TOWNSHIP [illegible] RIDGE

[illegible] ENVIRONMENTAL ASSESSMENT

[illegible] ENVIRONMENTAL STUDY REPORT

[illegible] STUDY

[illegible] THE

[illegible] Y OF FOREST PARK

[illegible] PROJECT [illegible] 51-01

AUGUST, 1995

McNEELY
ENGINEERING
CONSULTANTS LTD.

McNEELY ENGINEERING CONSULTANTS LTD.

August 31, 1995
File Ref: M-2963-011

South Nation River Conservation Authority
P.O. Box 69
15 Union Street
Berwick, Ontario
K0C 1G0

Attention: Leslie Vanclief
Water Quality Coordinator

Reference: Township of Cambridge
Water Supply for the Community of Forest Park
Class Environmental Assessment

Dear Ms. Vanclief,

Responding to your letter of August 15, 1995 and your request to be notified of future developments in the Class EA process, please find a copy of the Environmental Study Report for your information

Please call if you have any questions.

Yours very truly,

McNeely Engineering Consultants Ltd.

M. J. Zagorski

M.J. Zagorski, P.Eng.
Project Manager

MJZ/

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TOWNSHIP OF CAMBRIDGE

CLASS ENVIRONMENTAL ASSESSMENT

ENVIRONMENTAL STUDY REPORT

WATER SUPPLY STUDY

FOR THE

COMMUNITY OF FOREST PARK

O.C.W.A. PROJECT No. 7-0351-01

AUGUST, 1995

PREPARED BY:

McNEELY ENGINEERING CONSULTANTS LTD
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ORLEANS, ONTARIO
K1C 1T1
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EXECUTIVE SUMMARY

BACKGROUND INFORMATION

This Executive Summary summarizes the information contained in the Preliminary Environmental Study Report for the Community of Forest Park Water Supply Study. This water supply study was initiated in 1994 for the community of Forest Park by the Township of Cambridge in accordance with the 1993 Municipal Class Environmental Assessment (Class EA) Process for Municipal Water and Wastewater projects and is being planned as a Schedule C activity. The Class EA is a streamlined process vis-à vis the Environmental Assessment Act and includes an extensive public and governmental review agency consultation process.

Forest Park, a community of approximately 508 people, is located in the Township of Cambridge approximately 25 km east of Ottawa between the Villages of Casselman and Embrun. Many residents commute daily to places of employment located primarily in the Regional Municipality of Ottawa-Carleton. The community is serviced by communal water and private sewage systems.

The water supply and distribution system consists of two drilled wells, a well pumphouse, an underground storage reservoir, complete with a pumphouse structure and a distribution network of 150 mm diameter watermains and provides water to about 163 dwellings and an elementary public school.

The existing system has been operated and maintained by the Township of Cambridge since the early 1980's when the Township took over the water works from the original developer of the community.

Increasing demand on the system and a constant deterioration of raw groundwater quality has made it increasingly difficult for the Township to provide good quality water meeting the Provincial objectives to the residents of the Forest Park community.

In June, 1990, the Township of Cambridge submitted an application for funding to the Ministry of the Environment and Energy. This application was for a study to upgrade the existing water quality by finding a new water source or upgrading the existing treatment.

After a lengthy approval process a decision was made to proceed with a water supply study under a Class Environmental Assessment with the Province of Ontario providing financial assistance to the Township of Cambridge through Ontario Clean Water Agency (OCWA).

Completion of the Phases 1 and 2 Preliminary Report has confirmed that the preferred solution will be a Schedule C activity and that an Environmental Study Report (ESR) will be required.

PROBLEM IDENTIFICATION

The following deficiencies with the current water system were identified in Phase 1 of this study:

- poor water quality which does not meet Ministry of Environment and Energy's Ontario Drinking Water Objectives;
- inability of the community to grow and develop existing approved lots; and,
- deterioration and increased maintenance of water works facilities resulting in increased costs to homeowners.

SUMMARY AND EVALUATION OF ALTERNATIVE SOLUTIONS

Several alternative solutions were investigated to address the identified problems with the Forest Park water supply system.

These alternatives are divided into two categories:

The first category includes alternatives that restrict growth and offer no or only partial solutions to the identified problems. This group includes alternatives such as:

- "do nothing";
- limit community growth;
- upgrade existing system;
- a combination of communal and private systems.

None of the above alternatives offer a long term, reliable solution to the existing water quality problem.

The second category includes alternatives that provide good quality water to the existing dwellings and allow for future growth in the community. This group includes alternatives such as:

- construction of a new water treatment plant (surface supply);
- connection to an "area type" water supply system;
- obtaining water from Limoges; and,
- development of a new well field.

During discussion at Liaison Committee Meetings and with the Forest Park Community Association it was established that the preferred solution should not only resolve poor water quality but also allow for future community growth as per the existing approved Official Development Plan. All alternatives from the second category would meet those criteria, however, due to the complex treatment requirements and distance from surface water sources, the construction of a surface water treatment plant is too costly to implement for the Forest Park Community. The existing population density in Cambridge Township and adjacent municipalities

does not warrant the development of an "Area Type" water supply system in the foreseeable future. Thus, the alternatives of obtaining water from Limoges or development of new wells appear to be the only technically and economically feasible alternatives for a Forest Park water supply.

SELECTION OF RECOMMENDED ALTERNATIVES

As explained above, two alternatives are selected for further evaluation. They are:

- obtaining water from Limoges, and
- developing of a new groundwater supply.

The recommended alternative solution should provide good quality and quantity of water for the projected 20-year design population of 1,000 people, without posing severe financial burden on either the existing community or future development.

Alternative A - Obtaining Water from Limoges

The Village of Limoges is located about 4.0 km north - west of the Forest Park development, just north of Highway 417 along County Road No. 5. The Township of Cambridge is currently proceeding with a Class Environmental Assessment for the provision of a new water supply system to serve the Village of Limoges. The Phase 2 Report of the Class EA recently completed by Lecompte Engineering Ltd. recommends the construction of a communal water supply system for the Village using groundwater as the raw water supply source, together with water treatment and storage. Because of the proximity of Limoges to Forest Park, the provision of water from Limoges appears to be economically and technically feasible. Oversizing of the proposed Limoges water works together with the construction of a feedermain will be required to accommodate the Forest Park Community.

Alternative B - Develop New Wells

The development of a new well field having an acceptable quality and quantity of ground water could be a viable alternative to solve water problems in the Forest Park Community. In July, 1993 Jacques Whitford Environmental Limited was retained to carry out the hydrogeologic investigations necessary to locate an adequate groundwater source. The investigation concluded that there is good quality groundwater near Route 400 about 3 km north of Forest Park and that a minimum of three production wells would be required to meet the projected 20-year water demand.

The hydrogeological report also recommended that a multi-well pump test be conducted to determine interference effects and the long term safe yield of the system. The recommended 72 hour multi-well pump test was conducted in June 1995. The results indicated that a projected maximum safe yield of 4.5 l/s was attainable, which is well below the 12 l/s design flow required to accommodate future development. This testing included water quality sampling which revealed the groundwater was not as good quality as previously believed, however, it was still within treatable limits.

PREFERRED SOLUTION & RECOMMENDED WORKS

The Phase 1 and 2 report concluded that "Obtaining Water from Limoges" was the preferred solution to correct the water quality problems with the existing Forest Park Supply System and to allow for housing development in the community. After reviewing comments from the public and review agencies, the Township of Cambridge Council passed a resolution officially endorsing the Limoges option and instructing Lecompte Engineering Ltd. to include the Forest Park Community in the proposed service area for the communal water supply for the Village of Limoges and to make all the necessary changes in the proposed works.

The following recommended design concept is based on Phase 3 Class EA draft report for the Village of Limoges proposed water supply prepared by Lecompte Engineering Ltd. and proposed transmission watermain line from Limoges to the Forest Park reservoir.

- Two production wells and a well pumping station located in Part Lot 21, Con. VII, Township of Russell, (Russland Road west of Dunning Road).

- A 250 mm dia connecting raw watermain, approximately 5.2 km long, between the well pumping station and the water treatment plant.

- A water treatment plant located on the east side of Limoges immediately south of the new St-Viateur school.

- Oversizing of watermain on Limoges Road between Des Pins and the south Village limits (530 m).

- Transmission low pressure watermain between south limit of Village of Limoges and storage reservoir and pumphouse in the Forest Park.

- Upgrading of existing pumphouse.

- Installation of water meters at each house to promote water efficiency.

FINANCIAL IMPLICATIONS

The capital cost estimate for this project, including the cost for oversizing of the Limoges Water Works to feed Forest Park is estimated at **$2,500,000.**

An application for provincial funding to cover **$2,125,000** (85%) of capital cost will be made to the Ontario Clean Water Agency. The capital funding rate is 85% which is the maximum permissible rate according to present regulations. The grant, however, may be lower (i.e. 70%). The balance **$375,000** (15%) will be levied on the existing houses, the Cambridge Elementary School and 40 approved building lots, resulting in an average charge per household of approximately **$1,700**, if the level of subsidy is lower, the net lot charge would increase. The same lot charges will also be levied on all new development and recovered money will be allocated to the future Capital Reserve Fund.

The annual operating and maintenance cost, including a repair and maintenance reserve fund, is expected to rise from the current **$205** per household to approximately **$320.**

RÉSUMÉ

RENSEIGNEMENTS GÉNÉRAUX

Le présent document résume l'information contenue dans le Rapport préliminaire de l'étude environnementale sur l'approvisionnement en eau de la localité de Forest Park. Cette étude sur l'approvisionnement en eau pour la localité de Forest Park a été amorcée en 1994 par le canton de Cambridge conformément au processus de planification d'une évaluation environnementale de portée générale pour les ouvrages d'eau et d'égouts municipaux de 1993 et ce projet est planifié selon les exigences de la Cédule "C". L'évaluation environnementale de portée générale est un processus rationalisé destiné à respecter la Loi sur les évaluations environnementales et comporte une consultation approfondie auprès d'agences d'examen gouvernementales et du public.

Forest Park, une collectivité de 508 personnes, est situé dans le canton de Cambridge, à environ 25 km à l'est d'Ottawa entre les villages de Casselman et d'Embrun. Un bon nombre de résidants font quotidiennement la navette entre le domicile et le lieu de travail situé principalement dans la Municipalité régionale d'Ottawa-Carleton. La localité a accès à un système communautaire d'approvisionnement en eau et des systèmes d'égout privés.

Le système d'approvisionnement et de distribution d'eau consiste en deux puits forés, une pompe pour puits, un réservoir d'entreposage souterrain, complet avec structure de filtration et un réseau de distribution à conduites principales de 150 mm de diamètre; le système fournit de l'eau à 163 habitations et une école élémentaire publique.

Le système actuel est exploité et entretenu par le canton de Cambridge depuis le début des années 1980 alors que le canton a pris charge des ouvrages d'eau jusque là la responsabilité de l'entrepreneur domiciliaire de la localité.

Une demande d'eau accrue et une détérioration constante de la qualité de la nappe d'eau souterraine a rendu de plus en plus difficile pour le canton de fournir, aux résidants de la localité de Forest Park, une eau de bonne qualité qui respecte les objectifs provinciaux.

En juin 1990, le canton de Cambridge a présenté une demande de financement au ministère de l'Environnement et de l'Énergie pour procéder à une étude visant à améliorer la qualité de l'eau, soit en trouvant une nouvelle source d'eau ou en améliorant le système de traitement existant.

Suite à un long processus d'approbation, il a été décidé de procéder à l'étude sur l'approvisionnement en eau en conformité avec l'évaluation environnementale de portée générale; la Province de l'Ontario allait assurer l'aide financière au canton de Cambridge par l'entremise de l'Agence ontarienne des eaux (AOE).

L'achèvement du rapport préliminaire des phases 1 et 2 confirme que la solution privilégiée, une activité de catégorie C, rendra nécessaire la présentation d'un rapport d'étude environnementale.

IDENTIFICATION DU PROBLÈME

La phase 1 de la présente étude du système actuel d'approvisionnement en eau a permis de cerner les lacunes suivantes:

- mauvaise qualité de l'eau qui ne respecte pas les objectifs de qualité d'eau potable en Ontario;

- la collectivité ne peut procéder à l'expansion et développer les terrains sur lesquels la construction a été approuvée; et

- détérioration et entretien accru des ouvrages d'eau qui entraînent une augmentation des coûts pour les propriétaires.

RÉSUMÉ ET ÉVALUATION DES SOLUTIONS DE RECHANGE

Plusieurs solutions de rechange ont été examinées en vue d'aborder les problèmes cernés relatifs au réseau de distribution d'eau de Forest Park.

Ces solutions de rechange sont divisées en deux catégories:

La première catégorie comprend des solutions qui restreignent l'expansion et n'offrent pas de solutions aux problèmes identifiés ou n'offrent que des solutions partielles. Ce groupe comprend des solutions comme:

- «ne rien faire»;
- limiter la croissance de la collectivité;
- améliorer le réseau actuel;
- opter pour une combinaison de systèmes collectif et privé.

Aucune des solutions énumérées ci-dessus n'offre de solution fiable à long terme au problème actuel de qualité de l'eau.

La deuxième catégorie comporte des solutions de rechange qui permettent de fournir de l'eau de bonne qualité aux habitations actuelles et permettent l'expansion future de la collectivité. Ce groupe comprend les solutions de rechange suivantes:

- construire une nouvelle usine de traitement des eaux (approvisionnement de surface);
- raccorder le réseau de distribution à un système d'approvisionnement d'eau de «zone»;
- obtenir de l'eau de Limoges; et
- aménager un nouveau champ de captage.

Au cours des délibérations lors des réunions du comité de liaison et de l'Association de la collectivité de Forest Park, il a été établi que la solution privilégiée devrait non seulement résoudre le problème de la qualité de l'eau mais également permettre l'expansion future de la collectivité conformément au Plan d'aménagement officiel. Toutes les solutions de rechange de la deuxième catégorie respectent ces critères; toutefois, en raison des exigences complexes du traitement des eaux et de la distance qui sépare Forest Park de sources d'eaux de surface, la construction d'une usine de traitement des eaux de surface serait trop coûteuse pour la collectivité de Forest Park. La densité de la population actuelle dans le canton de Cambridge et les municipalités adjacentes ne justifie pas l'aménagement d'un réseau d'approvisionnement en eau de «zone» dans un avenir prévisible. Ainsi, l'obtention d'eau de Limoges ou l'aménagement d'un champ de captage semblent être les seules solutions d'approvisionnement en eau de Forest Park techniquement et économiquement possibles.

SÉLECTION DES SOLUTIONS DE RECHANGE RECOMMANDÉES

Comme il a déjà été expliqué plus haut, deux solutions de rechange ont été retenues pour une évaluation plus poussée:

- obtenir de l'eau de Limoges, et
- aménager un nouvel approvisionnement d'eau de surface.

La solution privilégiée devrait fournir une eau de bonne qualité en quantité suffisante pour desservir une population de 1000 personnes projetée sur 20 ans, sans imposer de fardeau financier important sur la collectivité actuelle ou tout développement à venir.

Solution A - Obtenir de l'eau de Limoges

Le village de Limoges est situé à environ 4,0 km au nord-ouest de Forest Park, juste au nord de la grande route 417, le long de la route de comté n° 5. Le canton de Cambridge procède actuellement à une évaluation environnementale de portée générale pour l'aménagement d'un nouveau système d'approvisionnement d'eau devant desservir le village de Limoges. Le rapport de Phase 2 de l'évaluation environnementale de portée générale complété récemment par Lecompte Engineering Ltd. recommande la construction d'un système collectif d'approvisionnement en eau pour le village utilisant de l'eau de surface comme source d'approvisionnement en eau brute avec traitement et entreposage de l'eau. À cause de la proximité de Limoges à Forest Park, l'approvisionnement en eau à partir de Limoges semble économiquement et techniquement possible. L'agrandissement des ouvrages d'eau proposés pour Limoges ainsi que la construction d'une conduite principale seraient nécessaires pour pouvoir accommoder la collectivité de Forest Park.

Solution B - Aménager un nouveau champ de captage

L'aménagement d'un nouveau champ de captage d'eau de surface de qualité acceptable et en quantité suffisante pourrait être une solution de rechange viable pour résoudre les problèmes d'eau de la localité de Forest Park. En juillet 1993, les services professionnels de Jacques Whitford Environmental Limited ont été retenus pour effectuer l'examen hydrogéologique nécessaire pour localiser une source d'eau de surface adéquate. L'enquête a conclu qu'il existait de l'eau de surface de bonne qualité près de la route 400 à environ 3 km au nord de Forest Park et qu'il faudrait au moins trois puits de production pour répondre aux besoins en eau projeté sur 20 ans.

Le rapport hydrogéologique recommandait également de mener un test de pompage multipuits afin de déterminer les effets d'interférence et le débit de production assuré du système à long terme. Le test de pompage multipuits sur une période de 72 heures a été mené en juin 1995. Les résultats ont indiqué un débit de production assuré maximum de 4,5 l/s ce qui est bien inférieur au débit de 12 l/s jugé nécessaire pour accommoder l'expansion prévue. Ce test comprenait l'échantillonnage de la qualité de l'eau qui a révélé que l'eau de surface n'était pas d'aussi bonne qualité qu'on l'avait d'abord cru; toutefois elle se trouvait quand même à l'intérieur des limites qu'il est possible de traiter.

SOLUTION PRIVILÉGIÉE ET LES TRAVAUX RECOMMANDÉS

Le rapport des phases 1 et 2 a conclu que «obtenir l'eau de Limoges» est la solution privilégiée pour corriger les problèmes relatifs à la qualité de l'eau du système existant d'approvisionnement en eau de Forest Park et tenir compte du développement domiciliaire dans la communauté. Après avoir examiné les commentaires reçus du public et des agences d'examen, le Conseil du canton de Cambridge a adopté une résolution appuyant officiellement l'option de Limoges et demandant à Lecompte Engineering Ltd. d'inclure la collectivité de Forest Park dans le secteur de service proposé pour l'approvisionnement collectif d'eau du village de Limoges et d'apporter toutes les modifications nécessaires aux travaux projetés.

