

Our File/N/Réf.                    49-99-2015-B  
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DATE                                    24 July 2000

TO/DEST.                            The Chair and Members of Council

FROM/EXP.                         Director, Engineering Division  
   Environment and Transportation Department

SUBJECT/OBJET                    **PRESSURE ZONE 2C/1E WATER SYSTEM RELIABILITY AND  
FUNCTIONAL DESIGN STUDY**

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SUMMARY

The purpose of this information memorandum is to brief Council on the status of the recently completed functional design for the Pressure Zones 2C and 1E Reliability Study. Having identified a preferred solution and successfully completed the requirements of a Schedule 'B' project under the provincial Class EA process for municipal water and wastewater projects, and with no major issues having been raised by the public or key stakeholders, staff intend to proceed with the filing of the Environmental Screening Report for the required 30 day public review period as of 11 August 2000. Should no bump-up requests be received within the 30 day notice period, the project will be deemed approved and will proceed to the pre-design phase for the proposed 914 mm watermain link between the Hurdman Bridge and Billings Bridge Pumping Stations.

The objectives of the Pressure Zone 2C/1E Water System Reliability Functional Design Study were as follows:

- Review and develop appropriate service levels to be considered for a reliability and risk assessment;
- Review a broad range of alternatives considering the specific local opportunities and constraints for additional infrastructure, the on-going changes to the water system. Day-to day and emergency operational considerations would also be given a high priority in the development of the preferred option;
- Address the Environmental Assessment requirements for the recommended alternative, at both the Provincial and Federal levels.

Information Previously Distributed

To be listed on Planning and Environment  
Committee Agenda of 08 August 2000

On 21 September 1999, Corporate Services and Economic Development Committee approved the appointment of Ainley Graham and Associates Limited, Gloucester, to undertake the Pressure Zone 2C/1E Water System Reliability Functional Design Study.

The results of the study and evaluation of alternatives confirmed that the preferred solution is the Billings Bridge to Hurdman Bridge Pumping Station Interconnect Pipe. The interconnect pipe is to be routed along a portion of the transitway near Hurdman Bridge, Old Riverside Drive, behind the Riverside Hospital, and along Riverside Drive to Bank Street. The route requires a crossing of Sawmill Creek at Riverside Drive. A future crossing of the Rideau River is proposed by the year 2021 for added reliability under future development conditions. This alternative scored higher than the other alternatives, both before and after costs were considered.

## BACKGROUND

### Water Distribution System Reliability

The Region of Ottawa-Carleton's water distribution system provides a high level of service to all customers, from both a water quality and a water supply viewpoint. In 1997, the Water Master Plan (WMP) was completed in support of the 1997 update to the Regional Official Plan and identified future water facility and capital infrastructure needs to the year 2021.

The WMP recognized that providing facilities to alleviate the impacts of major water distribution system failures is an important component in providing an adequate level of service to its customers. An adequate level of service, as defined in the WMP, considers the provision of secondary sources to maintain water supply in the event of a major system failure. The need for these facilities considers that, although the frequency of major failures is expected to be low, the impacts on a large number of customers can be high, and that, under emergency conditions, the system should still be capable of meeting the customers 'basic needs'.

### Pressure Zone 2C and 1E Reliability

The 2C and 1E Pressure Zones are illustrated in the attached 'Figure 1' and essentially supply water to the entire service area east and southeast of the Rideau River (i.e. Ottawa east and southeast, Gloucester and Cumberland). Each pressure zone is fed through single supply pipes and single pump stations (the Billings Bridge and Hurdman Bridge Pump Stations for the 2C and 1E zones respectively) with no major looping currently in place. The individual pipes supplying each pressure zone pass under the environmentally sensitive Rideau River and Rideau Canal, significantly increasing the repair time for these feeder mains.

Should a break occur on one of these main feeds, especially along the river crossing, water supply could be disrupted for a prolonged period of time, and to a large number of customers (approximately 100,000 persons reside in Zone 2C and another 200,000 in Zone 1E). Added reliability to these zones

is deemed essential since they have high populations and service major medical facilities and key industrial and commercial developments.

