrg and sm. with brn sand
From	110	to	120 Ft.	brn sand with big cobb, cemented and
From	0	to	0 Ft.	grey clay
From	120	to	130 Ft.	coarse sand and gravel, lrg and sm
From	130	to	132 Ft.	big cobb., drilled
From	132	to	140 Ft.	brn sand, coarse and clean
From	140	to	160 Ft.	loose sand and grvl (lrg and sm grvl)

From	160	to	165	Ft.	brn sand, some rocks
From	165	to	170	Ft.	brn sand, clean with some fines
From	170	to	175	Ft.	tight sand and big cobb.
From	175	to	186	Ft.	tight sand (pasty) and some grvl with
From	0	to	0	Ft.	little clay, not making water
From	186	to	189	Ft.	sand and sm. sharp rock, dirty
From	189	to	192	Ft.	loose sand and grvl, making water
From	192	to	195	Ft.	brn sand, looser (casing moved easier),
From	0	to	0	Ft.	cleaner, making water
From	195	to	200	Ft.	brn sand, clean, some pebb.
From	200	to	210	Ft.	brn sand, clean, some fines
From	210	to	212	Ft.	brn sand, strips of cemented grvl and
From	0	to	0	Ft.	sand, mixed and drilled
From	212	to	216	Ft.	brn sand with broken rock, mixed in some
From	0	to	0	Ft.	big cobbles - little coarser with fines
From	216	to	220.6	Ft.	brn sand, clean coarser
From	0	to	220.6	Ft.	bedrock

- Return to Main

BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 58927	Construction Date: 1989-07-10 00:00:00.0
Owner: G EKINS	Driller: Capri Drilling Well Identification Plate Number: Plate Attached By: Where Plate Attached:
Address: HWY 97	
Area: PEACHLAND	PRODUCTION DATA AT TIME OF DRILLING: Well Yield: 5 (Driller's Estimate) Ga Artesian Flow: 0 Gal/min Static Level: 82 feet
WELL LOCATION: OSOYOOS (ODYD) Land District District Lot: 490 Plan: 125 Lot: Township: Section: Range: Indian Reserve: Meridian: Block: 38 Quarter: Island BCGS Number (NAD 27): 082E072341 Well: 1	Water Utility: Water Supply System Name: Water Supply System Well Name: Surface Seal Flag: Surface Seal Material: Surface Seal Method: Surface Seal Depth: Surface Seal Thickness:
Class of Well: Subclass of Well: Orientation of WEll: Status of Well: New Well Use: Domestic Observation Well Number: Observation Well Status: Construction Method: Drilled Diameter: 6.0 inches Well Depth: 200.0 feet Elevation: 0 Bedrock Depth: 14 feet	Lithology Info Flag: Pump Test Info Flag: File Info Flag: Sieve Info Flag: Screen Info Flag: Water Chemistry Info Flag: Field Chemistry Info Flag: Site Info (SEAM): Site Info Details: Other Info Flag: Other Info Details:

GENERAL REMARKS:

From	0	to	0 Ft.	bedrock at 14'
From	0	to	0 Ft.	null
From	0	to	11 Ft.	cobbles and boulders
From	11	to	14 Ft.	fine sand w/gravel
From	14	to	63 Ft.	bedrock green and black -hardness ?
From	63	to	66 Ft.	frac. gr. and bl. bedrock
From	66	to	170 Ft.	green and black bedrock
From	170	to	200 Ft.	hard brownish red bedrock

- Return to Main

BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 61528 Owner: G EKINS & M LUHTALA Address: 1/2 MI EAST FROM SIGNAL LIGHTS Area: PEACHLAND WELL LOCATION: OSOYOOS (ODYD) Land District District Lot: 490 Plan: 125 Lot: 38 Township: Section: Range: Indian Reserve: Meridian: Block: Quarter: Island BCGS Number (NAD 27): 082E072341 Well: 2 Class of Well: Subclass of Well: Orientation of WEll: Status of Well: New Well Use: Domestic Observation Well Number: Observation Well Status: Construction Method: Drilled Diameter: 0.0 inches Well Depth: 0.0 feet Elevation: 0 Bedrock Depth: feet	Construction Date: 1989-07-06 00:00:00.0 Driller: Capri Drilling Well Identification Plate Number: Plate Attached By: Where Plate Attached: PRODUCTION DATA AT TIME OF DRILLING: Well Yield: 0 (Driller's Estimate) Artesian Flow: 0 Static Level: feet Water Utility: Water Supply System Name: Water Supply System Well Name: Surface Seal Flag: Surface Seal Material: Surface Seal Method: Surface Seal Depth: Surface Seal Thickness: Lithology Info Flag: Pump Test Info Flag: File Info Flag: Sieve Info Flag: Screen Info Flag: Water Chemistry Info Flag: Field Chemistry Info Flag: Site Info (SEAM): Site Info Details: Other Info Flag: Other Info Details:
GENERAL REMARKS:	

- Return to Main

BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 61522

Owner: GERHARD GABLER

Address: LAW STREET

Area: PEACHLAND

WELL LOCATION:
OSOYOOS (ODYD) Land District
District Lot: 1274 Plan: 40354 Lot: A
Township: Section: Range:
Indian Reserve: Meridian: Block:
Quarter:
Island
BCGS Number (NAD 27): 082E072311 Well: 2

Class of Well:
Subclass of Well:
Orientation of WEll:
Status of Well: New
Well Use: Domestic
Observation Well Number:
Observation Well Status:
Construction Method: Drilled
Diameter: 0.0 inches
Well Depth: 400.0 feet
Elevation: 0
Bedrock Depth: 388 feet

Construction Date: 1988-07-07 00:00:00.0

Driller: Capri Drilling
Well Identification Plate Number:
Plate Attached By:
Where Plate Attached:

PRODUCTION DATA AT TIME OF DRILLING:
Well Yield: 0 (Driller's Estimate)
Artesian Flow: 0
Static Level: feet

Water Utility:
Water Supply System Name:
Water Supply System Well Name:

Surface Seal Flag:
Surface Seal Material:
Surface Seal Method:
Surface Seal Depth:
Surface Seal Thickness:

Lithology Info Flag:
Pump Test Info Flag:
File Info Flag:
Sieve Info Flag:
Screen Info Flag:
Water Chemistry Info Flag:
Field Chemistry Info Flag:
Site Info (SEAM):
Site Info Details:
Other Info Flag:
Other Info Details:

GENERAL REMARKS:

From	0	to	1 Ft.	Top soil
From	1	to	5 Ft.	Sand & gravel
From	5	to	8.5 Ft.	Fractured bedrock
From	8.5	to	12 Ft.	Soft grey bedrock
From	12	to	135 Ft.	Grey bedrock
From	135	to	400 Ft.	Bedrock - heavy quartz bearing granite

- Return to Main

BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 57207	Construction Date: 1987-06-29 00:00:00.0
Owner: MR. BIL	Driller: Capri Drilling Well Identification Plate Number: Plate Attached By: Where Plate Attached:
Address: 5101 LAW ST.	PRODUCTION DATA AT TIME OF DRILLING:
Area: PEACHLAND	Well Yield: 30 (Driller's Estimate) Ga Artesian Flow: 0 gal/min Static Level: 98 feet
WELL LOCATION: OSOYOOS (ODYD) Land District District Lot: 1274 Plan: 518 Lot: 1 Township: Section: Range: Indian Reserve: Meridian: Block: Quarter: Island BCGS Number (NAD 27): 082E072311 Well: 1	Water Utility: Water Supply System Name: Water Supply System Well Name: Surface Seal Flag: Surface Seal Material: Surface Seal Method: Surface Seal Depth: Surface Seal Thickness:
Class of Well: Subclass of Well: Orientation of WEll: Status of Well: New Well Use: Domestic Observation Well Number: Observation Well Status: Construction Method: Drilled Diameter: 6.0 inches Well Depth: 210.0 feet Elevation: 0 Bedrock Depth: 3 feet	Lithology Info Flag: Pump Test Info Flag: File Info Flag: Sieve Info Flag: Screen Info Flag: Water Chemistry Info Flag: Field Chemistry Info Flag: Site Info (SEAM): Site Info Details: Other Info Flag: Other Info Details:

GENERAL REMARKS:
CASING SET 7FT INTO BEDROCK.

From	0	to	3	Ft. sand and gravel
From	3	to	210	Ft. bedrock

- Return to Main

BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 76747

Owner: ALFRED SCOTT

Address: 5205 LAW ST

Area: PEACHLAND BC

WELL LOCATION:
Land District
District Lot: Plan: 518 Lot: 5
Township: Section: Range:
Indian Reserve: Meridian: Block:
Quarter:
Island
BCGS Number (NAD 27): Well: 0

Class of Well:
Subclass of Well:
Orientation of WEll:
Status of Well: New
Well Use: Domestic
Observation Well Number:
Observation Well Status:
Construction Method:
Diameter: 6 inches
Well Depth: 700 feet
Elevation: 0
Bedrock Depth: UNK feet
Screen from 0 to 0 feet Slot Size 0
Screen from 0 to 0 feet Slot Size 0

Construction Date: 1998-11-03 00:00:00.

Driller: Cyclone Drilling Ltd.
Well Identification Plate Number:
Plate Attached By:
Where Plate Attached:

PRODUCTION DATA AT TIME OF DRILLING:
Well Yield: .8 (Driller's Estimate)
Artesian Flow: 0
Static Level: 155 feet

US gal/min

Water Utility:
Water Supply System Name:
Water Supply System Well Name:

Surface Seal Flag: N
Surface Seal Material:
Surface Seal Method:
Surface Seal Depth:
Surface Seal Thickness:

Lithology Info Flag:
Pump Test Info Flag:
File Info Flag:
Sieve Info Flag:
Screen Info Flag: N
Water Chemistry Info Flag:
Field Chemistry Info Flag:
Site Info (SEAM):
Site Info Details:
Other Info Flag:
Other Info Details:

GENERAL REMARKS:
PRINCETON RD TO PINERIDGE TO LAW ST RT T AIR

From	0	to	2 Ft.	SILTY CLAY & FRACTURED ROCK
From	2	to	110 Ft.	BLACK & WHITE WITH SOME PINE GRANITE
From	2	to	110 Ft.	BEDROCK MED SOFT
From	110	to	140 Ft.	ORANGE & PINK GRANITE BEDROCK
From	140	to	185 Ft.	GREY BLACK & WHITE BEDROCK
From	185	to	230 Ft.	TAN BROWN & GREY BEDROCK
From	230	to	245 Ft.	PINKISH BROWN BEDROCK
From	245	to	261 Ft.	HARDER DARK GREEN BEDROCK
From	261	to	580 Ft.	PINK & BROWN BEDROCK
From	580	to	672 Ft.	VERY HARD DARK GREEN & GREY BEDROCK
From	672	to	676 Ft.	SOFT GREY BEDROCK
From	676	to	700 Ft.	VERY HARD DARK GREEN BEDROCK
From		to	Ft.	SOFT SPOTS & FRACTURES AT 95' 197' 205'
From		to	Ft.	215' 218' 230' 261' 297' 385' 418' 672'
From		to	Ft.	676'
From		to	Ft.	4" PVC LINER INSTALLED TO PROTECT PUMP

From	to	Ft.	FROM FRACTURED ROCK ZONES WITH
From	to	Ft.	PERFORATIONS AT 640' TO 690' AND FROM
From	to	Ft.	280' TO 320 FT

- Return to Main

Information Disclaimer

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BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 82625

Owner: BRYCE & LEANNE BAKER

Address: 5205 LAW STREET

Area: PEACHLAND

WELL LOCATION:
OSOYOOS (ODYD) Land District
District Lot: 1274 Plan: 518 Lot: 5
Township: Section: Range:
Indian Reserve: Meridian: Block:
Quarter:
Island
BCGS Number (NAD 27): 082E072311 Well: 5