Le concept recommandé qui suit est basé sur l'ébauche du rapport de phase 3 de l'étude environnementale de portée générale pour le projet relatif à l'approvisionnement en eau du village de Limoges préparé par Lecompte Engineering Ltd., et propose une conduite principale de raccordement entre Limoges et le réservoir de Forest Park.

1ière Partie - Partage des Coûts avec Limoges

- Deux puits de production et une station de pompage situés sur une partie du lot 21, concession VII, canton de Russell (chemin Russland à l'ouest du chemin Dunning).

- Une conduite principale de connexion de l'eau à filtrer de 250 mm de diamètre, sur une longueur d'environ 5,2 km, entre la station de pompage du puits et l'usine de traitement de l'eau.

- Une usine de traitement de l'eau située du côté est de Limoges, immédiatement au sud de la nouvelle école St-Viateur.

- Le surdimentionnement de la conduite principale sur le chemin Limoges entre Des Pins et les limites sud du village (530 m).

2[ième] Partie - La Communauté de Forest Park Seulement

- Un raccordement de la conduite principale à faible pression entre la limite sud du village de Limoges et le réservoir d'entreposage, et la station de pompage de Forest Park.

- Amélioration de la station de pompage.

- L'installation de compteurs d'eau à chaque domicile pour encourager une consommation raisonnable d'eau.

LES IMPLICATIONS FINANCIÈRES

Il est prévu que le coût des immobilisations du projet, y compris le surdimentionnement des ouvrages d'eau de Limoges, s'élèvera à 2 500 000 $.

Une demande de financement provincial devant couvrir 2 125 000 $ (85 %) du coût des immobilisations sera présentée à l'Agence ontarienne des eaux. Le taux de financement des immobilisations de 85 % constitue le taux maximum autorisé en vertu des règlements actuels. (La subvention peut être moins élevée (c.-à-d.de 70 %)). La balance,375 000 $ (15 %) sera imposée aux propriétés existantes, à l'école élémentaire de Cambridge et aux 40 terrains sur lesquels il est autorisé de construire, ce qui se traduirait en une redevance moyenne d'environ 1700 $ par ménage. Par contre, si la subvention accordée est moins élevée, la redevance nette par lot augmenterait. Les mêmes redevances seront imposées à tout nouveau développement et l'argent récupéré sera versé au fonds de réserve des investissements futurs.

Il est prévu que le coût annuel d'exploitation et d'entretien, y compris le fonds de réparation et d'entretien, passera de l'actuel 205 $ à environ 320 $ par ménage.

1.0 INTRODUCTION

1.1 PROJECT AREA

Forest Park, a community of approximately 508 persons, is located on Lots 28 and 29 in Concession 6 of the Township of Cambridge on County Road No. 3 of the United Counties of Prescott and Russell. It lies between the Villages of Casselman and Embrun along the County Road No. 3 and is about (1) km east of the intersection of County Roads Nos 3 and 5, as depicted in Figure 1-1. Many residents commute daily to places of employment located in nearby larger centres such as Casselman, Embrun and the Regional Municipality of Ottawa-Carleton.

The residents within the community are serviced by communal water and private sewage systems.

The water works system, as shown in Figure 1-2, consists of two drilled wells, a well pumphouse, an underground storage reservoir, a pumphouse and a distribution network of pipes having 150 mm diameter which provides water to some 185 dwellings. At its inception around 1971, this communal water system was privately owned and operated under the auspices of the developer of the Community. During the early 1980's, the Corporation of the Township of Cambridge took over control of the water works and proceeded to undertake a major upgrading of the distribution network, pumphouses and appurtenances and constructed a reservoir. The Township took over operations and to this day are still managing the day to day operations and maintenance of the water works system.

The current water supply system consists of disinfecting the raw water from an underground aquifer located on part of Lot 29 Concession 7 on a property owned by the Corporation of the Township of Cambridge. The chlorinated water is pumped from the well site to the reservoir before being pumped to the distribution system. The water system has generally been able to supply water without excessive costs to the users. Increasing demand on the system and frequent complaints with respect to water quality has made it more difficult for the Township to provide water that meets the Provincial Guidelines in terms of water quality especially since the raw water has poor chemical characteristics.

The sewage systems are all privately owned and maintained by the residents. In general, the septic systems have been in operation since the original construction of the individual dwellings and have met the expectations of for normal operation of septic systems.

In June 1990, the Township of Cambridge submitted to the Project Priority Evaluation Committee (PPEC) an application for funding to secure approval from the Ministry of the Environment for funding of the replacement of the present water source or treatment of the present water supply either at the source or the individual dwellings. The Province was prepared to approve a project conditional upon the recognition of Forest Park as an official place name in Ontario by the Ontario Geographic Names Board of the Ministry of Natural Resources. This Board, at its 78th meeting on February 28, 1992 proceeded to enter the name of "Forest Park" in the official record.

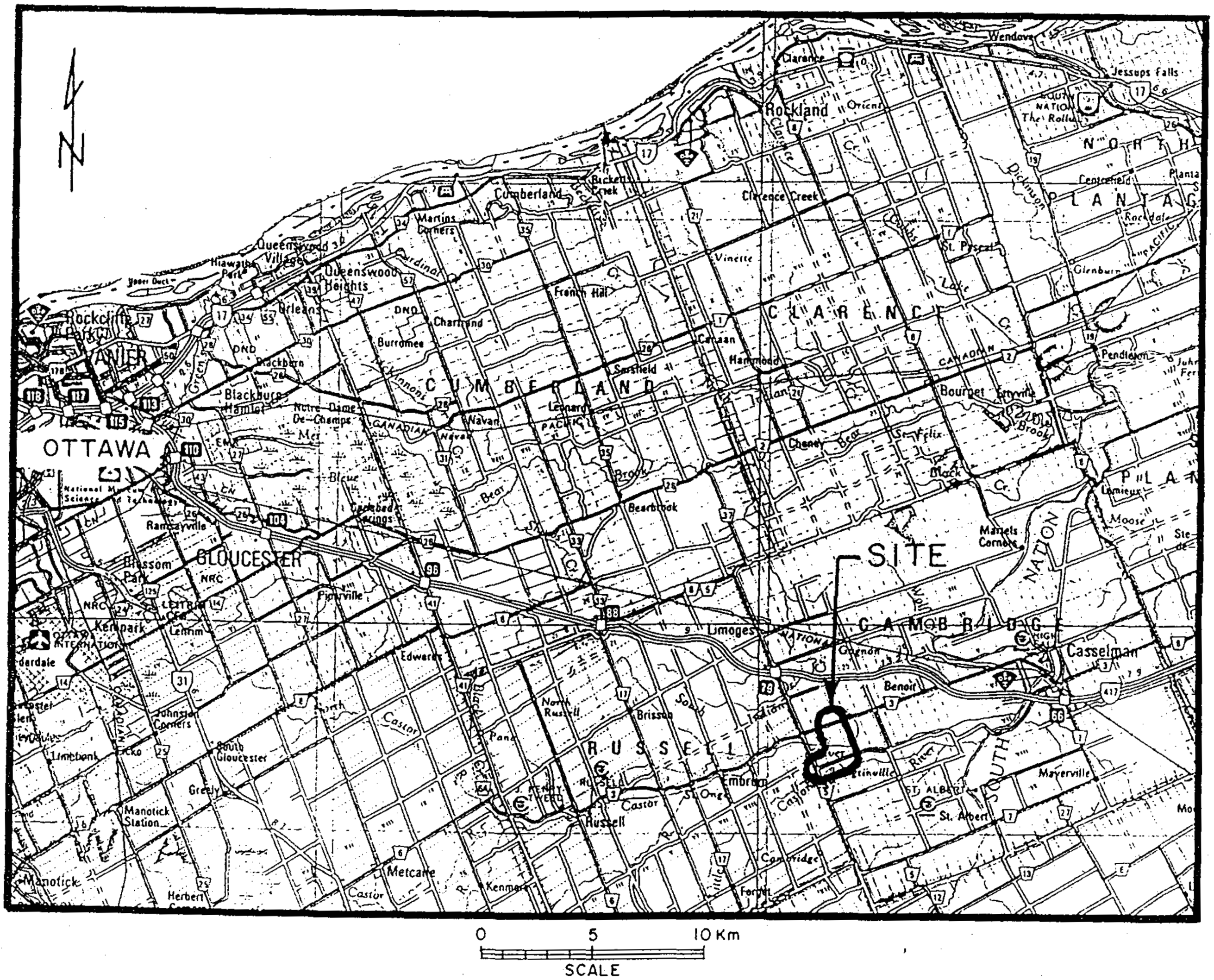
Since the decision have been rendered to proceed under a Class Environmental Assessment (EA) to prepare a Water Supply Study for the Community of Forest Park, pertinent background hydrogeologic data have been thoroughly investigated to ascertain the feasibility of locating a new lower aquifer water source. At this time, sufficient hydrogeologic information has been obtained. The undertaking of this Environmental Assessment process is proceeding as per the recognized procedure of the various "Phases" and "Steps" as outlined in the Municipal Engineers Association (MEA) Class EA for Municipal Water ad Wastewater Projects, June 1993.

1.2 PURPOSE OF THE UNDERTAKING

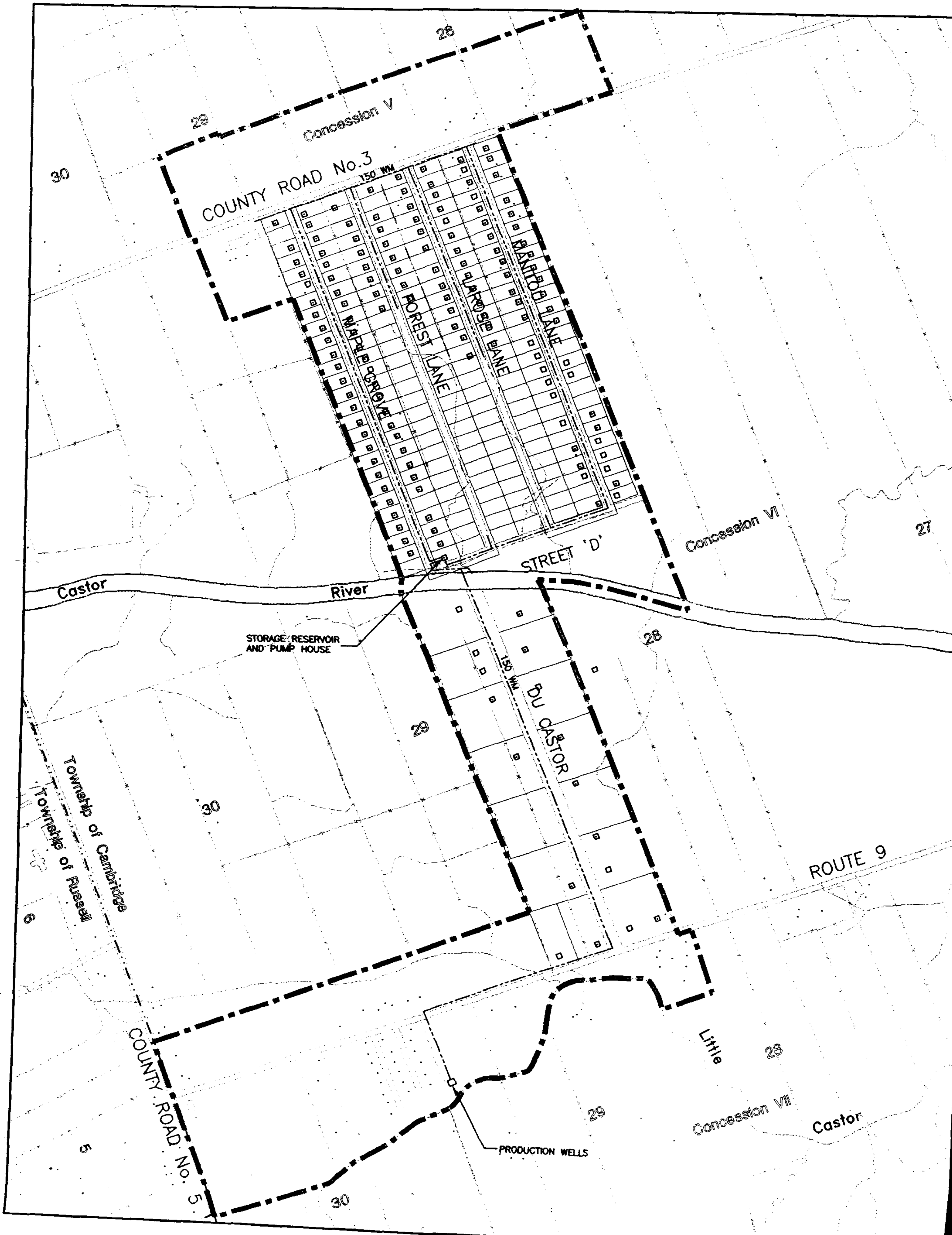
The purpose of the undertaking is to either improve the quality of the present water source or provide an alternative source in order that the water supplied to the residents of Forest Park community meets the Guidelines for Ontario Drinking Water Objectives (ODWO) by the Ministry of Environment and Energy (MOEE). To achieve this purpose, it is necessary to (i) clearly identify the problem(s), (ii) evaluate alternative corrective solution(s), (iii) assess the various environmental impacts of the alternative solution(s), and (iv) determine the preferred solution(s).

The proposed methodology is consistent with the EA process as set out in a document published by the MEA entitled "Class Environmental Assessment for Municipal Water and Wastewater Projects" dated June, 1993. The process, presented herein in Section 2.0, includes a public and review agency consultation process also herein addressed in Section 6.0.