A watermain link between the Billings Bridge and Hurdman Bridge Pumping Stations (hereafter referred to as the Billings-Hurdman Interconnect) was identified in the WMP as a requirement for enhancing the reliability of water supply to Zones 2C and 1E. The WMP also identified a need to upgrade the Hurdman Bridge Pumping Station (PS) in 2001 in order to provide the necessary reliability to Zone 2C via the proposed interconnect. An upgrade to the Billings Bridge Pumping Station (PS) has also been identified (outside of the WMP) and was included in the 1996 Capital Budget.

Because the WMP was conducted at a high level, it was not possible at the time to complete the development and assessment of a large number of alternatives and options for each recommendation. It was understood that more detailed investigations would be required prior to implementing the individual recommendations. This study has thus considered a wide range of potential options and routing alternatives to enhance the reliability of water supply to Zones 2C and 1E.

## DISCUSSION

### Value Engineering

Within the scope of this study, the Region of Ottawa-Carleton undertook a formal Value Engineering Workshop in order to:

- Provide a framework to establish reliability criteria for the 2C and 1E pressure zones and the Regional water distribution system in general;
- Define a feasible set of options for providing added reliability to Zones 2C and 1E in both the short and long terms.
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The Value Engineering (VE) analysis, conducted as part of this study, identified and ranked major failure scenarios in terms of severity and probability of occurrence. The assessment then suggested the most feasible approaches to providing redundant water supplies in the event of high and medium priority failure scenarios. The failure scenarios were defined as follows:

#### High Priority for Zones 2C/1E

- 1) Single pipe break in large diameter river/canal crossing to pumping station
- 2) Single pipe break in large diameter supply line to pumping station
- 3) Valve failure in large diameter feeder mains

#### Medium Priority for Zones 2C/1E

- 4) Complete pump station failure
- 5) Single pipe break in large diameter discharge line from pump station

## Feasible Alternatives

The foregoing preliminary analysis and options screening suggested that the most feasible approaches to providing added reliability to Pressure Zones 2C and 1E were:

High Priority Failures (river crossing break, major supply pipe break, valve failure):

- Billings-Hurdman Interconnect:  
Construct a 760 mm or 914 mm watermain from the Billings Bridge to Hurdman Bridge Pump Stations (size to be confirmed as part of the study); or;
- Twin Major River Crossings and Overland Piping:  
Construct a 610 mm watermain from the Billings Bridge PS across the Rideau River and Rideau Canal to the existing 1042 mm/406 mm watermains at Carling & Booth (alternative routes and connection point to be investigated), and construct a 610 mm watermain from the Hurdman Bridge PS across the Rideau River and Rideau Canal to the existing 1220 mm/406 mm watermains at O'Connor and Highway 417 (alternative routes and connection points to be investigated).

Medium Priority Failures (complete pump station failure):

- Add Zone 2C Pumping Capability in the event of a complete failure of the Billings Bridge Pumping Station:  
Integrate additional pumping to Zone 2C in the final design to provide redundancy in the event of a total failure of the Billings Bridge PS, either through the addition of Zone 2C pump(s) in the Hurdman Bridge PS or with the integration of by-pass pumping at the Billings Bridge PS itself.

A wide range of routing options for the above approaches were investigated and evaluated as part of the study and Environmental Assessment.

## Evaluation of Alternatives

The evaluation of the alternatives was based on the set of criteria initially developed as part of the Region's Transportation, Water and Wastewater Master Plans. These were subsequently modified to reflect recent evaluations undertaken by the Region on two local projects (Conroy Road Elevated Tank and the Smyth-Kilborn Watermain). The Steering Committee for this project has further refined the criteria and weighting system used in the assessment to include factors addressing functionality, operational flexibility, stakeholder concerns and constructability issues.

The evaluation criteria used to assess each of the options were delineated into 4 primary categories with the following weights:

- Natural Environment (30%)
- Caring and Healthy Communities (20%)
- Functionality, Operational Flexibility & Constructability (30%)
- Economy (20%)

### Preferred Alternative and Environmental Impacts

The results of the evaluation of alternatives confirmed that the preferred solution is the Billings/Hurdman Interconnect. The interconnect pipe is to be routed along a portion of the transitway near Hurdman Bridge, Old Riverside Drive, behind the Riverside Hospital, and along Riverside Drive to Bank Street. The route requires a crossing of Sawmill Creek at Riverside Drive. A future crossing of the Rideau River is proposed by the year 2021 for added reliability under future development conditions. This alternative scored higher than the other alternatives, both before and after costs were considered.