Class of Well: Water Supply
Subclass of Well: Domestic
Orientation of Well:
Status of Well: New
Well Use: Domestic
Observation Well Number:
Observation Well Status: Active
Construction Method: Drilled
Diameter: inches
Well Depth: 520 feet
Elevation:
Bedrock Depth: feet

Construction Date: 2001-10-18 00:00:00.0

Driller: Cyclone Drilling Ltd.
Well Identification Plate Number:
Plate Attached By:
Where Plate Attached:

PRODUCTION DATA AT TIME OF DRILLING:
Well Yield: 1.25 (Driller's Estimate) Ga
Artesian Flow:
Static Level: 60 feet 5 gal/min

Water Utility: N
Water Supply System Name:
Water Supply System Well Name:

Surface Seal Flag: N
Surface Seal Material:
Surface Seal Method:
Surface Seal Depth:
Surface Seal Thickness:

Lithology Info Flag: N
Pump Test Info Flag: N
File Info Flag: N
Sieve Info Flag: N
Screen Info Flag: N
Water Chemistry Info Flag: N
Field Chemistry Info Flag:
Site Info (SEAM): N
Site Info Details:
Other Info Flag:
Other Info Details:

GENERAL REMARKS:
SWL 60 FT AFTER 14 HRS.

From	0	to 4	Ft.	SAND AND GRAVEL WITH SANDY BROWN CLAY
From	4	to 14	Ft.	SOFT WEATHERED GRANITE BEDROCK
From	14	to 17	Ft.	HARDER GREEN AND WHITE GRANITE BEDROCK
From	17	to	Ft.	CASING STOPPED
From	17	to 105	Ft.	MED BLACK, WHITE AND GREEN GRANITE BEDROCK
From	105	to 203	Ft.	GREEN AND WHITE WITH SOME PINK GRANITE BEDROCK
From	203	to 340	Ft.	BLACK, WHITE AND PINK GRANITE BEDROCK
From	340	to 404	Ft.	PINK AND TAN WITH SOME WHITE GRANITE BEDROCK
From	404	to 480	Ft.	DARK GREEN-BLACK WITH SOME PINK GRANITE BEDROCK
From	480	to 520	Ft.	PINK WITH SOME BLACK AND WHITE
From	520	to 520	Ft.	STOPPED DRILLING
From		to	Ft.	SOFT SPOTS AND FRACTURES AT 44', 122', 170', 180', 212', 2

• Return to Main

Information Disclaimer
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BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 82318

Owner: BOB OLIVER

Address: 5309 LAW STREET

Area: PEACHLAND

WELL LOCATION:
OSOYOOS (ODYD) Land District
District Lot: 1274 Plan: 518 Lot: 9
Township: Section: Range:
Indian Reserve: Meridian: Block:
Quarter:
Island
BCGS Number (NAD 27): 082E072311 Well: 6

Class of Well: Water Supply
Subclass of Well: Domestic
Orientation of WEll:
Status of Well: New
Well Use: Domestic
Observation Well Number:
Observation Well Status:
Construction Method: Drilled
Diameter: 6 inches
Well Depth: 320 feet
Elevation:
Bedrock Depth: feet

Construction Date: 1990-09-07 00:00:00.0

Driller: Cascade Drilling Ltd. & Capri Dri
Well Identification Plate Number:
Plate Attached By:
Where Plate Attached:

PRODUCTION DATA AT TIME OF DRILLING:
Well Yield: 5 (Driller's Estimate) Ga
Artesian Flow:
Static Level: 35 feet

Water Utility: N
Water Supply System Name:
Water Supply System Well Name:

Surface Seal Flag: N
Surface Seal Material:
Surface Seal Method:
Surface Seal Depth:
Surface Seal Thickness:

Lithology Info Flag: Y
Pump Test Info Flag: N
File Info Flag: N
Sieve Info Flag: N
Screen Info Flag: N
EMS ID:
Water Chemistry Info Flag: N
Field Chemistry Info Flag:
Site Info (SEAM): N
Site Info Details:
Other Info Flag:
Other Info Details:

GENERAL REMARKS:
ON COMPLETION YIELD MEETS REQUIREMENTS OF CORD BYLAW 176.

From	0	to	10.5 Ft.	SANDY CLAY & GRAVEL WITH COBBLES
From	10.5	to	11.5 Ft.	FRACTURED BEDROCK
From	11.5	to	320 Ft.	MEDIUM HARD GRANITE BEDROCK

- Return to Main

BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 61523	Construction Date: 1988-05-23 00:00:00.0
Owner: DOUG & GAYLE THOMAS	Driller: Sweetwater Drilling Well Identification Plate Number: Plate Attached By: Where Plate Attached:
Address: LAW STREET	
Area: PEACHLAND	PRODUCTION DATA AT TIME OF DRILLING: Well Yield: 0 (Driller's Estimate) Artesian Flow: 0 Static Level: feet
WELL LOCATION: OSOYOOS (ODYD) Land District District Lot: 1274 Plan: 518 Lot: 7 Township: Section: Range: Indian Reserve: Meridian: Block: Quarter: Island BCGS Number (NAD 27): 082E072311 Well: 3	Water Utility: Water Supply System Name: Water Supply System Well Name: Surface Seal Flag: Surface Seal Material: Surface Seal Method: Surface Seal Depth: Surface Seal Thickness:
Class of Well: Subclass of Well: Orientation of WEll: Status of Well: New Well Use: Domestic Observation Well Number: Observation Well Status: Construction Method: Drilled Diameter: 6.0 inches Well Depth: 320.0 feet Elevation: 0 Bedrock Depth: 315 feet	Lithology Info Flag: Pump Test Info Flag: File Info Flag: Sieve Info Flag: Screen Info Flag: Water Chemistry Info Flag: Field Chemistry Info Flag: Site Info (SEAM): Site Info Details: Other Info Flag: Other Info Details:

GENERAL REMARKS:

From	0 to	5 Ft.	Dirt, sand & coarse gravel
From	5 to	320 Ft.	Open bedrock
From	0 to	0 Ft.	Water-bearing fracture @ 85'