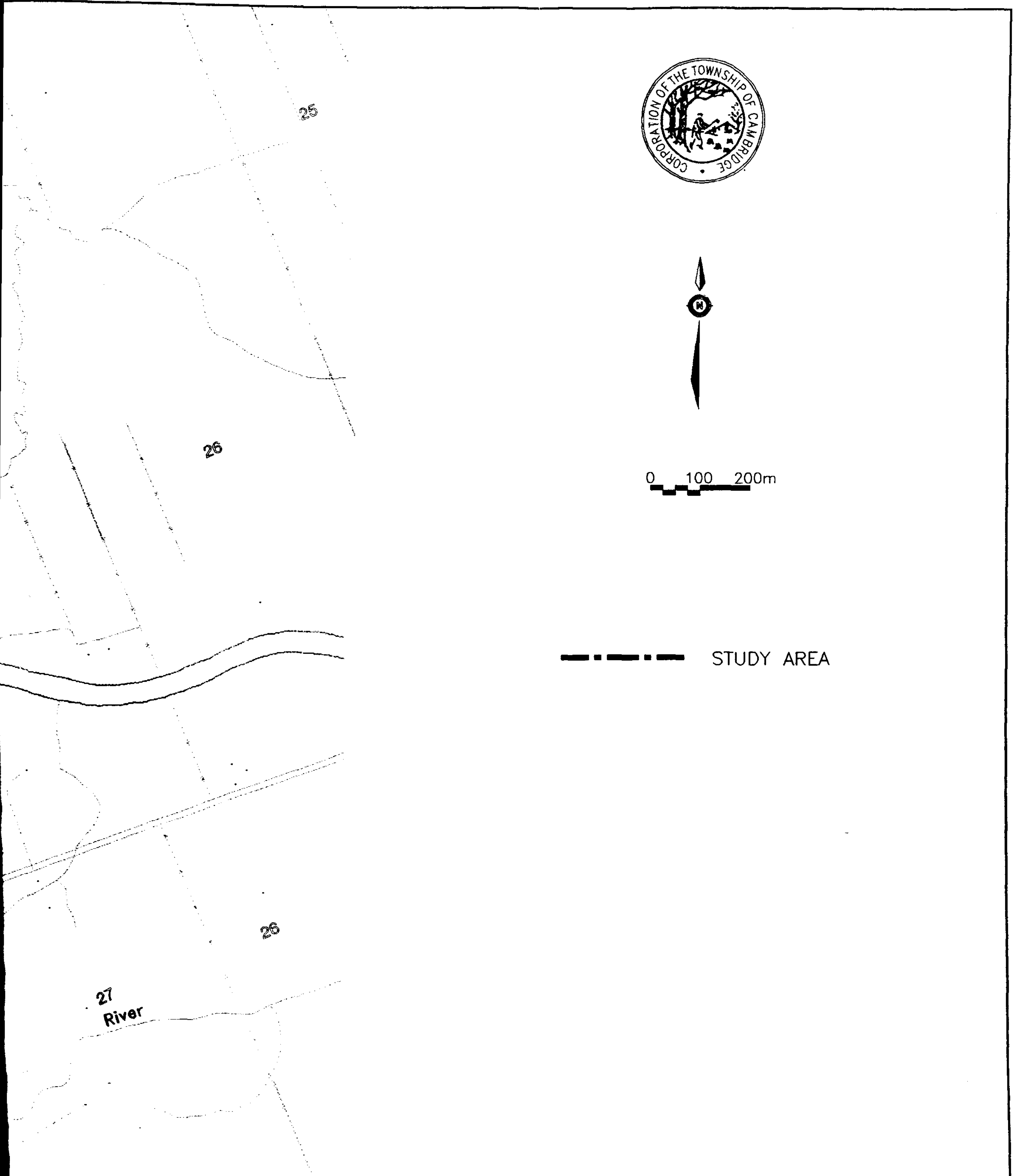
FIGURE 1-1



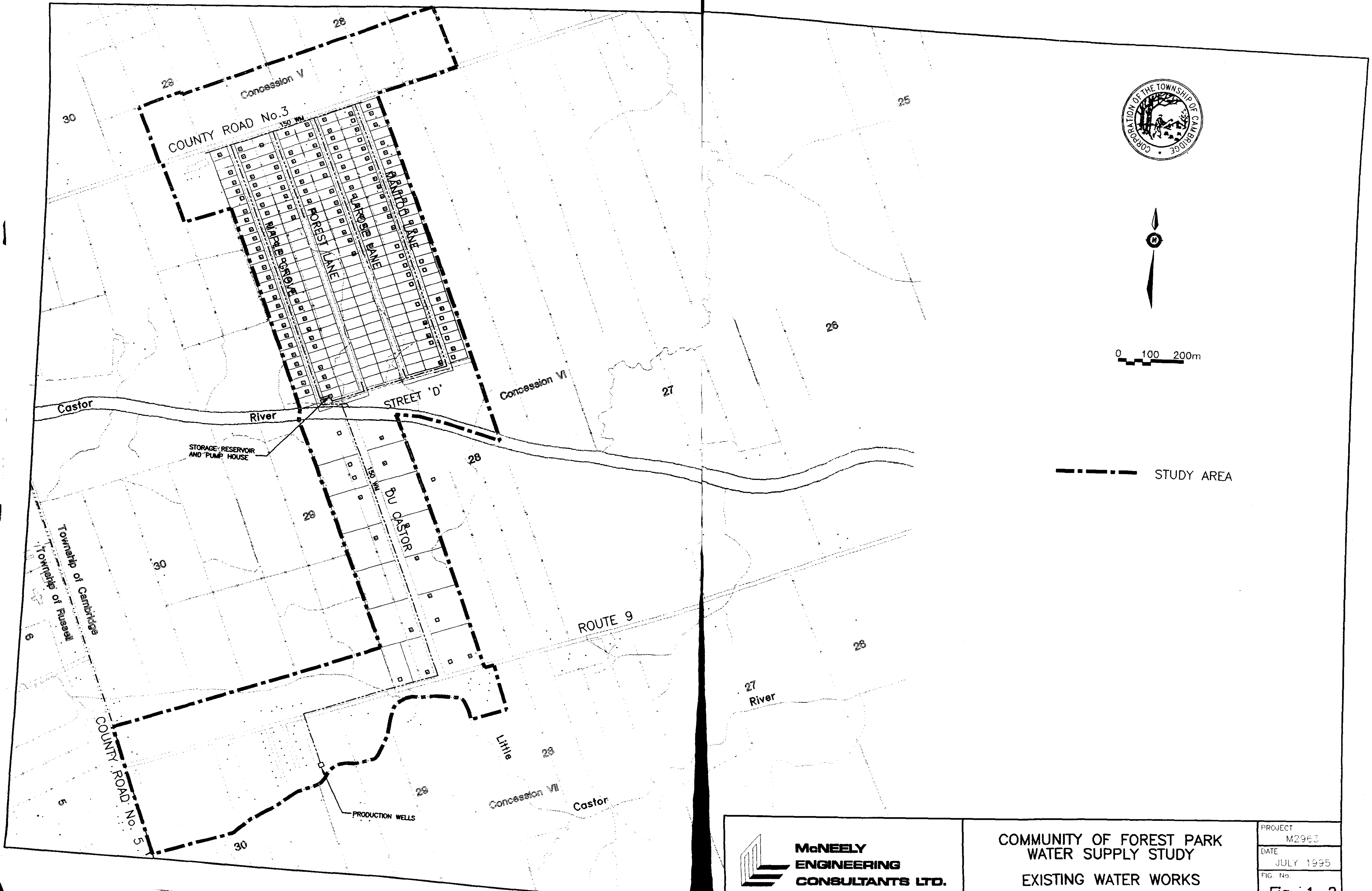
KEY PLAN



28
29
Concession V
30
COUNTY ROAD No.3
150 WM
MAPLE GROVE
FOREST LANE
LAROSE LANE
MANITOU LANE
Concession VI
27
STREET 'D'
Castor
River
STORAGE RESERVOIR
AND PUMP HOUSE
28
150 WM
DU CASTOR
29
Township of Cambridge
Township of Russell
30
ROUTE 9
6
COUNTY ROAD No. 5
Little
28
29
Concession VII
Castor
PRODUCTION WELLS
5
30



McNEELY ENGINEERING CONSULTANTS LTD.	COMMUNITY OF FOREST PARK WATER SUPPLY STUDY EXISTING WATER WORKS	PROJECT M2963 DATE JULY 1995 FIG. No. Fig. 1-2

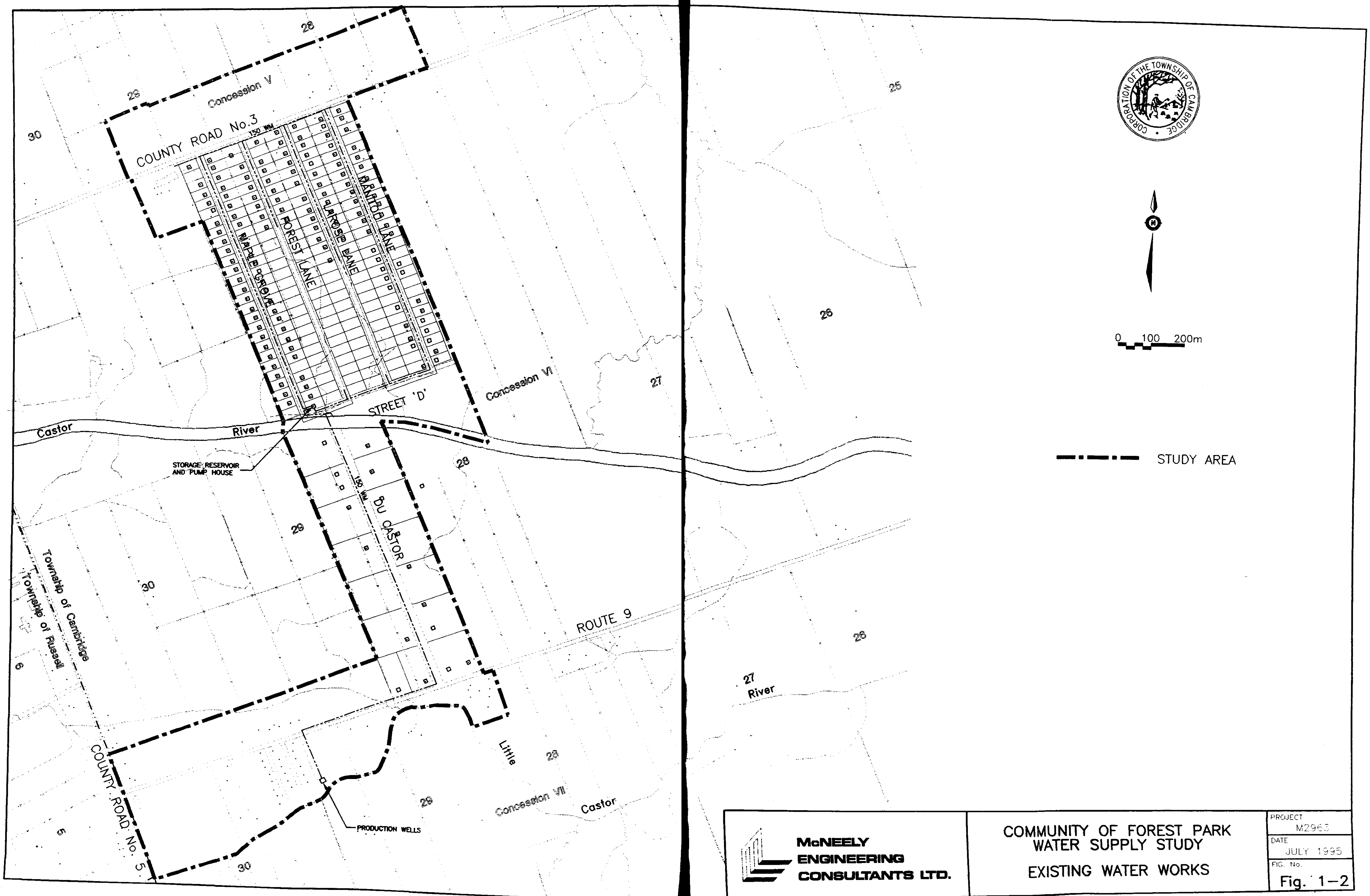


McNEELY ENGINEERING CONSULTANTS LTD.

COMMUNITY OF FOREST PARK
WATER SUPPLY STUDY

EXISTING WATER WORKS

PROJECT	M2963
DATE	JULY 1995
FIG. No.	



McNEELY ENGINEERING CONSULTANTS LTD.

COMMUNITY OF FOREST PARK WATER SUPPLY STUDY

EXISTING WATER WORKS

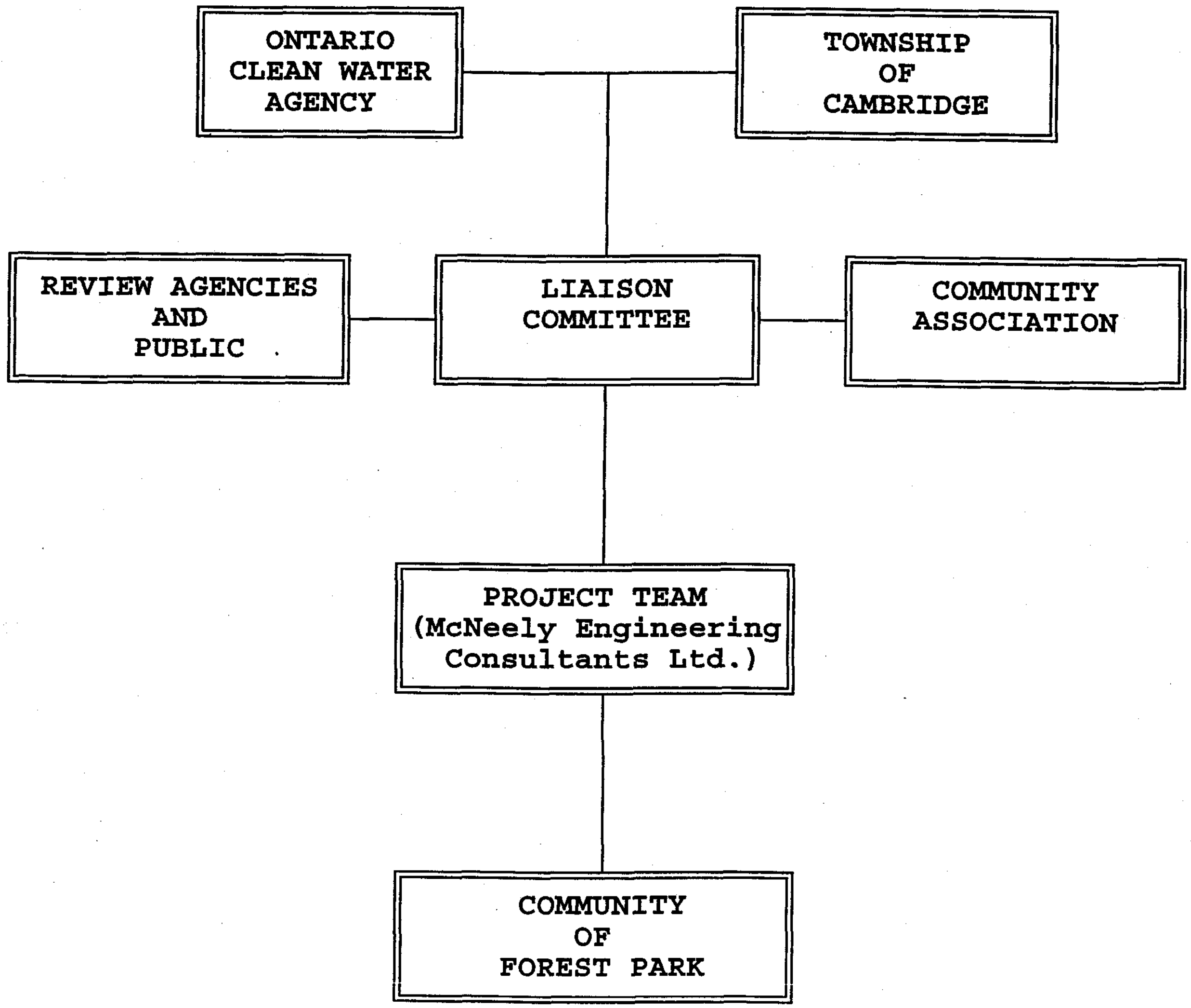
PROJECT	M2963
DATE	JULY 1995
FIG. No.	Fig. 1-2

1.3 PROJECT ORGANIZATION

A successful undertaking requires proper planning so that the end result meets or exceeds the needs of both the Community and the proponent. The project organization that has been established to direct this study is shown in Figure 1-3.

FIGURE 1-3

ORGANIZATIONAL CHART



The main responsibilities of each of the participants is presented in Table 1-1.

TABLE 1-1

ORGANIZATIONAL RESPONSIBILITIES

Ontario Clean Water Agency	• Administer financial assistance • Provides project management services • Coordinate approval process with MOEE • Provides technical input
Township of Cambridge	• Proponent of the undertaking • Assumes responsibility for overall conduct of the study • Decides on the course of action • Operates the water works system
Forest Park Association	• Provides input to proponent • Member of the decision process team • Liaise with the residents
Liaison Committee	• Provides directions and guidance to proponent for the study on behalf of the proponent
Agencies	• Provides input during document review • MOEE approves the Undertaking and issues Certificate(s) of Approval
Community of Forest Park	• Provides input at meetings • Formulates written statements on the undertaking
McNeely Engineering Consultants Ltd	• Consultant responsible for study and as such provides professional services for the undertaking

2.0 CLASS ENVIRONMENTAL ASSESSMENT PROCESS

2.1 GENERAL

In Ontario, the Environmental Assessment Act (EAA) provides for the protection, conservation and wise management of the environment by providing a responsible and accountable process of decision-making.

There is a cost effective and streamlined process called the Class Environmental Assessment (Class EA) under which projects can be evaluated with respect to meeting the requirements of the EAA. For a project to be evaluated under the Class EA process, it must meet the following conditions:

The project must be:

- recurring
- usually similar in nature
- usually limited in scale
- have a predictable range of environmental effects
- responsive to mitigative measures

The Class EA provides for the implementation of five key principles of successful planning. These are:

1. Early consultation with affected parties (includes public, landowners, etc).
2. Consideration of a reasonable range of alternatives.
3. Identification and consideration of the effects of each alternative on all aspects of the environment.
4. Evaluation of alternatives to determine their net environmental effect. This is done by identifying advantages and disadvantages.

5. A clear and complete documentation of the planning process to allow "traceability" of the decision-making.

The Class EA process provides for the planning and implementation of municipal projects, also referred to as "Undertakings". Since these projects undertaken by municipalities vary in their environmental impact, such projects (or Undertakings) are classified in terms of schedules. In brief these schedules can be summarized as follows:

Schedule A Projects in this classification are limited in scale, have minimal adverse effects. These projects include the majority of municipal operations and maintenance activities, such as watermain and sewer extensions within existing road allowances, and can proceed to implementation without further approvals under the EAA.

Schedule B Projects in this classification have the potential for some adverse environmental effects. The proponent is required to undertake a screening process, involving mandatory contact with directly affected public and with relevant government agencies, to ensure that they are aware of the project and that their concerns are addressed. If there are no outstanding concerns then the proponent may proceed to implementation. If, however, the screening process raises a concern which cannot be resolved, then the project may proceed to a schedule C or be "bumped-up" to an individual EA.

Projects under this schedule must, as a minimum requirement, comply with Phases 1, 2 and 5 of the Class EA process, as shown in Figure 2-1 and as described below. Such projects may include the construction or expansion of treatment facilities up to their approved rated capacities.

Schedule C Projects in this classification have the potential for significant environmental effects and must proceed under the full planning and documentation procedures specified in the Class EA. If concerns are raised that cannot be resolved, the "bump-up" procedure to an individual EA may be invoked.

Projects under this schedule must, as a minimum requirement, comply with Phases 1 to 5, inclusively, of the Class EA process, as shown in Figure 2-1 and as described below. Such projects may include the construction or expansion of treatment facilities beyond their rated capacities.

The chart shown in Figure 2-1 illustrates the process followed in the planning and design of projects covered by the Class EA. The steps considered essential for compliance with the requirements of the Act are summarized as follows:

Phase 1 This stage consists of identifying the problems or deficiencies with the current municipal water and/or sewage systems.

Phase 2 This stage consists of identifying alternative solutions to the problems and establishing the preferred solution, taking into account public and agency review input. At this point, identify the approval requirements and determine the appropriate schedule for the Undertaking.

The current report fulfils the requirements of Phases 1 and 2 of the Class EA process.

Phase 3 For projects classified as Schedule C activities, this stage consists of examining alternative methods of implementing the preferred solution in accordance with the Class EA requirements.

Phase 4 For projects classified as Schedule C activities, this stage consists of documenting in an environmental study report (ESR) a summary of the rationale, planning, design and consultation process of the project as established through the preceding phases. This document is subject to scrutiny by review agencies and the public.

Phase 5 Once the above phases have been successfully completed, this stage consists of completing the contract documents and proceeding to construction, operation and monitoring of the Undertaking.