Construction of almost 4000 m of large (914 mm) diameter watermain will result in short term disruption to the local area, including traffic and Sawmill Creek. Because of the potential for encountering contaminated soils through a major part of the construction area, specific inventories (in the form of a Phase 2 Environmental Site Assessment) will be undertaken prior to construction. Conventional approaches to mitigating and minimizing these impacts along with careful monitoring will be applied during construction.

### CONSULTATION

To assist in determining the most appropriate routing for the proposed watermain, review agencies, stakeholders and the public were notified and consulted during the course of this project. A 'Stakeholder Package' was prepared which summarized the principal findings of this study, including the initial environmental inventory of the study area and the evaluation criteria. This document was delivered to the primary stakeholders for their review and comment. Copies of correspondence, meeting notes and discussions with the various groups are provided in the Environmental Screening Report and Functional Design Report (copies available upon request).

A Public Open House was held on 08 June 2000 to present the preliminary assessment and conclusions to those residents who may be impacted by the construction of the interconnect pipe. Prior to the meeting, letters to local Community Associations with an Information Package and Question and Answer were sent. Open House Flyers were included in local newspapers (Ottawa Citizen, Alta Vista News and Vistas). Copies of the public consultation documents, including the Open House Attendance Sheet and Comment Sheets, are provided in the Environmental Screening Report and Functional Design Report.

The following summarizes some of the key input received from these groups with respect to the alternative evaluation and selection:

- City of Ottawa – Alta Vista Drive resurfaced in the past 2 years, so routing along Alta Vista Drive should be avoided.
- UPUCC – Potential for an old hydro sub-station and Ottawa Hydro plant on Old Riverside Drive, which will require further detailed review.
- NCC – Considering selling and/or developing a portion of land north of the transitway near Hurdman Bridge, so new watermain should consider appropriate alignment through this area.

Federal Land Use Approval will be required for any easements, and, given the high potential for contaminated soils, an Environmental Site Assessment (ESA) will also be required.

- NCC - future development is likely to occur in the area west of the Hurdman Bridge PS, which may include grade separation of road accesses.
- RVCA - Potential for construction to affect sensitive and significant fish habitat at confluence of Rideau River and Sawmill Creek with specific concerns addressed through additional fish habitat studies, in conjunction with the CEAA (the RVCA noted that recent works upstream in the Sawmill Creek required fish habitat compensation in the lower reach of the creek and that the stream area around Riverside Drive had been restored following construction activities in the upper part of the creek).
- RVCA – The 1:100 year flood levels may approach Old Riverside Drive.
- Riverside Hospital – Considering expanding garage facilities on north or south side of hospital, parking modifications and building refurbishment, so co-ordination with hospital required prior to final design. The area north and west of the building is currently being monitored for methane gas and should be avoided.

## ENVIRONMENTAL ASSESSMENT

The above project is planned under Schedule 'B' of the Class Environmental Assessment (EA) process for Municipal Water & Wastewater Projects. Given the potential to impact Federally-owned lands (NCC lands), the National Capital Act requires that the proponent must submit an application to the NCC for approval. A key part of the Federal approval process is the completion of an Environmental Screening Report in compliance with the Canadian Environmental Assessment Act (CEAA). The study and accompanying reports are intended to satisfy the Provincial Environmental Assessment requirements and provide the basis for completing the Federal Environmental Assessment process. Additional investigative work will be required at the pre-design stage of this project in order to complete the Environmental Site Assessment to fully satisfy the requirements of the Federal EA process.

The entire project has been summarized in an Environmental Screening Report, and subject to its acceptance following the 30 day public filing and review period, the Provincial Class EA requirements will have been satisfied.

At this time, the Provincial and Federal EA's will deal directly with the infrastructure to be constructed in the near term. The future needs for the second Rideau River crossing to Zone 1E (construction in approximately the year 2021) will also require, at a minimum, a Schedule 'B' Class EA to be completed at that time.