- Return to Main

BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 61524	Construction Date: 1992-09-04 00:00:00.0
Owner: MIKE GIBSON	Driller: Capri Drilling Well Identification Plate Number:
Address: LAW STREET	Plate Attached By: Where Plate Attached:
Area: PEACHLAND	PRODUCTION DATA AT TIME OF DRILLING: Well Yield: 0 (Driller's Estimate)
WELL LOCATION: OSOYOOS (ODYD) Land District District Lot: 1274 Plan: Lot: 4 Township: Section: Range: Indian Reserve: Meridian: Block: Quarter: Island BCGS Number (NAD 27): 082E072311 Well: 4	Artesian Flow: 0 Static Level: feet Water Utility: Water Supply System Name: Water Supply System Well Name: Surface Seal Flag: Surface Seal Material: Surface Seal Method: Surface Seal Depth: Surface Seal Thickness:
Class of Well: Subclass of Well: Orientation of WEll: Status of Well: New Well Use: Domestic Observation Well Number: Observation Well Status: Construction Method: Drilled Diameter: 6.0 inches Well Depth: 340.0 feet Elevation: 0 Bedrock Depth: 100 feet	Lithology Info Flag: Pump Test Info Flag: File Info Flag: Sieve Info Flag: Screen Info Flag: Water Chemistry Info Flag: Field Chemistry Info Flag: Site Info (SEAM): Site Info Details: Other Info Flag: Other Info Details:

GENERAL REMARKS:
SOME SEEPAGE PRODUCING APPROX. 20 GAL IN 12 HRS

From	0 to	240 Ft.	null
From	240 to	340 Ft.	Bedrock

- Return to Main

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BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 53174

Owner: G LUNDIN

Address: RR 1 S 13 C 8 PEACHLAND

Area: PEACHLAND

WELL LOCATION:
OSOYOOS (ODYD) Land District
District Lot: 221 Plan: 25185 Lot: D
Township: Section: Range:
Indian Reserve: Meridian: Block:
Quarter:
Island
BCGS Number (NAD 27): 082E072134 Well: 6

Class of Well:
Subclass of Well:
Orientation of WEll:
Status of Well: New
Well Use: Unknown Well Use
Observation Well Number:
Observation Well Status:
Construction Method: Drilled
Diameter: 7.0 inches
Well Depth: 120.0 feet
Elevation: 0
Bedrock Depth: 38 feet

Construction Date: 1984-01-01 00:00:00.0

Driller: Capri Drilling
Well Identification Plate Number:
Plate Attached By:
Where Plate Attached:

PRODUCTION DATA AT TIME OF DRILLING:
Well Yield: .1 (Driller's Estimate) Ga
Artesian Flow: gal/min
Static Level: feet

Water Utility:
Water Supply System Name:
Water Supply System Well Name:

Surface Seal Flag:
Surface Seal Material:
Surface Seal Method:
Surface Seal Depth:
Surface Seal Thickness:

Lithology Info Flag:
Pump Test Info Flag:
File Info Flag:
Sieve Info Flag:
Screen Info Flag:
Water Chemistry Info Flag:
Field Chemistry Info Flag:
Site Info (SEAM):
Site Info Details:
Other Info Flag:
Other Info Details:

GENERAL REMARKS:

From	0	to	6 Ft.	topsoil and gravel
From	6	to	38 Ft.	sandy clays
From	38	to	39 Ft.	fractured bedrock
From	39	to	120 Ft.	bedrock

- Return to Main

BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 62586	Construction Date: 1991-11-27 00:00:00.0
Owner: T MCLAUGHLAN	Driller: Capri Drilling Well Identification Plate Number: Plate Attached By: Where Plate Attached:
Address: 6709 THORNE ROAD	PRODUCTION DATA AT TIME OF DRILLING:
Area: PEACHLAND	Well Yield: 45 (Driller's Estimate) G Artesian Flow: 0 gal / hour Static Level: 206 feet
WELL LOCATION: OSOYOOS (ODYD) Land District District Lot: 221 Plan: 19113 Lot: C Township: Section: Range: Indian Reserve: Meridian: Block: Quarter: Island BCGS Number (NAD 27): 082E072134 Well: 11	Water Utility: Water Supply System Name: Water Supply System Well Name: Surface Seal Flag: Surface Seal Material: Surface Seal Method: Surface Seal Depth: Surface Seal Thickness:
Class of Well: Subclass of Well: Orientation of WEll: Status of Well: New Well Use: Domestic Observation Well Number: Observation Well Status: Construction Method: Drilled Diameter: 6.0 inches Well Depth: 500.0 feet Elevation: 0 Bedrock Depth: 457 feet	Lithology Info Flag: Pump Test Info Flag: Y File Info Flag: Sieve Info Flag: Screen Info Flag: Water Chemistry Info Flag: Field Chemistry Info Flag: Site Info (SEAM): Site Info Details: Other Info Flag: Other Info Details:

GENERAL REMARKS:

From	0	to	21 Ft.	Sand, gravel w/cobbles & some silty clay
From	21	to	25 Ft.	Moist brown clay
From	25	to	33 Ft.	Moist brown clay w/ gravel
From	33	to	41 Ft.	Soft weathered bedrock, fractured
From	41	to	500 Ft.	Solid medium & hard granite bedrock
From	0	to	0 Ft.	(pink & tan) w/ soft zones
From	0	to	0 Ft.	Soft fracture from 306' - 306.5'

- Return to Main

BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 17777 Owner: C W DUNKIN Address: PEACHLAND Area: PEACHLAND WELL LOCATION: OSOYOOS (ODYD) Land District District Lot: 221 Plan: Lot: 1 Township: Section: Range: Indian Reserve: Meridian: Block: 6 Quarter: Island BCGS Number (NAD 27): 082E072134 Well: 3 Class of Well: Subclass of Well: Orientation of WEll: Status of Well: New Well Use: Unknown Well Use Observation Well Number: Observation Well Status: Construction Method: Dug Diameter: 0.0 inches Well Depth: 8.0 feet Elevation: 0 Bedrock Depth: UNK feet	Construction Date: 1963-01-01 00:00:00.0 Driller: Unknown Well Identification Plate Number: Plate Attached By: Where Plate Attached: PRODUCTION DATA AT TIME OF DRILLING: Well Yield: 0 (Driller's Estimate) Artesian Flow: Static Level: 4 feet Water Utility: Water Supply System Name: Water Supply System Well Name: Surface Seal Flag: Surface Seal Material: Surface Seal Method: Surface Seal Depth: Surface Seal Thickness: Lithology Info Flag: Pump Test Info Flag: File Info Flag: Sieve Info Flag: Screen Info Flag: Water Chemistry Info Flag: Field Chemistry Info Flag: Site Info (SEAM): Site Info Details: Other Info Flag: Other Info Details:
GENERAL REMARKS: SPRING. GOOD SUPPLY. From 0 to 0 Ft. mostly silt	