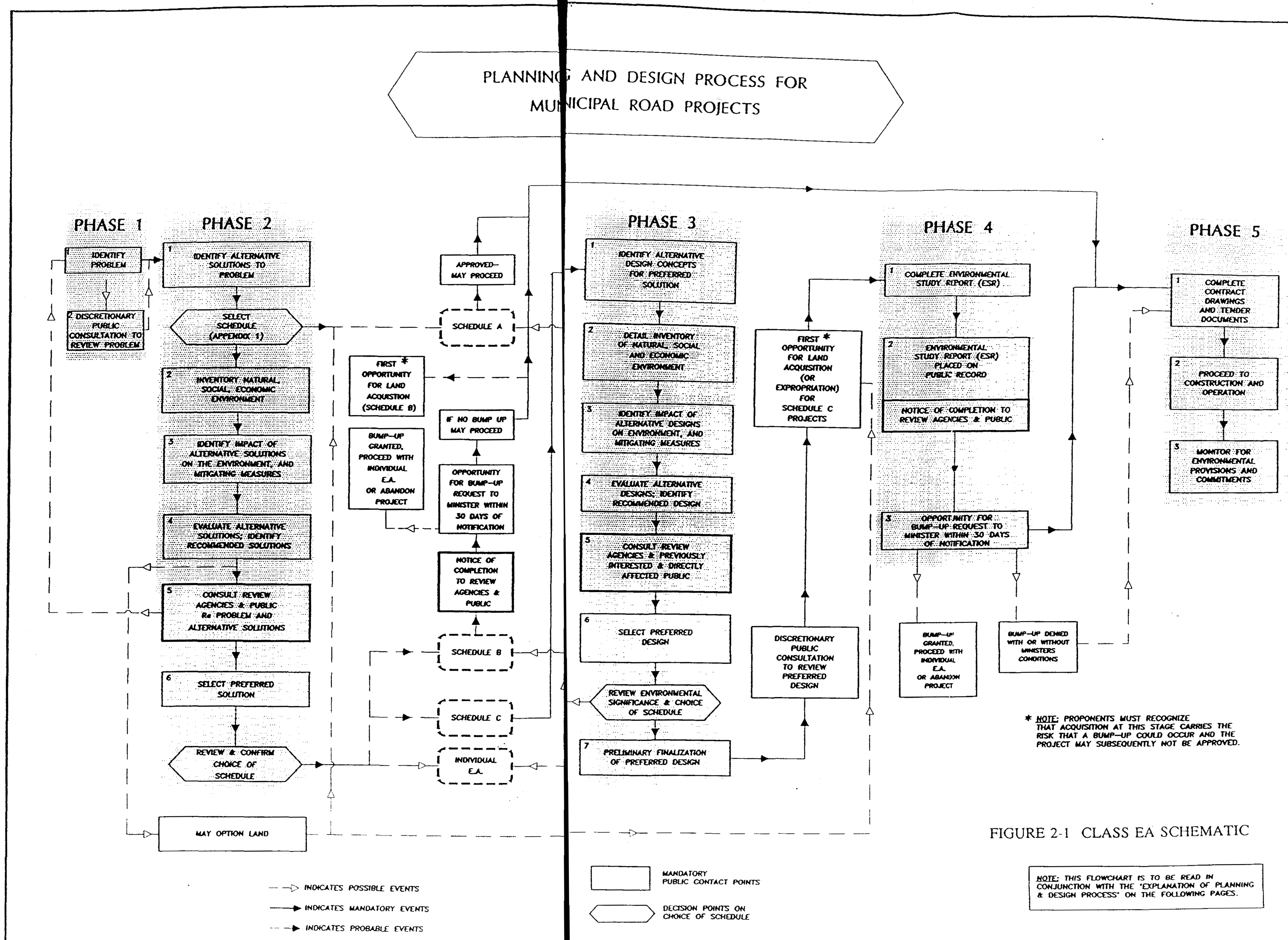


FIGURE 2-1 CLASS EA SCHEMATIC

The consultation process is a key element of EA planning. The principal aim of the consultation process is to promote public participation and to achieve resolution of differences in points of view, thus reducing or avoiding controversy and, ultimately, avoiding the use of the "bump-up" procedure. Section 9 of this report describes how the proponent has complied with feedback from the public during the initial stages of this study. This, through a well documented process, will ensure that concerns are met and impacts are well understood.

2.2 LIAISON COMMITTEE

Upgrading or expanding an existing municipal water system can represent a major undertaking for municipalities and can bring about complex technical and socio-economic issues. These issues can only be properly addressed in consultation with members of the public, municipal officials, government agencies and technical consultants. To ensure a proper dialogue between all parties, a Liaison Committee (Figure 1-3) was established at the beginning of the process. The purpose of the committee is to form a liaison between the public and the municipality and has the mandate to provide assistance in the decision making process. The Liaison Committee also provides direction to the Consulting Engineer on the nature and scope of this Undertaking.

The Liaison Committee is comprised of representatives from the Township of Cambridge, the Ontario Clean Water Agency (OCWA), members of the Forest Park Community Association and the Consulting Engineer. The members of the Committee as described below.

- Denis Pommainville, Reeve - Township of Cambridge
- Roger Brunette, Clerk - Township of Cambridge
- Members, Forest Park Community Association - Forest Park
- Members of Council - Township of Cambridge

- Robert Dormer, Ontario Clean Water Agency (OCWA)
- Fernand Dicaire, McNeely Engineering Consultants Limited (MECL)

Generally, the Liaison Committee will meet at milestones to review project status, decide on works to be done, approve budget and cost apportionment, and discuss upcoming issues.

2.3 PROJECT SCHEDULE

The Forest Park project is being planned as a Schedule C activity under the Class Environmental Assessment for Municipal Water and Wastewater Projects and therefore subject to the preparation of an Environmental Study Report (ESR). The preliminary ESR has been prepared and is being circulated to review agencies, mandatory contacts and interested public.

A Phase 3 public meeting was held on Tuesday, August 15, 1995 to provide further information to the public and to receive public input and comments. After receiving comments, the ESR had been finalized and placed on public record for the required 30-days review period.

An application for provincial funding will be made to OCWA in early fall, however, considering current provincial fiscal situation, it is difficult to predict when grants for detail design and project construction will be available.

3.0 PLANNING ISSUES

3.1 PURPOSE

The purpose of this section is to provide background information on demographics, land use and official plan policies and zoning requirements as they relate to servicing improvements for the Forest Park Community.

3.2 STUDY AREA

The study area (see Figure 3.1) consists of the Forest Park subdivision located between County Road No.3 and the Castor River, a linear subdivision along Rue du Castor between the Castor River and Chemin 600 Ouest, and land in the immediate vicinity of these areas, i.e. mobile home park (Lot 30, Concession 7), a church and elementary school along County Road No.3, and several dwellings. The study area is bisected by the Castor River which serves as a physical barrier between a more concentrated area of development on the north side of the river and two clusters of linear development on the south side of the river.

3.3 DESCRIPTION OF LAND USE

The study area is predominantly residential in character of which the housing type predominantly consists of single detached housing. The following provides a summary of the distribution of residential housing types:

•	Forest Park East subdivision:	135 single detached
		1 semi-detached
	Total	137 housing units
•	Rue du Castor:	16 single detached

•	County Road No.3:	10 single detached
•	Chemin 600 Ouest:	8 single detached
		19 mobile homes
	Total	24 housing units
	Grand Total	187 housing units

The total number of housing units within the study area is 187. In addition to a residential development, there is a church and the Cambridge Elementary School.

The lands surrounding the study area are predominantly agricultural as this area are actively farmed.

In terms of the land use pattern, the most concentrated development is Forest Park which consists of four streets of equal length, all of which intersect with County Road No.3. This community consists of 216 approved lots, of which, as indicated, 136 are developed. South of the Castor River, the development pattern is linear. The Rue du Castor for example, is a single street with residential development either side. Along Chemin 600 Ouest, development is also characterized as linear with the exception of a mobile home park which has three small streets intersecting with Chemin 600 Ouest, where there is a cluster of 18 mobile homes.

Development however within the Forest Park Community is generally more concentrated than in other rural areas of the Township and has the capacity to become a significant settlement area should undeveloped lots within the subdivisions or vacant existing lots of record become developed.

3.4 DEVELOPMENT POTENTIAL

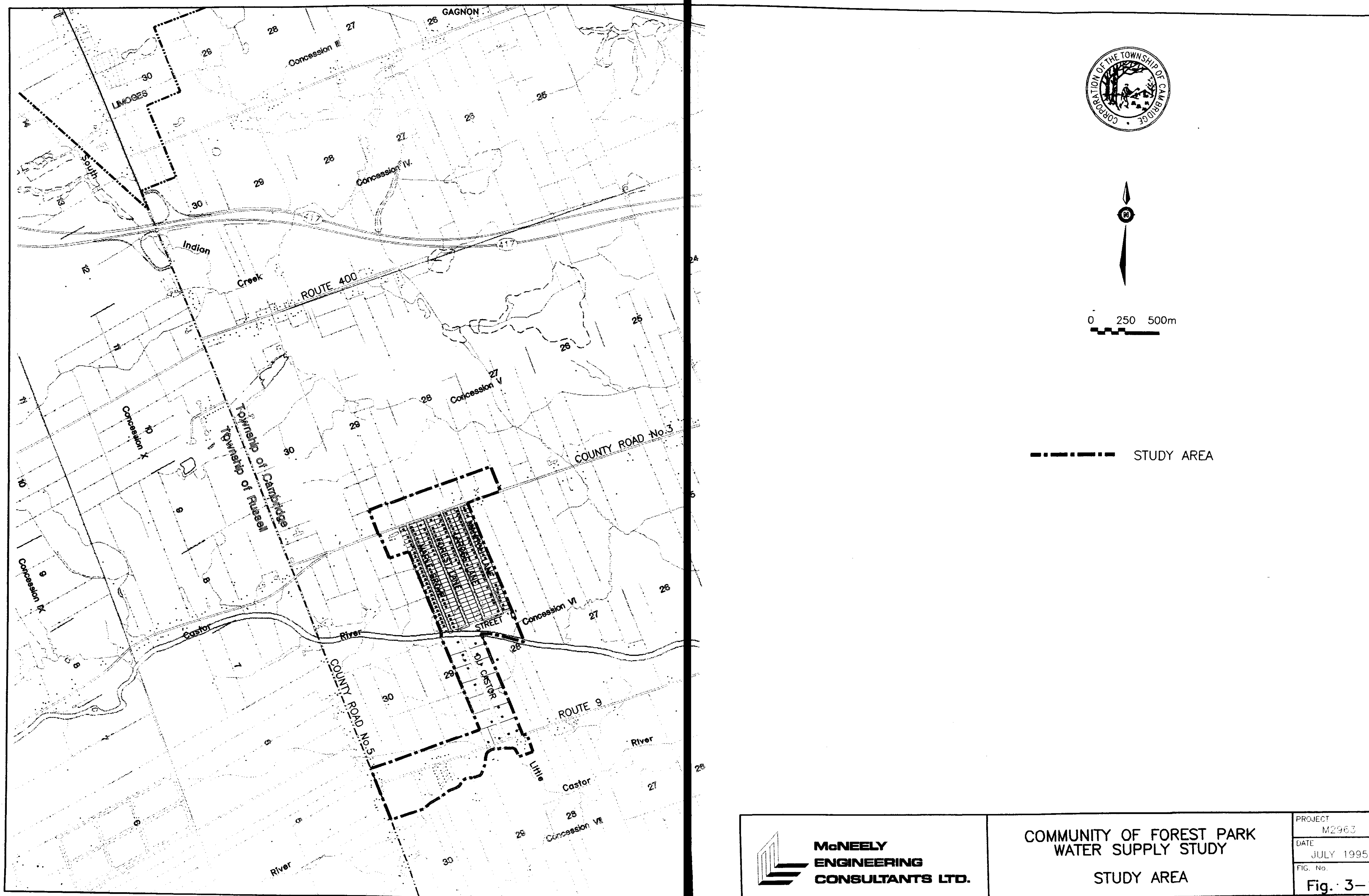
The development potential exists primarily within the Forest Park. Of a total of 216 lots, 135 are developed, leaving a residual of 81 lots. Of these, one is occupied by a pump house associated with the water works system. Some of the lots in the community have not been developed likely because of topographic constraints given two of ravines which extend north from the Castor River into the subdivision. The market potential will dictate the viability of developing these lots as will the land use policies of the municipality in encouraging, for example, development in this community as a designated settlement area. It is therefore not unreasonable to consider the development of another 60 or so lots within this community.

Aside from the development potential in the Forest Park, there is one vacant lot along the Rue du Castor. Given the frontage of lots along this street however, the development potential exists for re-subdivision of lots to increase the number of potential dwelling units from 16 (existing) to perhaps 24. A further potential exists for infill development on existing lots of record along County Road No. 3 and Chemin 600 Ouest, i.e. approximately 4 to 6 lots.

The total potential for future residential development would be in the order of 70 to 75 lots within this particular area.

3.5 SCHOOLS

The Cambridge Elementary School, under the jurisdiction of the Prescott and Russell School Board (public) serves all of Cambridge Township and Concessions 6-10 east of St. Guillaume Street in Russell Township.



McNEELY ENGINEERING CONSULTANTS LTD.

COMMUNITY OF FOREST PARK
WATER SUPPLY STUDY

STUDY AREA

PROJECT	M2963
DATE	JULY 1995
FIG. No.	Fig. 3–1

The current school enrolment is 331 students and 30 staff. The designated capacity of the permanent component of the school is 95 students and is supplemented by a number of portables which increases the capacity to 350. The school serves junior kindergarten through Grade 8.

Separate elementary students from Forest Park attend St. Viateur school in Limoges. High school students are bused to Hammond or Embrun.

3.6 OFFICIAL PLAN AND ZONING BY-LAW

3.6.1 Official Plan (OP)

The policy framework for land use planning is contained within the municipality's Official Plan which was approved on October the 3rd, 1985 with modifications. There are three major policy sections within the document which apply to the lands in and around the Forest Park Community. These policies are: Rural Subdivisions, Linear Developments and Mobile Home Parks.

It is clear from the policies of the Official Plan that further residential development is contemplated for this component of the Forest Park Community. It is to be emphasized however that development is confined to the limits of the existing subdivision and that further land divisions to create a greater lot yield would not be permitted. The type of residential development is limited to low density singles. Non-residential development is intended to support very basic services to this subdivision such as a convenience store, school and park but does not conversely, contemplate the build-up of other urban type commercial, institutional or other uses. More detailed information regarding the Official Plan can be found in Appendix "C".

3.6.2 Analysis of Official Plan Policies

To a large extent, the Official Plan policies are status quo with respect to development in the sense that the designation of additional lands is not contemplated for further residential development. Conversely, there is essentially no restriction on complete development of vacant lands within the existing designations be it subdivision, linear development or mobile homes. Given this policy framework, the development potential as identified earlier in this report i.e. 70 to 75 new residential units (single detached dwellings or mobile homes) would be permitted. The Official Plan enumerates the requirements for servicing but is permissive with respect to the requirement for municipal water and street lighting in rural residential subdivisions. While there is no obligation for the municipality to insist on this type of service, where they do, the cost is intended to be at the developer's expense.

The Plan also identifies the existence of development constraints and in particular, areas subject to unstable slopes or flood risk. Increased setbacks from river bodies to avoid the risk of flooding will be a limiting factor on development. The function of the local road system in providing access to adjacent properties is not compromised by virtue of any development within the Forest Park Community.

3.6.3 Zoning By-Law

The Township's Zoning By-law No. 144-88 dates to 1988 and sets out the restrictions regarding land development within the municipality. Several zones apply to the various lands within the Forest Park Community.

Zoning for the Forest Park East subdivision is General Residential (R1) which permits single family, duplex and semi-detached dwellings. Single dwellings are permitted on lots with a minimum of 1,850 m² with a minimum lot frontage of 30 m. The requirements for a semi-detached are on a lot area of 1,400 m² per dwelling house with a 20 m minimum frontage. For duplexes the minimum lot area is 2,800 m² with a minimum lot frontage of 30 m.

A Residential Exception Zone (R1-2) applies to the linear development areas (Rue du Castor) wherein only a single family dwelling is permitted. By-law No. 132-90 reduced the lot frontage to 30.49 m (from 60 m) and prescribed a minimum lot depth of approximately 120 m.

Within the Mobile Home Park Zone, the lot area for a mobile home on private services is consistent with the R1 zone requirements i.e. 1,850 m² and 30 m frontage. Lot areas and frontages may be reduced where communal services exist to a lot area 850 m² for one communal service and a lot frontage of 20 m.

Other zones that apply include an Institutional Zone for the Forest Park Elementary School, a Rural Agricultural RA-1 Exception Zone for the church and an Open Space OS Zone for lands abutting the Castor River on the south side of the Forest Park East subdivision. Finally, there is a C2-2 Zone which recognizes an automobile repair shop on lands on the north side of County Road 3 opposite the northeast corner of the Forest Park East subdivision.

3.7 DEMOGRAPHICS AND HOUSING CHARACTERISTICS

3.7.1 Population Growth

Figure 3-2 provides a historical illustration of growth within the Township of Cambridge (1921-1991). As may be seen from these illustrations, the annual growth rate over the period 1971-1991 was substantial i.e. 6.58% per year and reflected in actuality higher rates of growth in the decade 1971-1981. The rate of growth in the latter decade has dropped off and according to the last census is 3.19% (1981-1991)... and has been further reduced to 3.06% per annum (1986-1991). The Official Plan does not set out a specific target population for the Township of Cambridge but does indicate that the population growth for the entire municipality would be in the order of 9,000 by the year 2000. This would equate to an average rate of growth of 5% per annum over the period 1986 to 2001. This projected rate of growth is rapid by current standards.

The growth rate projected in the Official Plan, however, has not been realized. For example, the 1991 population for Cambridge was 5,915. This would generate an average annual growth of 23 to 30 persons or approximately 8 to 10 new households in the Township.