## CONCLUSION

Based on the findings of the Zone 2C/1E Reliability and Functional Design Study, staff recommends five major infrastructure components to provide the long term solution for enhancing the reliability of water supply to Pressure Zones 2C and 1E as follows:

### Immediate

- A 914 mm (36") diameter interconnect pipe (watermain) from the Hurdman Bridge PS south and west along the access road to the pump station, along a portion of the Transitway, along Old Riverside Drive to Smyth Road, south of the Riverside Hospital, along Billings Avenue and then along Riverside Drive and under Sawmill Creek to the Billings Bridge Pump Station west of Bank Street.
- One small circulation pump unit (minimum 5-6 ML/d) at the Hurdman Bridge PS to convey water through the proposed 914 mm watermain directly into Zone 2C.

### Future

- One additional large pump unit (approximately 60ML/d) at the Hurdman Bridge PS - this may be installed immediately if desired by the Region.
- Upgrades to the existing internal water distribution system in Zone 1W feeding the Billings Bridge PS on Grosvenor, Lyon, Riverdale and Main Streets and feeding the Hurdman Bridge PS on Chapel, Mann, King Edward and Wilbrod Avenues. This will be completed within the scope of the on-going water distribution system rehabilitation programme.
- A 914 mm diameter Rideau River crossing to the Hurdman Bridge PS from Lees and Chapel Avenues in 2021 or shortly thereafter.

Estimated costs for the above project components are summarized in the attached 'Table 1'. The total costs for the project are \$8,910,000 of which \$6,600,000 are anticipated within the 10 year Capital Forecast. The Water Master Plan, by comparison, had estimated a total project cost of \$9,345,000 for the current 10 year forecast as reflected in the 2000 Capital Budget projects 900185 (Hurdman Bridge PS to Billings Bridge PS Link) and 900175 (Hurdman Bridge Pumping Station).

Staff have now proceeded with the advertisement of the Notice of Completion and the filing of the Environmental Screening Report in order to satisfy the requirements for completion of a Schedule 'B' project under the Provincial Class EA process for municipal water and wastewater projects. Should no bump-up requests be received within the 30 day notice period, the project will be deemed approved and will proceed to the design and construction phases.

*Approved by*  
*J. Miller, P.Eng.*

JM/ac

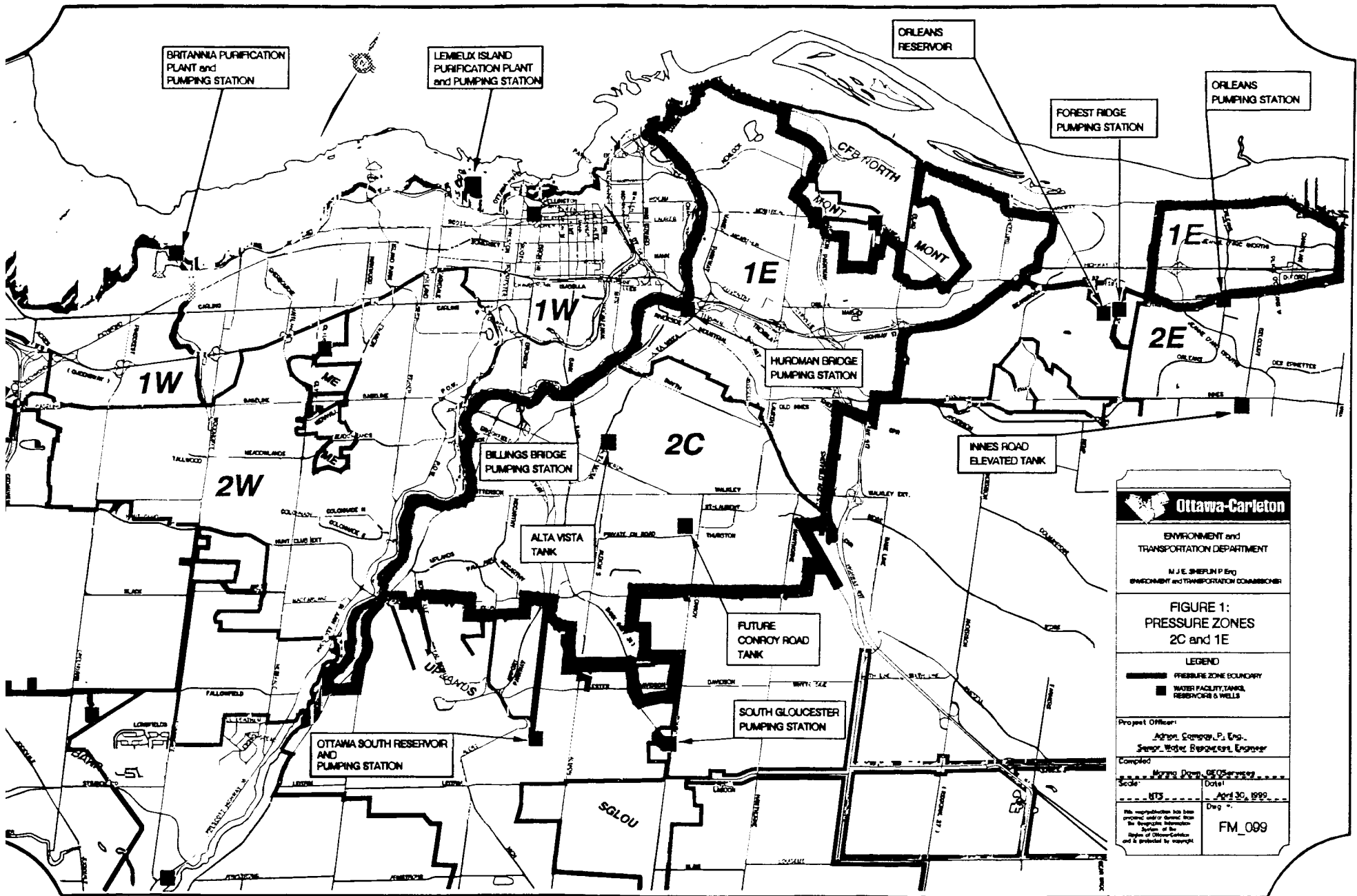
Attach. ( 2 )