- Return to Main

BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 34498

Owner: OLD TIMER CAFE

Address: HWY 97 PEACHLAND

Area: PEACHLAND

WELL LOCATION:
OSOYOOS (ODYD) Land District
District Lot: 221 Plan: 177 Lot: 8
Township: Section: Range:
Indian Reserve: Meridian: Block:
Quarter:
Island
BCGS Number (NAD 27): 082E072134 Well: 7

Class of Well:
Subclass of Well:
Orientation of WEll:
Status of Well: New
Well Use: Unknown Well Use
Observation Well Number:
Observation Well Status:
Construction Method: Drilled
Diameter: 6.0 inches
Well Depth: 26.0 feet
Elevation: 0
Bedrock Depth: UNK feet

Construction Date: 1976-04-01 00:00:00.0

Driller: Quality Well Drilling
Well Identification Plate Number:
Plate Attached By:
Where Plate Attached:

PRODUCTION DATA AT TIME OF DRILLING:
Well Yield: 6 (Driller's Estimate) Ga
Artesian Flow: gal/min
Static Level: 10 feet

Water Utility:
Water Supply System Name:
Water Supply System Well Name:

Surface Seal Flag:
Surface Seal Material:
Surface Seal Method:
Surface Seal Depth:
Surface Seal Thickness:

Lithology Info Flag:
Pump Test Info Flag:
File Info Flag:
Sieve Info Flag:
Screen Info Flag:
Water Chemistry Info Flag:
Field Chemistry Info Flag:
Site Info (SEAM):
Site Info Details:
Other Info Flag:
Other Info Details:

GENERAL REMARKS:

From	0	to	14 Ft.	sand and gravel
From	14	to	18.5 Ft.	sand and gravel, pebbles
From	18.5	to	26 Ft.	grey silt
From	0	to	0 Ft.	null
From	0	to	0 Ft.	No more than 6 GPM should be pumped from
From	0	to	0 Ft.	this well.

- Return to Main

BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 30591

Owner: D ORSTED DEEP CR TRA

Address: RR 1 PEACHLAND

Area: PEACHLAND

WELL LOCATION:
OSOYOOS (ODYD) Land District
District Lot: 221 Plan: 25185 Lot: A
Township: Section: Range:
Indian Reserve: Meridian: Block:
Quarter:
Island
BCGS Number (NAD 27): 082E072134 Well: 5

Class of Well:
Subclass of Well:
Orientation of WEll:
Status of Well: New
Well Use: Unknown Well Use
Observation Well Number:
Observation Well Status:
Construction Method: Drilled
Diameter: 6.0 inches
Well Depth: 45.0 feet
Elevation: 0
Bedrock Depth: UNK feet

Construction Date: 1974-06-19 00:00:00.0

Driller: Pacific Water Wells
Well Identification Plate Number:
Plate Attached By:
Where Plate Attached:

PRODUCTION DATA AT TIME OF DRILLING:
Well Yield: 30 (Driller's Estimate) Ga
Artesian Flow:
Static Level: feet gal/min

Water Utility:
Water Supply System Name:
Water Supply System Well Name:

Surface Seal Flag:
Surface Seal Material:
Surface Seal Method:
Surface Seal Depth:
Surface Seal Thickness:

Lithology Info Flag:
Pump Test Info Flag:
File Info Flag:
Sieve Info Flag:
Screen Info Flag:
Water Chemistry Info Flag:
Field Chemistry Info Flag:
Site Info (SEAM):
Site Info Details:
Other Info Flag:
Other Info Details:

GENERAL REMARKS:

From	0 to	23 Ft.	gravel
From	23 to	37 Ft.	brown clay
From	37 to	45 Ft.	gravel

- Return to Main

BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 61527	Construction Date: 1993-02-25 00:00:00.0
Owner: THRIFTY GAS BAR	Driller: Capri Drilling Well Identification Plate Number: Plate Attached By: Where Plate Attached:
Address: HWY 97 SOUTH & HARDY ROAD	
Area: PEACHLAND	PRODUCTION DATA AT TIME OF DRILLING: Well Yield: 2100 (Driller's Estimate) G Artesian Flow: 0 gal/hour Static Level: 12 feet
WELL LOCATION: OSOYOOS (ODYD) Land District District Lot: 221 Plan: 177 Lot: 11 Township: Section: Range: Indian Reserve: Meridian: Block: Quarter: Island BCGS Number (NAD 27): 082E072134 Well: 10	Water Utility: Water Supply System Name: Water Supply System Well Name: Surface Seal Flag: Surface Seal Material: Surface Seal Method: Surface Seal Depth: Surface Seal Thickness:
Class of Well: Subclass of Well: Orientation of WEll: Status of Well: New Well Use: Domestic Observation Well Number: Observation Well Status: Construction Method: Drilled Diameter: 6.0 inches Well Depth: 43.0 feet Elevation: 0 Bedrock Depth: feet	Lithology Info Flag: Pump Test Info Flag: Y File Info Flag: Sieve Info Flag: Screen Info Flag: Water Chemistry Info Flag: Field Chemistry Info Flag: Site Info (SEAM): Site Info Details: Other Info Flag: Other Info Details:

GENERAL REMARKS:
WELL WAS DEEPENED FROM 12' INSIDE RING WELL.