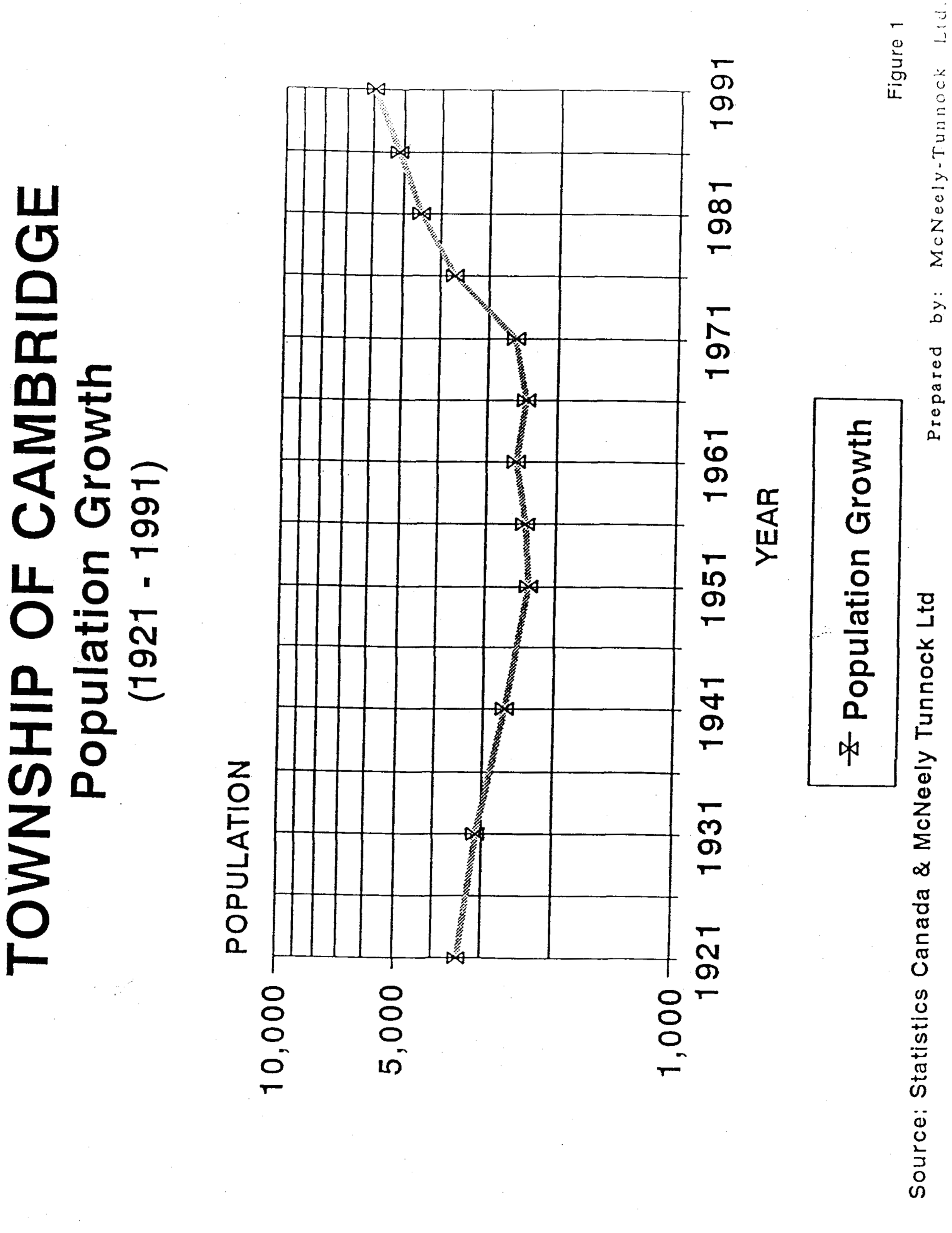
3.7.2 Summary of Demographic and Housing Information

The population of the Township may be summarized as young and growing at a rate which is in excess of average growth rates for other rural communities. Moderate to rapid periods of growth in the 70's however have gradually declined although the projected future growth rate will still be above the norm i.e. in the vicinity of 2% or more for the foreseeable future.

There is a significant preference for owner occupied single detached housing, a trend which is not likely to change. Higher than average incomes indicate substantial overall prosperity by residents of the Township and the capability to purchase single detached housing.

Statistical information is not specifically available for the Forest Park Community since Statistics Canada information is not collected at this level. However, in extrapolating the population information, the number of persons residing in the Forest Park Community would be 583 (187 housing units x 3.12 persons per household). This represents approximately 9% of the overall Township population. The service area population, that is to say those residents who are serviced by communal water, would be 452 (145 dwellings units x 3.12 persons per household).

FIGURE 3-2


TOWNSHIP OF CAMBRIDGE
Population Growth
(1921 - 1991)
POPULATION
10,000
5,000
1,000
1921
1931
1941
1951
1961
1971
1981
1991
YEAR
Population Growth
Source: Statistics Canada & McNeely Tunnock Ltd
Prepared by: McNeely-Tunnock Ltd.
Figure 1

3.8 IMPLICATIONS FOR GROWTH IN THE FOREST PARK COMMUNITY

The land use policy framework and associated regulatory controls make provision for continued growth within the Forest Park Community. It is reasonable to suggest that this is one of the identified settlement areas within the Township of Cambridge and should be a focal point for future development, particularly with the availability of a water service for this area. It may be expected that this area will, however, compete with other settlement areas within the Township and that the viability of growth will be dependent on the serviceability and the cost of developing building lots. The number of potentially available lots for development (70-75) represents a 6 to 8 year supply of land if for example, all development in the Township were directed into the Forest Park Community. This is not however realistic but is indicative of the long term potential for continued growth within Forest Park without the necessity of designating additional lands. The desire for development within this area will be reinforced by the influence of comprehensive policy statements contained within the new Planning Act which are intended to focus new development in settlement areas where services are available.

4.0 NATURAL SETTING

4.1 PHYSIOGRAPHY AND GEOLOGY

The geology and physiographics features of the study area are identified in the Jacques Whitford Environment Limited (JWEL) report dated December 1994 reproduced in Appendix G. The following paragraphs summarize this information.

The main physiographic features within the study area are the Castor and Little Castor Rivers, both of which flow eastward, the South Indian Creek which flows eastward and the South Nation River which flows northward through the eastern part of the study area.

The study area is located on the Russell and Prescott Sand Plains, which is an area of low relief. This sand area is dispersed over the local clay plain and varies in thickness from approximately 3 to 6 meters deep. The area is part of the South Nation River Drainage Basin. To the north of the study area surface drainage flows northerly towards the South Indian Creek. To the south, the surficial waters are drained by the Castor and Little Castor Rivers. The general topography of the study area consists of low relief with a gentle bedrock ridge located north of the Castor River and in the general location of the intersection of County Road No. 3 and Township of Cambridge Route 400.
The bedrock geology, as shown in JWEL's drawing no. 30340-103 of Appendix G, found in the study area consists of the Lindsay Formation which is identified as a fine crystalline limestone with thin interbeds of shale. As mentioned, to the west of County Road No.3 a bedrock outcrop is present in this portion of the study area. This Verulam Formation consists of interbedded bioclastic limestone to fine crystalline limestone with shale interbeds. To the north of the study area, the bedrock consists of the Queenstone Formation which is a interbedded siltstone and shale. As indicated on this drawing, numerous faults have been mapped in the general study area.

4.2 HYDROGEOLOGY

The hydrogeology and potential for groundwater resources in the study area are identified in the JWEL report dated December 1994 reproduced in Appendix G. The following paragraphs have been extracted from JWEL report.

The hydrogeologic conditions in eastern Ontario have been described in broad terms by E.J Charron in two reports. One report by Charron, published in 1974, is on a regional study of groundwater flow in Russell County. The second report by Charron, published in 1978, is on hydrochemical study of groundwater flow in the in stream area between the Ottawa and the St. Lawrence River. Some general information can be drawn from these studies as highlighted below.

The groundwater flow study of Russell County reveals that in the Forest Park area and the surrounding environs there are a considerable number of drilled wells on records. The drilled wells are into limestone, likely of the Oxford Formation. Dug wells are also on record in the Forest Park area as noted on Figure 8 in the Charron report. The interpreted directions of groundwater flow in the bedrock aquifer as presented by Charron is approximately from southwest to northeast across the study area for this communal investigation.

Hydrogeochemical maps accompanying the 1974 Charron report suggest that water in bedrock will have the following characteristics:

- relative high salt content
- specific conductance approaching 1500 uS/cm
- total hardness ($CaCO_3$) less than 100 mg/l
- TDS in the range of 500 to 1000 mg/l
- potentially high H_2S
- SO_4 less than 10.0 mg/l

The quality of the water is thus expected to be generally fair with a potential for high salt and H_2S concentration.

The 1978 report by Charron is on a much broader scale than the 1974 report. The interpreted groundwater flow direction is generally south to north. Mapping also suggest the piezometric level in the bedrock is likely to be done in the range of elevation 45 to 70m. above sea level and the depth to the piezometric surface is between 0 and 3 m. Both the 1974 and 1978 Charron reports suggest that the study area is in a transition zone (between groundwater recharge zone and discharge zone) in groundwater flow.

MOEE water well records current to 1986 were acquired for the wells drilled within 3 to 4 km of Forest Park. There were approximately 30 wells on record in the Forest Park area and north along County Road No. 5. In reality there are many more wells in the study area than this based on the number of residences. One may infer from this that many of the local residents use a shallow well completed in the upper sand deposit which overlies the marine clay in the north half of the study area. The MOEE well records were reviewed for well yield and depth to water. The well yield was found to be between 13 and 975 m3/day (2 and 150 igpm) and depth to water was in the range of 5 to 31 m in the wells on record north of Forest Park within the study area.

This hydrogeologic information coupled with the geologic conditions leads to the following summary of hydrologic conditions:

1. There are two potential aquifers in the study area: a shallow unconfined overburden aquifer and a confined bedrock aquifer.
2. The nature of the bedrock aquifer is not readily defined by the available data base. It is likely located within horizontal fractures in bedrock near the bedrock/overburden interface or there may be a preferential source of groundwater along or adjacent to the mapped faults in the area.
3. There is a clay aquitard separating the bedrock aquifer and the shallow overburden aquifer.
4. Recharge to the bedrock aquifer from infiltrating precipitation is expected to be relatively low due to the presence of the clay aquitard. Recharge may be higher in areas of direct infiltration such as bedrock outcrop areas.
5. The shallow aquifer is thin and, is susceptible to contamination from surface and subsurface activities by residents. Therefore, it would not likely supply adequate quantities of good quality water for a communal supply.
6. A deep aquifer in bedrock should be sought for a potential communal supply.

4.2.1 Exploration Drilling

Upon completion of a geophysical survey in September 1993, to locate geological faults in the candidate area, target areas to conduct test drilling program were identified. Land optioning of site(s) where the test wells were to be constructed was then the subject of negotiation with the owners of the property. For obvious reasons, the permission to proceed with the well drilling program was not granted until a land option had been duly signed by the owner of the subject land and same had been endorsed by Council of the Township of Cambridge.

During the land optioning process and the selecting of target areas process, the Liaison Committee met on numerous occasions. The general consensus reached by the Liaison Committee was that the proposed hydrogeological drilling program(s) were to be carried out in a logical phased-in approach since the chance to find a suitable underground source was limited and alternatives to communal water supply also had to be investigated. Specifically, JWEL's initial assignment consisted of an approved methodology having lump sum fees for professional services and unit prices for drilling expenses. It had been clearly understood and established that only sufficient drilling investigation was to be carried out to locate a potential source of water capable of supplying water to the community of Forest Park. After the completion of a specific assignment, the mandate of the hydrogeologist was to prepare a letter-report on the findings, provide a conclusion(s) and make a recommendation(s) to the Liaison Committee.

As a result of this set procedure, the hydrogeological task proceeded at a controlled pace and resulted in a three (3) phased exploration test drilling program. From July 1993, when JWEL's services were retained, some seventeen months have elapsed until the delivery of the report titled "Hydrogeological Assessment - Communal Water Supply - Community of Forest Park". The findings and recommendations of the three exploration phases are well documented in JWEL's report dated December 1994.

4.3 NATURAL ENVIRONMENT

The aquatic and terrestrial environment in the vicinity of the proposed work, have been reviewed by Jacques Whitford Ltd. Senior Biologist. Detailed description of the funding are presented in section 11.3 of this report.

4.4 CLIMATE AND AIR QUALITY

Climate

The study area is located within a cold, continental-type climate. According to Environment Canada meteorological data for the period from 1951 to 1980, as recorded at the Russell, Ontario weather station, the mean daily temperature ranges from -11.0 degrees Celsius in January to 20.3 degrees Celsius in July. Below freezing temperatures are usually experienced for four months out of the year (December through March) and the average annual total precipitation is 846 mm, of which approximately 178 mm falls as snow (melted water equivalent). During the average year, the number of days with measurable precipitation is 140.

The impact of winter climatic conditions must be considered in the design of watermains to protect them from frost penetration through the overburden soil. In 1994, as recorded in the nearby Regional Municipality of Ottawa-Carleton, the frost depth reached 2.2 metres (due to a very cold winter).

Air Quality

Other than the sewage treatment lagoons in the Villages of Casselman, St Albert and Embrun, there are currently no other significant sources of air pollution within the study area which have the potential to impact on air quality. The dominant sources of air pollution originate mainly from industrial facilities in surrounding municipalities.

4.5 TRANSPORTATION AND UTILITY CORRIDORS

The road transportation network within the study area, is subject to three jurisdictions, namely municipal (Township of Cambridge, Township of Russell, Township of Clarence), county (United Counties of Prescott-Russell) and provincial (Ministry of Transportation of Ontario). Provincial Highway No. 417 is the primary transportation corridor within the study area and provides movement in east-west directions. County roads are considered secondary roads and include County Road #'s 3 and 5 which provide both north-south and east-west services. Other local roads which connect with primary and/or secondary corridors fall under municipal jurisdictions.

The Canadian Pacific Railway corridor is located along the north and at the limit of the study area, as shown in Figure 1-1. This corridor is still active and provides transportation to both passengers and merchandise.

A privately owned facility is the only airfield in the study area. Located to the south of the study area along County Road No. 3, this small airfield services non-commercial flights for small aircraft. The only public utility corridor within the study area are used for hydro and telephone servicing. The Ontario Hydro main power distribution line and the Bell Canada fibre optic cables are the primary utility corridors.

5.0 PROBLEM IDENTIFICATION

5.1 EXISTING WATER WORKS SYSTEM

The existing water supply system consists of two drilled wells, a well pumphouse, a storage reservoir and a pumphouse and distribution network serving 163 dwellings.

5.1.1 Wells and Well Pumphouse

The wells are located on lot 28 Concession VII of the Township of Cambridge, 190 m south of the road allowance between concessions VI and VII. They are beside the south branch of the Castor River and adjacent to a trailer park development.

The well casings are 200 mm steel casings. Well #1 is 22 meters deep, ending at the overburden rock interface. Well # 2 is 23 m deep. The static level in well # 1 is 4.8 meters and in well # 2 is at 5.0 m. A pumping test conducted on well # 1 by Service Techniques Eau Souterraine Inc. of Dorval, Quebec in 1975, indicated the well capacity of 12.6 litres/second. A similar pumping test on well # 2 conducted by J.L. Richards Consulting Engineers, Ottawa, Ontario in 1981 indicated a well capacity of 14.6 litres/second.

Well # 1 is equipped with a submersible vertical turbine pump rated at 10.7 litres/second against a total dynamic head of 33.5 meters. Well # 2 is equipped with a similar pump unit.

Water is pumped from the wells to the reservoir and the water level is maintained by a float operated valve.

The pumphouse is a metal clad building founded on a concrete slab at the grade level. It is 3.7 x 5.5 meters and is electrically heated. The pumphouse equipment includes :

- 75 mm trident full flow crest meter,supplied by Neptune Meters Ltd.
- two 454 litre Myers Air Guard hydropneumatic tanks
- hypochlorinator with an adjustable capacity range from 1.0 - 200 litres per day complete with a 227 litre polyethylene solution tank, and electrical mixer.

5.1.2 Supply Main

A 150 mm diameter supply main 1500 meters long transports water from the wells to the storage reservoir at the southern end of the subdivision. The supply main and hydropneumatic tanks in the pumphouse provide the necessary volume for chlorination contact time.

5.1.3 Storage Reservoir and Pumphouse

This facility was constructed in 1982, and provides a total storage volume of 700 cu.m. It has three cells (including the pump well) which allows shut down of each cell for repairs and cleaning. There are three vertical turbine high lift pumps (one as a stand by), each rated to pump 8 litres/second against a TDH of 42 m with 2 pumps operating in parallel to pump the expected design peak hour demand of 16 litres/second. There is also a diesel engine driven vertical turbine fire pump rated to pump 47.3 L/s against a total dynamic head of 70 m. All the pumps, diesel engine, electric controls, etc. are housed in a 7 m x 6 m building over the part of the reservoir.

5.1.4 Distribution System

The distribution system is comprised of 150 mm diameter watermains, valves and hydrants for all streets in the development.

5.1.5 Water Consumption Rates

Water consumption rates for the last 4 years are summarized in Table 5-1.

As can be seen, the average present water consumption rate at Forest Park Community is around 280 litres/capita/day which falls within average daily per capita water demands of 270 to 450 l/c/d suggested in MOEE guidelines. It should be noted that during summer months average consumption of water increases up to 416 l/c/d.

Table 5-1

WATER CONSUMPTION RATES (All figures in cu.m except where noted)				
Month	**Year**			
	1991	**1992**	**1993**	**1994**
Jan	3590	3618	3733	3891
Feb	2987	4022	4395	3540
Mar	3223	5373	3891	3770
Apr	3556	4946	3673	3888
May	4898	6305	5120	4862
Jun	5352	6234	5323	5110
Jul	6540	5165	5764	5008
Aug	4714	5413	4607	4569
Sep	4137	4278	4046	4166
Oct	3571	4065	3999	4351
Nov	3500	3805	3658	3758
Dec	3598	3641	3788	2602
Total	49666	56865	51997	49515
Average Daily Demand	136	156	143	136
Population	508	508	508	508
Demand Per Capita (L/c/d)	268	307	280	268

5.2 PROBLEM DEFINITION

5.2.1 General

Poor water quality has always been a problem for the Forest Park community.

The approval notice accompanying Certificate of Approval No. 7 - 0224 - 83 - 006 for Forest Park water works states :

"The water supply does not fully meet the Ministry of the Environment objectives for chemical characteristics with respect to chloride and fluoride concentration, total dissolved solids and has a concentration equal to the Ministry's objectives for iron with elevated levels of nitrogen. Although the concentrations in the water are not desirable , they are not considered a health hazard at their present levels. It is expected that the water quality may deteriorate with continued pumping of the aquifer and therefore a monthly analysis program is required for monitoring changes in water quality. If significant deterioration of water quality occurs additional treatment may be required."

As expected since the time of issuing of the above certificate, water quality has been deteriorating as a recent survey of water quality indicates.

As a result of poor water quality no additional development is allowed in the subdivision. In addition there is significant increase in the maintenance of the water works due to corrosion by elevated chlorides and iron. Pump replacement is more frequent, as well as the replacement of piping and other reservoir equipment.

In summary, the problems associated with the existing water supply system can be summarized as follows:

- Poor water quality which does not meet MOEE Ontario Drinking Water Objectives
- Inability of the Community to grow and develop existing lots
- Deterioration and increased maintenance of water works resulting in increase charges to home owners.

5.2.2 Poor Water Quality

The main purpose of the Ontario Drinking Water Objectives (ODWO) is to establish the minimum level of quality for water intended for human consumption in order to protect public health. Water should not contain disease- causing organisms or hazardous concentrations of toxic chemicals or radioactive parameters and should be aesthetically acceptable. Taste, odour, turbidity and colour are parameters that, when controlled, result in water which is clear, colourless and without objectionable or unpleasant taste. Other aspects of water quality such as corrosiveness, tendency to form encrustations and excessive soap consumption should be controlled on the basis of economic consideration because of their effects on the distribution system and domestic use.