**Table 1: Summary of Project Recommendations and Associated Costs**

<b>Project Component</b>	<b>Cost (\$)</b>
<b>IMMEDIATE NEEDS (2001)</b>	
Construct 3930 m of 914 mm interconnect pipe along Old Riverside Drive (Suction/discharge of Billings Bridge PS to suction/discharge of Hurdman Bridge PS)	\$ 5,650,000
Install one small distribution pump (Zone 2C) at the Hurdman Bridge PS and header & suction modifications (minimum 5-6 ML/d to run continuously for water quality purposes)	\$ 225,000
<b>Sub-Total</b>	<b>\$ 5,875,000</b>
<b>FUTURE NEEDS – in conjunction with Watermain Rehabilitation Programme</b>	
By approximately 2011: Up-size two secondary supply pipes in Zone 1W to Zone 2C (*) (based on up-sizing cost only from 305 to 406mm on Lyon & Main – 4980m)	\$ 200,000
Before 2021: Up-size single secondary supply pipes in Zone 1W to Zone 1E (*) (based on up-sizing cost only from 610 to 760mm on King Edward – 2560m)	\$ 150,000
<b>Sub-Total</b>	<b>\$ 350,000</b>
<b>FUTURE NEEDS - to enhance service level when desired to deal with Medium Priority Failure Scenario</b>	
Install one additional Zone 2C pump at the Hurdman Bridge PS (approximately 60ML/d capacity for complete failure of Billings Bridge PS only)	\$ 375,000
<b>FUTURE NEEDS - after 2021</b>	
Add 2 <sup>nd</sup> 760 mm Rideau River crossing and overland piping to Hurdman Bridge Pumping Station (from Lees Ave/Queensway to PS)	\$ 2,310,000
<b>TOTAL PROJECT COST:</b>	<b>\$ 8,910,000</b>

(\*) *Up-size costs include additional cost only for up-sizing pipes in conjunction with the Region's Watermain Rehabilitation programme.*





<b>Ottawa-Carleton</b>	
ENVIRONMENT and TRANSPORTATION DEPARTMENT	
M. J. E. SHERWIN P. Eng. ENVIRONMENT and TRANSPORTATION COMMISSIONER	
<b>FIGURE 1: PRESSURE ZONES 2C and 1E</b>	
<b>LEGEND</b>	
PRESSURE ZONE BOUNDARY	
WATER FACILITY, TANK, RESERVOIR & WELLS	
Project Officer:	
Adrian Compton, P. Eng., Senior Water Resources Engineer	
Completed:	
M. J. E. SHERWIN P. Eng.	
Scale:	Date:
N.T.S.	April 30, 1990
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