From	0	to	12 Ft.	null
From	12	to	21 Ft.	Medium & silty sands w/ gravel, water-
From	0	to	0 Ft.	bearing (dirty)
From	21	to	36.5 Ft.	Water-bearing sand & gravel w/silt seams
From	36.5	to	43 Ft.	Cleaner sand & gravel (water-bearing)
From	43	to	0 Ft.	Silty sand seam
From	0	to	0 Ft.	NOTE - all measurements made from top of
From	0	to	0 Ft.	ring well

- Return to Main

Report 1 - Detailed Well Record

Well Tag Number: 16265 Owner: SIMMONS Address: PEACHLAND Area: PEACHLAND WELL LOCATION: OSOYOOS (ODYD) Land District District Lot: 221 Plan: Lot: A Township: Section: Range: Indian Reserve: Meridian: Block: Quarter: Island BCGS Number (NAD 27): 082E072134 Well: 4 Class of Well: Subclass of Well: Orientation of WEll: Status of Well: New Well Use: Unknown Well Use Observation Well Number: Observation Well Status: Construction Method: Dug Diameter: 0.0 inches Well Depth: 12.0 feet Elevation: 0 Bedrock Depth: UNK feet	Construction Date: 1960-01-01 00:00:00.0 Driller: Unknown Well Identification Plate Number: Plate Attached By: Where Plate Attached: PRODUCTION DATA AT TIME OF DRILLING: Well Yield: 0 (Driller's Estimate) Artesian Flow: Static Level: 4 feet Water Utility: Water Supply System Name: Water Supply System Well Name: Surface Seal Flag: Surface Seal Material: Surface Seal Method: Surface Seal Depth: Surface Seal Thickness: Lithology Info Flag: Pump Test Info Flag: File Info Flag: Sieve Info Flag: Screen Info Flag: Water Chemistry Info Flag: Field Chemistry Info Flag: Site Info (SEAM): Site Info Details: Other Info Flag: Other Info Details:
GENERAL REMARKS: GOOD SUPPLY. From 0 to 0 Ft. loose gravel and some sand	

- Return to Main

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BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 76549

Owner: ASHLEY CROMWELL

Address: 6727 THORNE RD

Area: PEACHLAND BC

WELL LOCATION:
OSOYOOS (ODYD) Land District
District Lot: 221 Plan: 20115 Lot: 1
Township: Section: Range:
Indian Reserve: Meridian: Block:
Quarter:
Island
BCGS Number (NAD 27): Well: 0

Class of Well:
Subclass of Well:
Orientation of WEll:
Status of Well: New
Well Use: Domestic
Observation Well Number:
Observation Well Status:
Construction Method:
Diameter: 6 inches
Well Depth: 400 feet
Elevation: 0
Bedrock Depth: UNK feet
Screen from 0 to 0 feet Slot Size 0
Screen from 0 to 0 feet Slot Size 0

Construction Date: 1998-10-08 00:00:00.

Driller: Cascade Drilling
Well Identification Plate Number:
Plate Attached By:
Where Plate Attached:

PRODUCTION DATA AT TIME OF DRILLING:
Well Yield: 30 (Driller's Estimate)
Artesian Flow: 0
Static Level: 90 feet gal/hour

Water Utility:
Water Supply System Name:
Water Supply System Well Name:

Surface Seal Flag: N
Surface Seal Material:
Surface Seal Method:
Surface Seal Depth:
Surface Seal Thickness:

Lithology Info Flag:
Pump Test Info Flag:
File Info Flag:
Sieve Info Flag:
Screen Info Flag: N
Water Chemistry Info Flag:
Field Chemistry Info Flag:
Site Info (SEAM):
Site Info Details:
Other Info Flag:
Other Info Details:

GENERAL REMARKS:
6727 THORNE RD

From	0	to	25 Ft.	SAND & GRAVEL
From	25	to	33 Ft.	CLAY & GRAVEL
From	33	to	400 Ft.	BEDROCK

- Return to Main

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BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 82857

Owner: TINGSTAD

Address: 6757 THORNE RD

Area: PEACHLAND

WELL LOCATION:
OSOYOOS (ODYD) Land District
District Lot: 221 Plan: 19113 Lot: B
Township: Section: Range:
Indian Reserve: Meridian: Block:
Quarter:
Island
BCGS Number (NAD 27): 082E072134 Well: 14

Class of Well: Water Supply
Subclass of Well:
Orientation of WEll:
Status of Well: New
Well Use: Domestic
Observation Well Number:
Observation Well Status:
Construction Method: Drilled
Diameter: 6 inches
Well Depth: 403 feet
Elevation:
Bedrock Depth: feet

Construction Date: 2001-08-26 00:00:00.0

Driller: Cascade Drilling Ltd. & Capri Dr
Well Identification Plate Number:
Plate Attached By:
Where Plate Attached:

PRODUCTION DATA AT TIME OF DRILLING:
Well Yield: 0.3 (Driller's Estimate) G
Artesian Flow:
Static Level: 138 feet

Water Utility: N
Water Supply System Name:
Water Supply System Well Name:

Surface Seal Flag: N
Surface Seal Material:
Surface Seal Method:
Surface Seal Depth:
Surface Seal Thickness:

Lithology Info Flag: N
Pump Test Info Flag: N
File Info Flag: N
Sieve Info Flag: N
Screen Info Flag: N
EMS ID:
Water Chemistry Info Flag: N
Field Chemistry Info Flag:
Site Info (SEAM): N
Site Info Details:
Other Info Flag:
Other Info Details:

GENERAL REMARKS:

From 0 to 303 Ft. SEE WELL LOG 2321.
From 303 to 403 Ft. BEDROCK WITH WATER BEARING FRACTURES FROM 360' TO 390'.

- Return to Main

BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 76718

Owner: ERVIN TINGSTAD

Address: 6757 THORNE RD

Area: PEACHLAND

WELL LOCATION:
OSOYOOS (ODYD) Land District
District Lot: 221 Plan: 19113 Lot: B
Township: Section: Range:
Indian Reserve: Meridian: Block:
Quarter:
Island
BCGS Number (NAD 27): 082E072134 Well: 12

Class of Well: Water Supply
Subclass of Well: Domestic
Orientation of WEll:
Status of Well: New
Well Use: Domestic
Observation Well Number:
Observation Well Status:
Construction Method: Drilled
Diameter: 6 inches
Well Depth: 300 feet
Elevation:
Bedrock Depth: 54 feet
Screen from 0 to 0 feet Slot Size 0
Screen from 0 to 0 feet Slot Size 0

Construction Date: 1998-10-06 00:00:00.