The existing water quality at Forest Park fails to meet several parameters listed in ODWO such as chlorides, sodium, iron, total dissolved solids,nitrogen, fluoride,colour, alkalinity and hardness. Table 5-2 summarize the most recent survey for selected water quality parameters.

Table 5-2

Community of Forest Park Water Supply Study

Existing Supply Chemical Water Data

Date Sampled	Type of Water	Color T.C.U.	Turbidity	Conductivity	pH	Iron	Chloride	Fluoride	Na	Amonia	Nitrite	Nitrate	T.D.S.
Objectives		**5**	**1**		**6.5 - 8.5**	**0.30**	**250**	**0.8 - 1.2**	**200**		**1**	**10**	**500**
Jan 11 / 1994	Raw	10	1.60	2780	8.4	0.34	577	1.45	552	2.20	0.002	< .02	1560
	Treated	< 1	0.40	2570	8.2	0.24	510	1.49	515	0.83	0.008	0.03	1460
Feb 15 / 1994	Raw	18	0.45	2400	8.8	0.26	456	1.38	477	1.65	0.004	<0.02	1434
	Treated	18	0.70	2520	8.5	0.34	496	1.44	489	1.50	0.01	< 0.02	1489
Mar 15 / 1994	Raw	13	0.45	2230	8.2	0.30	472	1.35	516	2.10	0.02	6.58	1510
	Treated	1.0	0.40	2300	8.1	0.26	502	1.47	495	0.60	<0.02	< 0.02	1480
Apr 15 / 1994	Raw	17	0.55	2730	8.5	0.30	529	1.45	540	1.80	< 0.002	< 0.02	1546
	Treated	20	0.50	2600	8.5	0.28	530	1.45	505	1.60	0.006	< 0.02	1504
May 17 / 1994	Raw	17	1.60	2510	8.1	0.34	488	1.79	468	1.65	0.002	< 0.02	1528
	Treated	12	1.20	2530	8.0	0.32	503	1.74	490	0.34	0.014	0.11	1576
June 28 / 1994	Raw	18	1.20	2740	8.2	0.32	569	1.38	501	2	< 0.002	0.08	2262
	Treated	12	0.95	2650	8.2	0.38	534	1.40	514	1.45	0.012	< 0.02	2388
July 26 / 1994	Raw	10	1.40	2300	8.1	1.20	465	1.44	429	1.75	0.02	< 0.02	1490
	Treated	8	1.80	2430	8.1	0.34	495	1.46	461	0.86	0.014	0.014	1540
Aug 23 / 1994	Raw	15	0.75	2590	8.3	0.26	511	1.42	513	2.30	0.02	0.28	1510
	Treated	8	0.70	2580	8.3	0.20	498	1.47	519	1.70	0.03	< 0.20	1500
Oct 04 / 1994	Raw	18	1.90	2440	8.5	0.41	456	1.60	412	2.10	0.02	< 0.2	1586
	Treated	17	1.40	2410	8.5	0.41	451	1.67	431	1.20	0.02	< 0.2	1566
Nov 08 / 1994	Raw	15	0.70	2620	8.4	0.35	543	2.04	504	2.15	< 0.002	0.34	1500
	Treated	5	0.63	2480	8.4	0.27	450	2.01	482	1.50	0.012	< 0.02	1460
Dec 06 / 1994	Raw	< 1	1.01	2500	8.1	0.25	484	1.59	449	1.75	0.002	< 0.02	1458
	Treated	< 1	0.41	2540	8.1	0.24	493	1.59	447	1.40	0.012	< 0.02	1484

Table 5-2 (cont'd)

Community of Forest Park Water Supply Study

Existing Supply Chemical Water Data

Date Sampled	Type of Water	Color T.C.U.	Turbidity	Conductivity	pH	Iron	Chloride	Fluoride	Na	Amonia	Nitrite	Nitrate	T.D.S.
Objectives		**5**	**1**		**6.5 - 8.5**	**0.30**	**250**	**0.8 - 1.2**	**200**		**1**	**10**	**500**
Jan 10 / 1995	Raw	20	1.40	2580	8.3	0.23	511	1.80	438	1.80	0.004	< .02	1548
	Treated	8	0.40	2550	8.2	0.23	514	1.64	457	1.45	0.008	0.05	1532
Feb 14 / 1995	Raw	13	1.10	2460	8.4	0.22	454	1.58	508	1.80	< 0.002	0.20	1453
	Treated	10	1.10	2510	8.5	0.29	488	1.64	534	1.30	0.014	0.03	1434
Mar 14 / 1995	Raw	15	0.65	2620	8.3	0.28	520	1.56	535	2.00	< 0.002	< 0.02	1584
	Treated	17	0.40	2480	8.3	0.24	471	1.66	488	1.75	0.014	0.03	1500
Apr 11 / 1995	Raw	13	0.73	2510	8.1	0.30	514	1.43	477	-	-	-	1486
	Treated	8	0.40	2520	8.1	0.26	493	1.47	476	1.60	0.012	< 0.02	1488
May 16 / 1995	Raw	15	0.71	2430	8.5	0.24	438	1.79	391	1.60	< 0.002	< 0.02	1418
	Treated	5	1.30	2560	8.4	0.34	478	1.81	452	0.69	0.010	0.03	1484

Note: Shaded Values Exceed MOEE Ontario Drinking Water Objectives

Chlorides

The elevated chloride content has been the source of significant concern since 1971. The average concentration of chlorides in the well water has increased annually from 484 mg/l in 1971 to 560 mg /l in 1994 and will likely continue to increase with time. The 1994 concentration of chloride (560 mg/l) is more than double the recommended limit of 250 mg/l. High chloride concentrations are not harmful to health, however, high chloride concentrations are nearly always accompanied by sodium concentrations which as explained below can have adverse health effects. Also, at concentrations above 250 mg/l, chloride may impart an undesirable taste to water.

Sodium

Sodium concentrations are approximately 540 mg/l. The ODWO aesthetic objective for sodium in drinking water is 200 mg/l. Sodium occurs naturally in the earth's crust and is not consider to be toxic. A maximum acceptable concentration of sodium in drinking water has, therefore, not been specified. However persons suffering from hypertension or congestive heart failure may require a sodium - restricted diet, in which case, the intake of sodium from drinking water could be significant. The Medical Officer of Health should be notified when sodium concentration exceeds 20 mg/l, so that this information can be passed to local physicians for their use with patients on sodium restricted diets.

Iron

Similar to the chlorides, the iron concentration is increasing with pumping time. In March 1976 the concentration of iron was 0.3 mg/l - the recommended limit. The level is now reported to be 0.4 mg/l, 1.3 times the limit. Excessive levels of iron in drinking water supplies may impart a brownish colour to laundry, produce a bitter, astringent taste in water and beverages, and the precipitation of iron can promote the growth of iron bacteria in treated watermains and service pipes.

Total Dissolved Solids

TDS concentrations consistently have been 2½ to 3 times the acceptable limit of 500 mg/L. Dr. A. Ley, MOE Regional Microbiologist has implicated the high solids concentrations in the occurrence of elevated bacterial counts in the storage reservoir in 1984. He concluded that the bacterial counts may have been as a result of a combination of sediment accumulation in the reservoir cells and infrequent cleaning. He reported no evidence to suggest surface contamination sources of entry into the well pits. Thus it appeared the only source of these sediments was solids precipitating out of the water. This sediment provides a breeding ground for bacteria at a site that is protected from the disinfecting action of chlorine.

Fluoride

The recent fluoride level is 1.4 mg/L. This concentration has risen since 1971 when a level of 0.8 mg/L was detected.

Colour

Colour of the existing water is between 10 and 17 True Colour Units (TCU), two to three times the aesthetic objective of 5 TCU for colour in drinking water. Colour in drinking water may be due to the presence of natural or synthetic organic parameters as well as certain metallic ions such as iron, manganese and copper and become noticeable to consumers at levels greater than 5 TCU.

Alkalinity

The reported water alkalinity is around 500 mg/L which is at upper limit of ODWO operational guidelines (30 to 500 mg/L). Waters with low alkalinity will tend to corrode iron and produce "red water" while highly alkaline waters may produce encrustations on utensils, service pipes and water heaters.

Hardness

Hardness is around 150 mg/L which is 1.5 times higher than ODWO maximum objective of 100 mg/L. Hardness in drinking water can have significant aesthetic and economic effects. On heating, hard water has a tendency to form scale deposits and can result in excessive soap consumption.

5.2.3 Restriction of Community Growth

As a result of poor water quality and apparent constant deterioration with increased rate of pumping, all further development in the community is on hold until the situation is rectified. According to the Township of Cambridge Official Plan (see section 3.0 Planning Issues) Forest Park is one of the identified settlement areas where future development should take place. This is in accordance with Ministry of Environment and Energy planning guidelines to direct new development to areas where municipal services are already available. Providing a good quality water would allow growth in the Township without the need for designating other lands for housing.

5.2.4 Excessive Deterioration and Maintenance of Works

In addition to stopping development of new lots, the high concentration of chlorides, iron and total dissolved solids results in a higher than average deterioration and maintenance of the existing Forest Park water system.

6.0 ALTERNATIVE SOLUTIONS

This section presents potential alternative solutions to the identified problems :

6.1 DO NOTHING

The "Do Nothing" alternative does not resolve the existing problems with poor water quality nor will it allow for any future development in the Community of Forest Park. This would put pressure on the Township to designate new lands for housing development. In addition, the water quality will likely continue to deteriorate further impairing quality of life for the Forest Park residents resulting in decreased property values.

For the above reasons, the "do nothing" alternative would only be selected if economical factors preclude the selection of others technically feasible alternatives.

6.2 LIMIT COMMUNITY GROWTH

Limiting development in the Community will not solve water quality problems for the existing houses. No major expansion has taken place in the community since 1987 when the MOEE objected developing of remaining lots water quality continued to deteriorate. By not allowing development of remaining lots in Forest Park, Township population growth will have to occur elsewhere.

6.3 UPGRADE EXISTING SYSTEM

This alternative would require the construction of suitable treatment to improve water quality. This alternative appears to be possible however the poor quality of existing raw water would require extensive treatment. In addition, because the quality of water dramatically deteriorates with an increase in the rate of pumping, the level of treatment required would be unpredictable for future growth.

6.4 CONSTRUCT A SURFACE WATER TREATMENT PLANT

This alternative involves providing treated surface water to the community. There are three potential surface water sources as follows:

6.4.1 Ottawa River

The Ottawa River is located approximately 30 km north of the Forest Park community and would provide a good, reliable source of water. Due to the distance however, costs required to construct and operate a transmission line, booster stations and a water treatment plant would be prohibitive.

6.4.2 South Nation River

The South Nation River is located approximately 10 km east of the Forest Park development. Due to the rapidly changing conditions of the raw water quality during high flow conditions and high summer water temperatures a sophisticated water treatment process has to be employed. The cost of sophisticated treatment and need to construct 10 km of transmission line together with booster station makes this alternative too expensive.

6.4.3 Castor River

The Castor River is adjacent to Forest Park development. It is not however is not considered a viable source of water because of poor water quality and very low flow conditions during summer months.

6.5 COMBINATION OF COMMUNAL AND PRIVATE SYSTEMS

This alternative would keep existing water supply source with addition of individual treatment units for each house such as water filters and reverse osmosis treatment units. Because of poor water quality set of different filters would be required to treat different parameters such as colour, iron , chlorides, sodium, hardness, turbidity, etc. Constant maintenance and use of expensive chemicals regenerants like potassium permanganate, caustic soda, etc. is required to keep filters in good working condition. Also periodical backwashing of the equipment is required resulting in increased loads on septic systems and higher water consumption rates. Reverse osmosis units are capable of treating only limited quantity of water for drinking and cooking purposes only. The feedwater entering the unit has to be free of iron, manganese, sulphur and turbidity which is not a case in Forest Park. The water would have to be pre-treated by set of mentioned before filters, making this alternative quite impractical.

6.6 CONNECTION TO AN "AREA TYPE" WATER SUPPLY SYSTEM

The Townships of Clarence, Russell and Cambridge had commissioned a study in 1990 to look at a means to supply water to the communities in the above Townships. Since then, the Townships of Cambridge and Russell have proceeded with other servicing plans for their municipalities and are not participating in the area scheme and have forwarded an application to the Ontario Clean Water Agency for development of water supply source to service the development in Clarence Township. Since this initiative is still in its infancy and has to proceed through the Class EA process before the project can be adequately defined and subsequently approved by the MOEE and public, there is insufficient information available now to evaluate this future possibility.

6.7 OBTAINING WATER FROM LIMOGES

The Village of Limoges is located about 3.5 km north - west from the Forest Park development, just north of Highway 417. The Township of Cambridge is now proceeding with a Class Environmental Assessment for the installation of a new water supply system to serve the Village. A Phase 2 Report of the Class EA recently completed by Lecompte Engineering Ltd. recommends the construction of a communal water supply system for the Village using ground water as the raw water supply source, together with water treatment and storage. Because of Limoges' proximity to Forest Park obtaining water from the Village appears to be an economically and technically feasible alternative.

6.8 DEVELOP NEW WELLS

Developing a new well field with an acceptable quality and quantity of ground water would be a viable alternative to solve water problems in the Forest Park Community. In July of 1993 Jacques Whitford Environmental Limited was retained to carry out the hydrogeologic investigations necessary to locate an adequate groundwater supply source. This investigation concluded that there is a good quality water resource near Route 400 around 3 km north of Forest Park and that a minimum of three production wells would be required to meet the projected 20-year demand for water in the community.

7.0 EVALUATION OF ALTERNATIVE SOLUTIONS

The various alternatives described in previous chapter can be divided into two main groups:

The first group contains alternatives that restrict future growth and offer no or only partially solutions to the identified problems. This group includes such alternatives as :

- **Do Nothing**
- **Limit Community Growth,**

- **Upgrade Existing System**
- **Combination of Communal and Private Systems.**

None of the above alternatives offer a long term, reliable solution to the existing water quality problems.

The second group contains alternatives that would provide good quality water to the existing houses and also allow for future growth in the community. This group includes such alternatives as:

- **Construct a Surface Water Treatment Plant,**
- **Connection to the " Area Type " Water Supply System,**
- **Obtaining Water From Limoges**
- **Develop New Wells.**

During discussions at Liaison Committee meetings and with the Forest Park Community Association it was established that the preferred solution should not only resolve poor water quality but should also allow for future community growth as per existing approved Official Development Plan. All alternatives from the second group would meet those criteria. As already mentioned, however, due to extensive treatment requirements and distance from surface water sources the **Construction of Surface Water Treatment Plant** is to expensive to implement for Forest Park Community. The existing population density in Cambridge Township and adjacent municipalities does not warrant the development of an **" Area Type " Water Supply System** in the foreseeable future. Therefore the alternatives of **Obtaining Water From Limoges** and **Development of New Wells** appear to be only practical and economically feasible alternatives for a Forest Park water supply.

These two alternatives are evaluated further in the next sections.

8.0 ENVIRONMENTAL IMPACTS OF THE SELECTED ALTERNATIVES

8.1 DESCRIPTION OF ALTERNATIVES

8.1.1 Alternative A - Obtaining Water from Limoges

To obtain water from the Village of Limoges, oversizing of the proposed Limoges water works will be required to accommodate the Forest Park Community. Connection to the system would be made at the south end of the Village as shown in Fig 8.1.

Three alternative routes are identified for the feedermain between the Village of Limoges and Forest Park as shown in Figure 8-1.

Route A is the most direct route for the feedermain. Discussions were held with the land owners between Route 400 and Route 500 to obtain required easements on private property.

Route B has been examined to provide an alternative location to cross the Highway #417 in case of any difficulty in obtaining easements.

Route C is the most expensive because of the required rock excavation, conflicts with existing utilities along County Road No. 5 and the greater distance but would allow supply other areas such as Le Baron estates.

Each of the proposed routes would require crossing of Highway #417 using a trenchless technology such as jacking and boring using steel or concrete pipe casing.

8.1.2 Alternative B - Develop New Wells

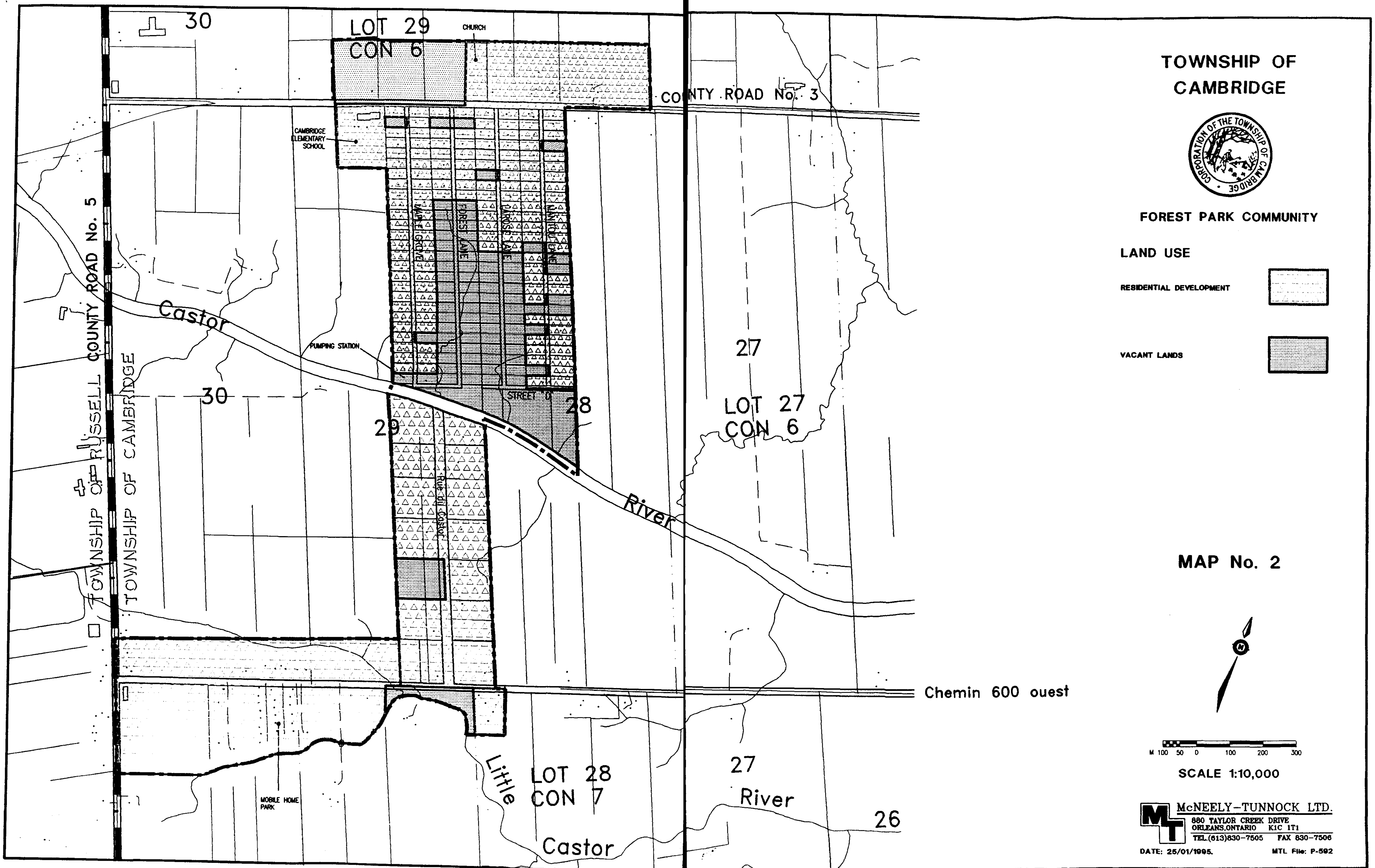
As indicated in Jacques Whitford Hydrogeological Report, to develop a communal water supply in the shallow bedrock aquifer in the area north of Route 4000, a minimum of three wells will be required to meet the 20-year design flow. The proposed wells should be spaced at approximately 200 m apart to minimize the interference effects and maximize the available drawdown. Groundwater chemical test results from wells TW-5, TW-7 and TW-9 located as shown on Dwg. 30340, 105 Appendix E indicate good groundwater quality with all chemical parameters being within the Ontario Drinking Water Objectives with the exception of colour.

Two routes were proposed for the feedermain between the well field and Forest Park as shown in Figure 8-2.

Similar to Alternative A, Route A is the most direct line for feedermain. Discussions were held with the land owner between Route 400 and Route 500 to obtain the required easements on private property. Route B would be an option in case there is difficulty in obtaining easements for Route A.

Construction of well enclosures for each well together with treatment building will be necessary for this option.

The Jacques Whitford hydrogeological report also recommended that a multi-well pump test be conducted to determine interference effects and the long term safe yield of the system. The recommended 72 hour multi-well pump test was conducted in June 1995. The results indicated that a projected maximum safe yield of 4.5 l/s was attainable from the aquifer in the vicinity of the proposed production well, which is well below the 12 l/s design flow required to accommodate future development. This testing included water quality sampling which revealed the groundwater was not as good quality as previously believed,


TOWNSHIP OF CAMBRIDGE
CORPORATION OF THE TOWNSHIP OF CAMBRIDGE
FOREST PARK COMMUNITY
LAND USE
RESIDENTIAL DEVELOPMENT
VACANT LANDS
MAP No. 2
M 100 50 0 100 200 300
SCALE 1:10,000
McNEELY-TUNNOCK LTD.
880 TAYLOR CREEK DRIVE
ORLEANS,ONTARIO K1C 1T1
TEL.(613)830-7505 FAX 830-7506
DATE: 25/01/1995.
MTL File: P-592
LOT 29
CON 6
CHURCH
COUNTY ROAD No. 3
CAMBRIDGE ELEMENTARY SCHOOL
COUNTY ROAD No. 5
TOWNSHIP OF RUSSELL
TOWNSHIP OF CAMBRIDGE
Castor
River
PUMPING STATION
MAPLE GROVE
FOREST LANE
ROSE LANE
MANITOU LANE
STREET 'D'
Rue du Castor
30
29
28
27
LOT 27
CON 6
Chemin 600 ouest
MOBILE HOME PARK
Little
LOT 28
CON 7
Castor
River
27
26

Schools

Cambridge Elementary School, under the jurisdiction of the Prescott and Russell School Board (public) serves all of Cambridge Township and Concessions 6-10 east of St. Guillaume Street in Russell Township.

The current school enrollment is 331 students and 30 staff. The designated capacity of the permanent component of the school is 95 students and is supplemented by a number of portables which increases the capacity to 350. The school serves junior kindergarten through Grade 8.

Separate elementary students from Forest Park attend St. Viateur school in Limoges.

High school students are bused to Hammond or Embrun.

Official Plan and Zoning By-law

OFFICIAL PLAN

The policy framework for land use planning is contained within the municipality's Official Plan which was approved on October the 3rd, 1985 with modifications. There are three major policy sections within the document which apply to the lands in and around the Forest Park Community, Rural Subdivisions, Linear Developments and Mobile Home Parks.

Section 6.1, Rural Subdivisions, applies to the subdivision between County Road No. 3 and the Castor River, i.e. Forest Park East. Section 6.1 of this policy recognizes Forest Park (along with 2 other subdivisions in the Township) as a primary population centre in which development would be permitted on existing registered lots but no further expansion of the subdivision or severances would be permitted.

Section 6.2 identifies the permitted uses within such a rural subdivision as single family residential dwellings and uses which primarily serve the residents of the subdivision such as a convenience store and a park. The preferred location for non-residential uses would be along the Concession Road (or along the watercourse in the case of the park).

Section 6.3 (b) applies specifically to Forest Park and states: "When the balance of the subdivision is developed, the municipal water system and public roads must be constructed at the expense of the developer. The municipality should also insist on the opening of side streets between the existing streets, and on a public open space along the river. The existing school should be upgraded and it is considered a permitted use for Official Plan purposes. The lot area of the existing registered lots have a legal conforming status with respect to the Official Plan."

It is clear from the policies of the Official Plan that further residential development is contemplated for this component of the Forest Park Community. It is to be emphasized however that development is confined to the limits of the existing subdivision and that further land vision to create a greater lot yield would not be permitted. The type of residential development is limited to low density singles. Non-residential development is intended to support very basic services to this subdivision such as a convenience store, school and park but does not conversely, contemplate the build-up of other urban type commercial, institutional or other uses.

Section 8 of the Official Plan - Linear Developments applies to lands abutting the Castor Road (Rue du Castor) between the Castor River and Chemin 600 Ouest as well as to a small strip of land in Lot 29 between the Castor River and Chemin 600 Ouest. The latter is permitted by virtue of Amendment No. 20 to the Official Plan.

The linear development policies of the Official Plan permit residential development (Section 8.1) in the form of single family dwellings or cottages (Sections 8.2) and provided the minimum lot area is 1,850 m^2 or larger (Section 8.3). Amendment No. 46 to the Official Plan modified the requirement in Section 8.3 regarding the minimum frontage of remnant parcels within linear development. The minimum frontage of 50 m was deleted. Section 8.5 of the Plan states that lands designated "linear development" along the Castor River may not in all cases be suitable for development because of the set-backs required by Section 17.

Finally, the linear development policies do not contemplate the extension of existing designated linear areas as shown on the Official Plan Schedule "A" (attached as Appendix 1).

The intent of the linear development policies is to permit exclusively low density residential development with lot sizes sufficient to support private services. No other land uses are contemplated within this land use designation. Unlike the policies regarding rural subdivisions, there are no apparent restrictions on severances within linear development. As a consequence, a subdivision of larger lots within linear development areas would be permitted as long as they meet the Health Unit requirements.

Section 7 of the Official Plan - Mobile Home Parks, applies to lands along Chemin 600 Ouest in Lot 30, Concessions 6 and 7. A mobile home park means a property developed and managed under single ownership in which the individual lots are not registered and the owner is essentially responsible for the general administration of the park vis-a-vis services (Section 7.1). The Plan does not permit the establishment of new mobile home parks, although the enlargement of an existing park may be permitted where demand can be substantiated (Section 7.2). The permitted uses within the mobile home park are mobile homes as well a supporting non-residential uses such as a convenience store, laundry, private open space and mobile home sales (Section 7.3).

Again, the policies of this section of the Official Plan contemplate a low density residential development with some supporting non-residential as well. Some opportunity exists for modifying the scope of the area for future development although it would have to be justified by a housing study.

Aside from the three major policy areas which affect the Forest Park Community, Section 9 of the Plan - Agricultural Resource Area, must be considered. The policies of this section of the Plan have as the key objective, to protect good agricultural lands for agricultural activities. In general, the policies are very restrictive with respect to residential development. For example, a second residential unit on an existing farm property may be permitted "for the use of farm family or employees". Farm-related severances under Section 9.4 are permitted principally to allow for a retirement lot for a farmer, for farm consolidations or for the disposition of a surplus dwelling. As a consequence, the scope for additional development in and around the Forest Park community is limited with respect to this policy section of the Official Plan. It should be noted that one amendment (Amendment No. 8) to the Official Plan allowed for the redesignation of land on the north side of County Road 3 opposite Forest Park East to permit the church on that property.

Section 17 of the Plan identifies certain development constraints which must be considered, specifically Section 17.3.1 - Floor Potential, identifies the potential for flooding of areas along the South Nation and Castor Rivers respectively and establishes the necessity for a setback to avoid damage to property.

Section 18 of the Plan sets out policies for roads and identifies the local roads system as being preferable for "direct lot access". Road right-of-ways should be 20 m and that the road be maintained on a year-round basis.

<u>Analysis of Official Plan Policies</u>

To a large extent, the Official Plan policies are status quo with respect to development in the sense that the designation of additional lands is not contemplated for further residential development. Conversely, there is essentially no restriction on complete development of vacant lands within the existing designations be it subdivision, linear development or mobile homes. Given this policy framework, the development potential as identified earlier in this report i.e. 70 to 75 new residential units (single detached dwellings or mobile homes) would be permitted. The Official Plan enumerates the requirements for servicing but is permissive with respect to the requirement for municipal water and street lighting in rural residential subdivisions. While there is no obligation for the municipality to insist on this type of service, where they do, the cost is intended to be at the developer's expense.

The Plan also identifies the existence of development constraints and in particular, areas subject to unstable slopes or flood risk. Increased setbacks from river bodies to avoid the risk of flooding will be a limiting factor on development. The function of the local road system in providing access to adjacent properties is not compromised by virtue of any development within the Forest Park Community.

ZONING BY-LAW

The Township's Zoning By-law No. 144-88 dates to 1988 and sets out the restrictions regarding land development within the municipality. Several zones apply to the various lands within the Forest Park Community.

Zoning for the Forest Park East subdivision is General Residential (R1) which permits single family, duplex and semi-detached dwellings. Single dwellings are permitted on lots with a minimum of 1,850 m^2 with a minimum lot frontage of 30 m. The requirements for a semi-detached are on a lot area of 1,400 m^2 per dwelling house with a 20 m minimum frontage. For duplexes the minimum lot area is 2,800 m^2 with a minimum lot frontage of 30 m.

A Residential Exception Zone (R1-2) applies to the linear development areas (Rue du Castor) wherein only a single family dwelling is permitted. By-law No. 132-90 reduced the lot frontage to 30.49 m (from 60 m) and prescribed a minimum lot depth of approximately 120 m.

Within the Mobile Home Park Zone, the lot area for a mobile home on private services is consistent with the R1 zone requirements i.e. 1,850 m^2 and 30 m frontage. Lot areas and frontages may be reduced where communal services exist to a lot area 850 m^2 for one communal service and a lot frontage of 20 m.

Other zones that apply include an Institutional Zone for the Forest Park Elementary School, a Rural Agricultural RA-1 Exception Zone for the church and an Open Space OS Zone for lands abutting the Castor River on the south side of the Forest Park East subdivision. Finally, there is a C2-2 Zone which recognizes an automobile repair shop on lands on the north side of County Road 3 opposite the northeast corner of the Forest Park East subdivision.

Analysis of Zoning By-law

The Zoning By-law implements the Official Plan although it is interesting to note that with respect to the R1 Zone, while the Official Plan restricts development to only single dwellings, the zoning permits semis and duplexes as well. This could potentially increase the number of housing units permitted in the Forest Park East subdivision. The other impact of the amendment with respect to the linear development along the Rue du Castor would be to permit severances on lots with a reduced frontage from 60 m to 30 m.

Demographics and Housing Characteristics

POPULATION GROWTH

Figure 1 and Table 1 provide a historical illustration of growth within the Township of Cambridge (1921-1991). As may be seen from these illustrations, the annual growth rate over the period 1971-1991 was substantial i.e. 6.58% per year and reflected in actuality higher rates of growth in the decade 1971-1981. The rate of growth in the latter decade has dropped off and according to the last census is 3.19% (1981-1991)... and has been further reduced to 3.06% per annum (1986-1991). The Official Plan does not set out a specific target population for the Township of Cambridge but does indicate that the population growth for the entire municipality would be in the order of 9,000 by the year 2000. This would equate to an average rate of growth of 5% per annum over the period 1986 to 2001. This projected rate of growth is rapid by current standards.

The growth rate projected in the Official Plan, however, has not been realized. For example, the 1991 population for Cambridge was 5,915. This would generate an average annual growth of 23 to 30 persons or approximately 8 to 10 new households in the Township.

The decline in the average rate of growth in the Township is to some extent reflective of changes in the composition of the population as well as economic factors. With an aging population, fertility rates have declined as reflected in Figure No. 2 where the average number of persons per household in the Township of Cambridge has declined to 3.12 persons per household from 3.27. Economic factors include the influence of development in the Regional Municipality of Ottawa-Carleton and surrounding communities within the commuter shed. As may be seen from Figure 3, the total labour force - 15 years and over, persons employed in government services constitutes the third largest category. With the decline of the growth of the Federal Civil Service, growth in this particular category may not be anticipated. Conversely however, growth in the service industries which is represented by figures on trade and other services in Figure 3, will continue to have a positive influence on growth in the Township. It should be noted from a comparison of 1986 and 1991 figures in Figure 3 that there has been a substantial increase in employment in the categories of trade and other services. Overall, the growth rate in Cambridge with greater than average rates of growth in many other rural communities of 1 to 2% per annum or less.

POPULATION COMPOSITION

The composition of the population of the Township of Cambridge is represented in Figure 4 and Table 2. These illustrations indicate quite clearly that the population is a young population with a substantive working age component. For example, while the Ontario average for persons over 65 years is 11% (1991), the percentage in Cambridge

TOWNSHIP OF CAMBRIDGE
Population Growth
(1921 - 1991)

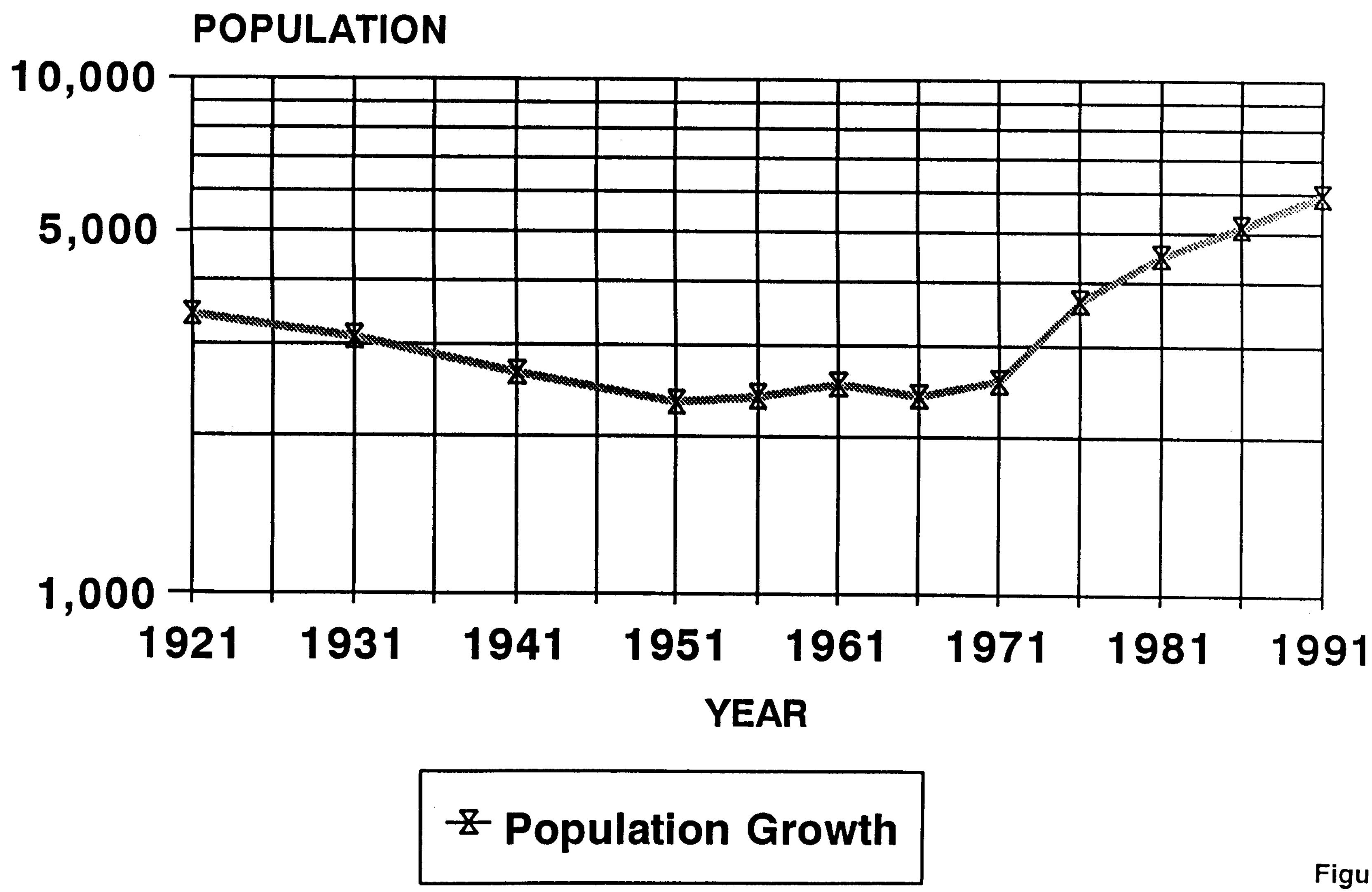


Figure 1

Table 1 TOWNSHIP OF CAMBRIDGE

YEAR	POPULATION	CHANGE	ANNUAL % CHANGE 5 YEARS	10 Yr CHANGE	ANNUAL % CHANGE 10 YEARS
1921	3,426	---			
1931	3,082	-344	-1.00%	-344	-1.00%
1941	2,641	-441	-1.43%	-441	-1.43%
1951	2,318	-323	-1.22%	-323	-1.22%
1956	2,380	62	0.53%		
1961	2,510	130	1.09%	192	0.83%
1966	2,388	-122	-0.97%		
1971	2,555	167	1.40%	45	0.18%
1976	3,664	1109	8.68%		
1981	4,485	821	4.48%	1930	7.55%
1986	5,131	646	2.88%		
1991	**5,915**	784	3.06%	1430	**3.19%**

1971-1991	20 years	6.58% per year
1951-1991	40 years	3.88% per year
1921-1991	70 years	1.04% per year

is only 6.68%. The implications of a younger overall population is positive for growth since the child bearing years will be extended by contrast to the general population.