Driller: Cascade Drilling Ltd. & Capri
Well Identification Plate Number:
Plate Attached By:
Where Plate Attached:

PRODUCTION DATA AT TIME OF DRILLING:
Well Yield: 1 (Driller's Estimate)
Artesian Flow:
Static Level: 120 feet

Water Utility: N
Water Supply System Name:
Water Supply System Well Name:

Surface Seal Flag: N
Surface Seal Material:
Surface Seal Method:
Surface Seal Depth:
Surface Seal Thickness:

Lithology Info Flag: Y
Pump Test Info Flag: N
File Info Flag: N
Sieve Info Flag: N
Screen Info Flag: N
EMS ID:
Water Chemistry Info Flag: N
Field Chemistry Info Flag:
Site Info (SEAM): N
Site Info Details:
Other Info Flag:
Other Info Details:

GENERAL REMARKS:

From	0	to	10 Ft.	GRAVEL
From	10	to	35 Ft.	SAND & GRAVEL
From	35	to	40 Ft.	SAND
From	40	to	45 Ft.	SAND & CLAY
From	45	to	54 Ft.	CLAY & GRAVEL
From	54	to	300 Ft.	BEDROCK
From	190	to	200 Ft.	FRACTURES

- Return to Main

BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 76719	Construction Date: 1998-10-17 00:00:00.
Owner: ASHLEY CROMWELL	Driller: Cascade Drilling Well Identification Plate Number: Plate Attached By:
Address: 6727 THORNE RD	Where Plate Attached:
Area: PEACHLAND BC	PRODUCTION DATA AT TIME OF DRILLING: Well Yield: 60 (Driller's Estimate)
WELL LOCATION: Land District District Lot: 221 Plan: 20115 Lot: 1 Township: Section: Range: Indian Reserve: Meridian: Block: Quarter: Island BCGS Number (NAD 27): Well: 0	Artesian Flow: 0 gal/hour Static Level: 50 feet Water Utility: Water Supply System Name: Water Supply System Well Name: Surface Seal Flag: N Surface Seal Material: Surface Seal Method: Surface Seal Depth: Surface Seal Thickness:
Class of Well: Subclass of Well: Orientation of WEll: Status of Well: New Well Use: Domestic Observation Well Number: Observation Well Status: Construction Method: Diameter: 6 inches Well Depth: 500 feet Elevation: 0 Bedrock Depth: UNK feet Screen from 0 to 0 feet Slot Size 0 Screen from 0 to 0 feet Slot Size 0	Lithology Info Flag: Pump Test Info Flag: File Info Flag: Sieve Info Flag: Screen Info Flag: N Water Chemistry Info Flag: Field Chemistry Info Flag: Site Info (SEAM): Site Info Details: Other Info Flag: Other Info Details:

GENERAL REMARKS:
6727 THORNE RD REFER TO WELL LOG 2322, UPON COMPLETION OF DRILLING WELL YIELD MEET:

From to Ft. null

- Return to Main

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BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 30354	Construction Date: 1974-05-18 00:00:00.0
Owner: CROMWELL	Driller: Pacific Water Wells Well Identification Plate Number: Plate Attached By: Where Plate Attached:
Address: THORNE RD	PRODUCTION DATA AT TIME OF DRILLING:
Area: PEACHLAND	Well Yield: 24 (Driller's Estimate) Ga Artesian Flow: Static Level: 24 feet gal/min
WELL LOCATION: OSOYOOS (ODYD) Land District District Lot: 221 Plan: 21660 Lot: A Township: Section: Range: Indian Reserve: Meridian: Block: Quarter: Island BCGS Number (NAD 27): 082E072134 Well: 8	Water Utility: Water Supply System Name: Water Supply System Well Name: Surface Seal Flag: Surface Seal Material: Surface Seal Method: Surface Seal Depth: Surface Seal Thickness:
Class of Well: Subclass of Well: Orientation of WEll: Status of Well: New Well Use: Unknown Well Use Observation Well Number: Observation Well Status: Construction Method: Drilled Diameter: 6.0 inches Well Depth: 50.0 feet Elevation: 0 Bedrock Depth: UNK feet	Lithology Info Flag: Pump Test Info Flag: File Info Flag: Sieve Info Flag: Screen Info Flag: Water Chemistry Info Flag: Field Chemistry Info Flag: Site Info (SEAM): Site Info Details: Other Info Flag: Other Info Details:

GENERAL REMARKS:

From	0 to	30 Ft.	coarse dry gravel
From	30 to	48 Ft.	w.b. gravel
From	48 to	50 Ft.	dry gravel

- Return to Main

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BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 22232	Construction Date: 1969-03-07 00:00:00.0
Owner: FRANK WARKENTIN	Driller: Osoyoos Tile Works Well Identification Plate Number:
Address: VERNON AVE WEST PEACHLAND	Plate Attached By: Where Plate Attached:
Area: PEACHLAND	PRODUCTION DATA AT TIME OF DRILLING: Well Yield: 20 (Driller's Estimate) Ga Artesian Flow: gal / hour
WELL LOCATION: OSOYOOS (ODYD) Land District District Lot: 3316 Plan: 19113 Lot: D Township: Section: Range: Indian Reserve: Meridian: Block: Quarter: Island BCGS Number (NAD 27): 082E072134 Well: 2	Static Level: 46 feet Water Utility: Water Supply System Name: Water Supply System Well Name: Surface Seal Flag: Surface Seal Material: Surface Seal Method: Surface Seal Depth: Surface Seal Thickness:
Class of Well: Subclass of Well: Orientation of WEll: Status of Well: New Well Use: Unknown Well Use Observation Well Number: Observation Well Status: Construction Method: Drilled Diameter: 6.0 inches Well Depth: 91.0 feet Elevation: 0 Bedrock Depth: 32 feet	Lithology Info Flag: Pump Test Info Flag: File Info Flag: Sieve Info Flag: Screen Info Flag: Water Chemistry Info Flag: Field Chemistry Info Flag: Site Info (SEAM): Site Info Details: Other Info Flag: Other Info Details:

GENERAL REMARKS:

From	0	to	14 Ft.	compact, clayish sand with embedded
From	0	to	0 Ft.	boulders
From	14	to	32 Ft.	till (clayish silt)
From	32	to	91 Ft.	bedrock
From	0	to	0 Ft.	null
From	0	to	0 Ft.	Est. yield: 20 gals/hour

- Return to Main

BRITISH COLUMBIA

Report 1 - Detailed Well Record

Well Tag Number: 19465	Construction Date: 1965-10-01 00:00:00.0
Owner: A L EHLERS	Driller: Art Moore & Son Well Identification Plate Number: Plate Attached By: Where Plate Attached:
Address: MINTO RD PEACHLAND	
Area: PEACHLAND	PRODUCTION DATA AT TIME OF DRILLING: Well Yield: 0 (Driller's Estimate) Artesian Flow: Static Level: feet
WELL LOCATION: OSOYOOS (ODYD) Land District District Lot: Plan: Lot: Township: Section: Range: Indian Reserve: Meridian: Block: Quarter: Island BCGS Number (NAD 27): 082E072134 Well: 1	Water Utility: Water Supply System Name: Water Supply System Well Name: Surface Seal Flag: Surface Seal Material: Surface Seal Method: Surface Seal Depth: Surface Seal Thickness:
Class of Well: Subclass of Well: Orientation of WEll: Status of Well: New Well Use: Unknown Well Use Observation Well Number: Observation Well Status: Construction Method: Drilled Diameter: 6.0 inches Well Depth: 60.0 feet Elevation: 0 Bedrock Depth: UNK feet	Lithology Info Flag: Pump Test Info Flag: File Info Flag: Sieve Info Flag: Screen Info Flag: Water Chemistry Info Flag: Field Chemistry Info Flag: Site Info (SEAM): Site Info Details: Other Info Flag: Other Info Details:

GENERAL REMARKS:
DRY HOLE

From	0	to	6 Ft.	boulders and silt
From	6	to	46 Ft.	med. to coarse grvel, clay and sand
From	46	to	50 Ft.	fine dirty sand
From	50	to	60 Ft.	clean med. sand
From	60	to	0 Ft.	still in this formation

- Return to Main

APPENDIX IV

EXAMPLES OF GROUNDWATER PROTECTION MEASURES

EXAMPLES OF GROUNDWATER PROTECTION MEASURES

1.	Hazardous Waste Collection	✓	Drop-off at central depot outside of capture zone
		✓	Mobile units that travel to various locations
		✓	Collection days once or twice per year
2.	Technical Assistance	✓	Best Management Practices pamphlets
		✓	Training building and fire inspectors to recognize abandoned wells and USTs
		✓	Agricultural consultants
		✓	Septic system consultants
		✓	Training for commercial and industrial facilities
3.	Land Acquisition	✓	Donation
		✓	Land exchange
		✓	Land purchase
		✓	Purchase and lease back
4.	Cluster Development	✓	Encourage development in less sensitive areas
		✓	Encourage development where sewer extension is planned
5.	Stormwater and Sewage Control	✓	Integrated Water Management Plan
		✓	Design standards for drainage systems and catch basins
		✓	Regular inspection and maintenance
		✓	Upgrading and replacement
		✓	Testing of stormwater and sewage discharges
		✓	Permitting of stormwater and sewage discharges
		✓	Containment and treatment of discharges
		✓	Subdivision controls
		✓	Prohibit dry wells and infiltration trenches
6.	Septic System Controls	✓	Educational programs
		✓	Technical assistance
		✓	Water conservation
		✓	Siting control
		✓	Prohibition in sensitive areas
		✓	Minimum lot size requirements
		✓	Design control
		✓	Restrict use by industry
		✓	Extend sewer system
		✓	Use holding tanks
		✓	Operational permits
		✓	Regular inspection program and maintenance program
		✓	Inspection prior to property transfer
		✓	Ban cleaners with organic solvents

EXAMPLES OF GROUNDWATER PROTECTION MEASURES

13.	Groundwater Quality Guidelines /Regulations	✓	Non-degradation policy
		✓	Limited degradation policy
14.	Zoning	✓	Overlay zones
		✓	Prohibition of hazardous materials
		✓	Prohibition of land uses
		✓	Aquifer-wide protection area
		✓	Protection area around a well field
		✓	Large-lot zoning
15.	Facility Siting, Design and Operation Controls	✓	Best management plan
		✓	Siting Restrictions
		✓	Design and construction standards (i.e., secondary containment)
		✓	Operating standards
		✓	Permitting and licensing
		✓	Regular inspection and maintenance
		✓	Contingency plan
16.	Hazardous Materials Restrictions	✓	Control type and quantity of hazardous materials
		✓	Registration and tracking controls (i.e. business license renewal process)
		✓	Storage and handling controls
		✓	Disposal controls
17.	Underground Storage Tanks and Pipelines	✓	Operations standards
		✓	Secondary containment
		✓	Pressure testing
		✓	Groundwater Monitoring
		✓	Permitting
		✓	Fees
		✓	Prohibition in sensitive areas
18.	Above-ground Storage Tanks	✓	Operations standards
		✓	Secondary containment
		✓	Pressure testing
		✓	Groundwater Monitoring
		✓	Permitting
		✓	Fees
		✓	Prohibition in sensitive areas

EXAMPLES OF GROUNDWATER PROTECTION MEASURES

19.	Sand and Gravel Mining	✓	Security requirements
		✓	Drainage control
		✓	Mining restrictions
		✓	Prohibition in sensitive areas
20.	Inspection and Compliance	✓	Fire Inspectors

Adapted from (Environment Canada, 1995) Table 10: Detailed Summary of Groundwater Protection Measures