INCOME

Income characteristics are shown in Figure 5. Family and household incomes are substantive and equate to the Canadian average. This indicates a substantive level of economic prosperity within the Township.

HOUSING CHARACTERISTICS

Figures 6 and 7 provide dwelling unit characteristics. Figure 6 indicates that a high percentage of the dwelling units in the Township as a whole are single detached (91.1% versus the Ontario average of 57.6%). The preference for this type of residential unit is also reinforced by the fact that a substantial portion (86.2%) of the housing stock is owner occupied.

The period of construction of dwellings within the Township is reflected in Figure 8 and reinforces the substantial growth that took place in the Township over the period 1971-1991. For example, fully 70.7% of the current housing stock has been constructed since 1971.

Summary of Demographic and Housing Information

The population of the Township may be summarized as young and growing at a rate which is in excess of average growth rates for other rural communities. Moderate to rapid periods of growth in the 70's however have gradually declined although the projected future growth rate will still be above the norm i.e. in the vicinity of 2% or more for the foreseeable future.

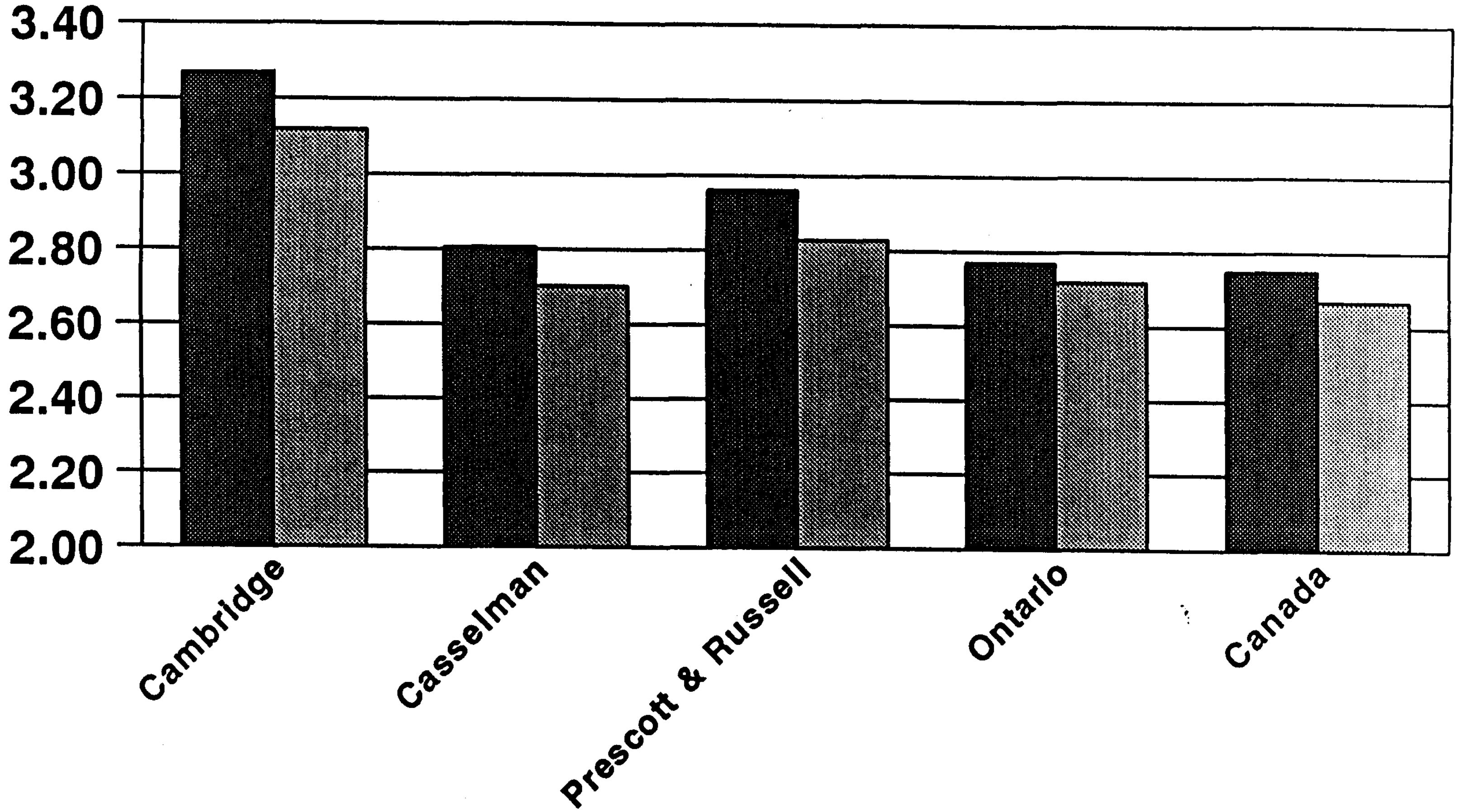
There is a significant preference for owner occupied single detached housing, a trend which is not likely to change. Higher than average incomes indicate substantial overall prosperity by residents of the Township and the capability to purchase single detached housing.

Statistical information is not specifically available for the Forest Park Community since Statistics Canada information is not collected at this level. However, in extrapolating the population information, the number of persons residing in the Forest Park Community would be 583 (187 housing units x 3.12 persons per household). This represents approximately 9% of the overall Township population. The service area population, that is to say those residents who are serviced by communal water, would be 452 (145 dwellings units x 3.12 persons per household). Aside from population, it is not unreasonable to state that the Forest Park Community represents the other characteristics of age composition, income, labour force and dwelling unit characteristics.

Implications for Growth in the Forest Park Community

The land use policy framework and associated regulatory controls make provision for continued growth within the Forest Park Community. It is reasonable to suggest that this is one of the identified settlement areas within the Township of Cambridge and should be a focal point for future development, particularly with the availability of a water service for this area. It may be expected that this area will, however, compete with other settlement areas within the Township and that the viability of growth will be dependent on the serviceability and the cost of developing building lots. The number of potentially available lots for development (70-75) represents a 6 to 8 year supply of land if for example, all development in the Township were directed into the Forest Park Community. This is not however realistic but is indicative of the long term potential for continued growth within Forest Park without the necessity of designating additional lands. The desire for development within this area will be reinforced by the influence of comprehensive policy statements contained within the new Planning Act which are intended to focus new development in settlement areas where services are available.

AVERAGE NUMBER OF PERSONS PER HOUSEHOLD
1986 and 1991



	Cambridge	Casselman	Prescott & Russell	Ontario	Canada
1986	3.27	2.81	2.96	2.77	2.75
1991	3.12	2.70	2.83	2.72	2.67

Sources: Statistics Canada, 1991 (Cat. 95-337)
Statistics Canada, 1986 (Cat. 94-111)

Figure 2

% MALES	% FEMALES	Casselman - 1991	MALES	FEMALES	% MALES	% FEMALES	Cambridge - 1991	MALES	FEMALES	% MALES	% FEMALES
0.01682	0.02746	75-++	70	135	0.02846	0.05488	75-++	70	85	0.01183	0.01437
0.02843	0.03342	65-74	75	110	0.03049	0.04472	65-74	125	115	0.02113	0.01944
0.01786	0.01942	60-64	45	50	0.01829	0.02033	60-64	65	80	0.01099	0.01352
0.01957	0.01972	55-59	40	40	0.01626	0.01626	55-59	75	70	0.01268	0.01183
0.02359	0.02054	50-54	50	40	0.02033	0.01626	50-54	125	95	0.02113	0.01606
0.03163	0.02947	45-49	70	80	0.02846	0.03252	45-49	170	155	0.02874	0.02620
0.04011	0.03662	40-44	90	65	0.03659	0.02642	40-44	285	225	0.04818	0.03804
0.04547	0.04473	35-39	100	100	0.04065	0.04065	35-39	310	295	0.05241	0.04987
0.04964	0.05046	30-34	105	110	0.04268	0.04472	30-34	320	340	0.05410	0.05748
0.04302	0.04488	25-29	125	130	0.05081	0.05285	25-29	270	300	0.04565	0.05072
0.02917	0.02821	20-24	70	90	0.02846	0.03659	20-24	160	150	0.02705	0.02536
0.03446	0.03304	15-19	80	80	0.03252	0.03252	15-19	225	200	0.03804	0.03381
0.03773	0.03483	10-14	75	70	0.03049	0.02846	10-14	270	235	0.04565	0.03973
0.03967	0.03870	5-9	100	90	0.04065	0.03659	5-9	285	270	0.04818	0.04565
0.04197	0.03937	0-4	95	80	0.03862	0.03252	0-4	285	260	0.04818	0.04396
0.49914	0.50086		1,190	1,270	0.48374	0.51626		3,040	2,875	0.51395	0.48605
1.00000		Total=		2,460	1.00000		Total=		5,915	1.00000	
		0-19	27.24%				0-19	34.32%			
		20-64	56.91%				20-64	59.00%			
		65+	15.85%				65+	6.68%			
			100.00%					***********			

Table 2

TOWNSHIP OF CAMBRIDGE
Population Composition
1991

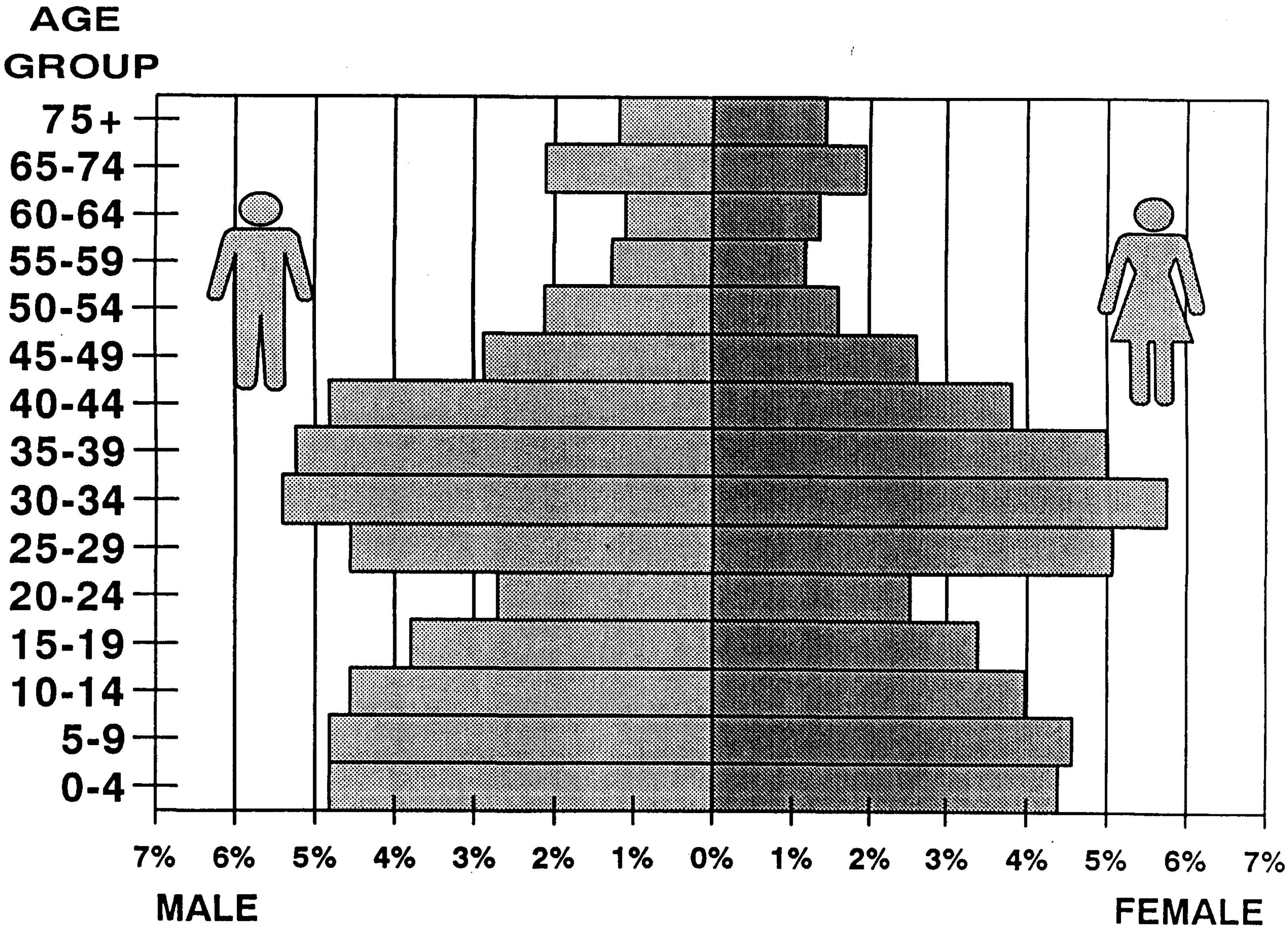
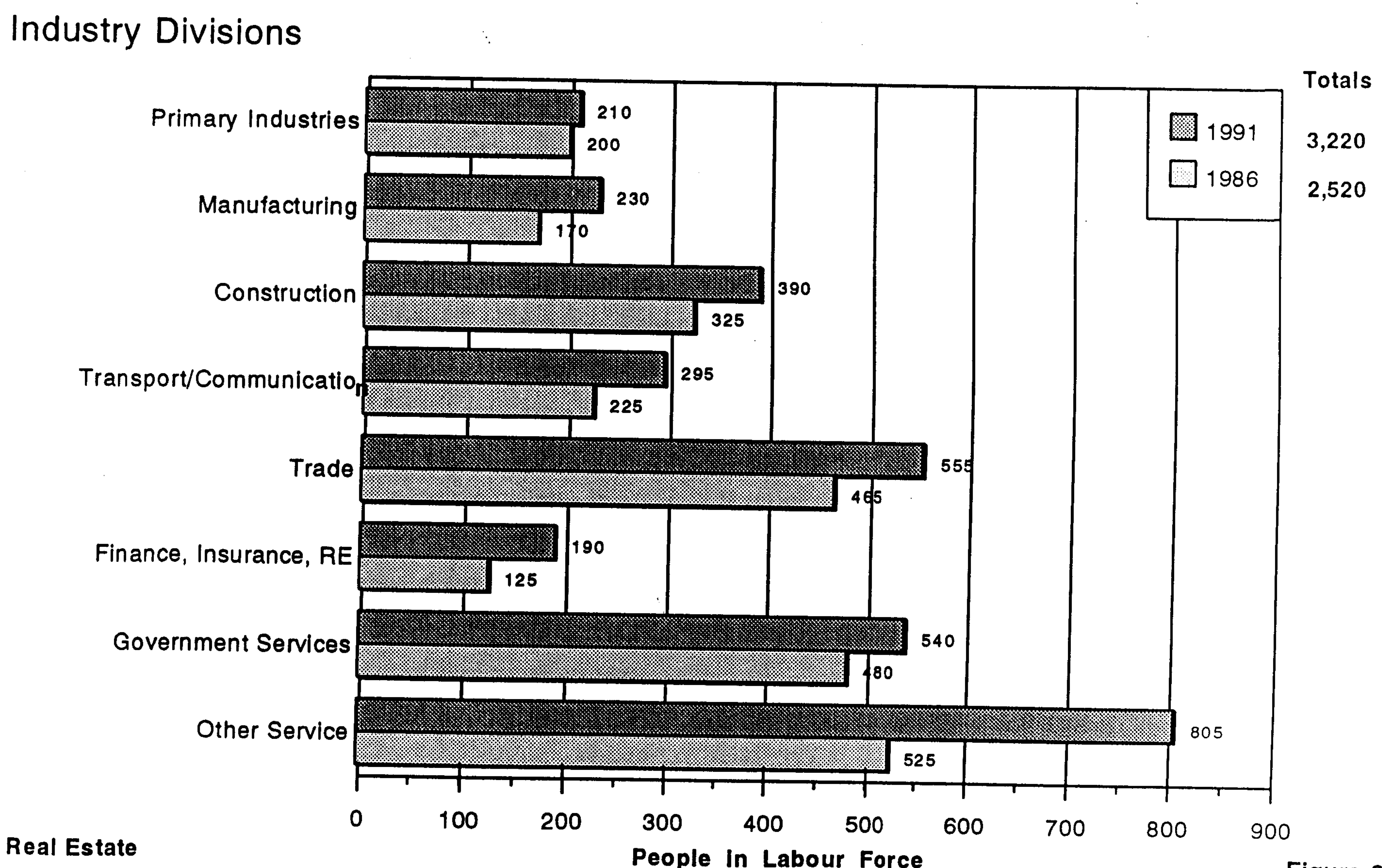


Figure 4

Source: Statistics Canada (Cat. 95-337)

Prepared by: [illegible]

TOWNSHIP OF CAMBRIDGE
Total Labour Force - 15 years and over
1991 - 1986



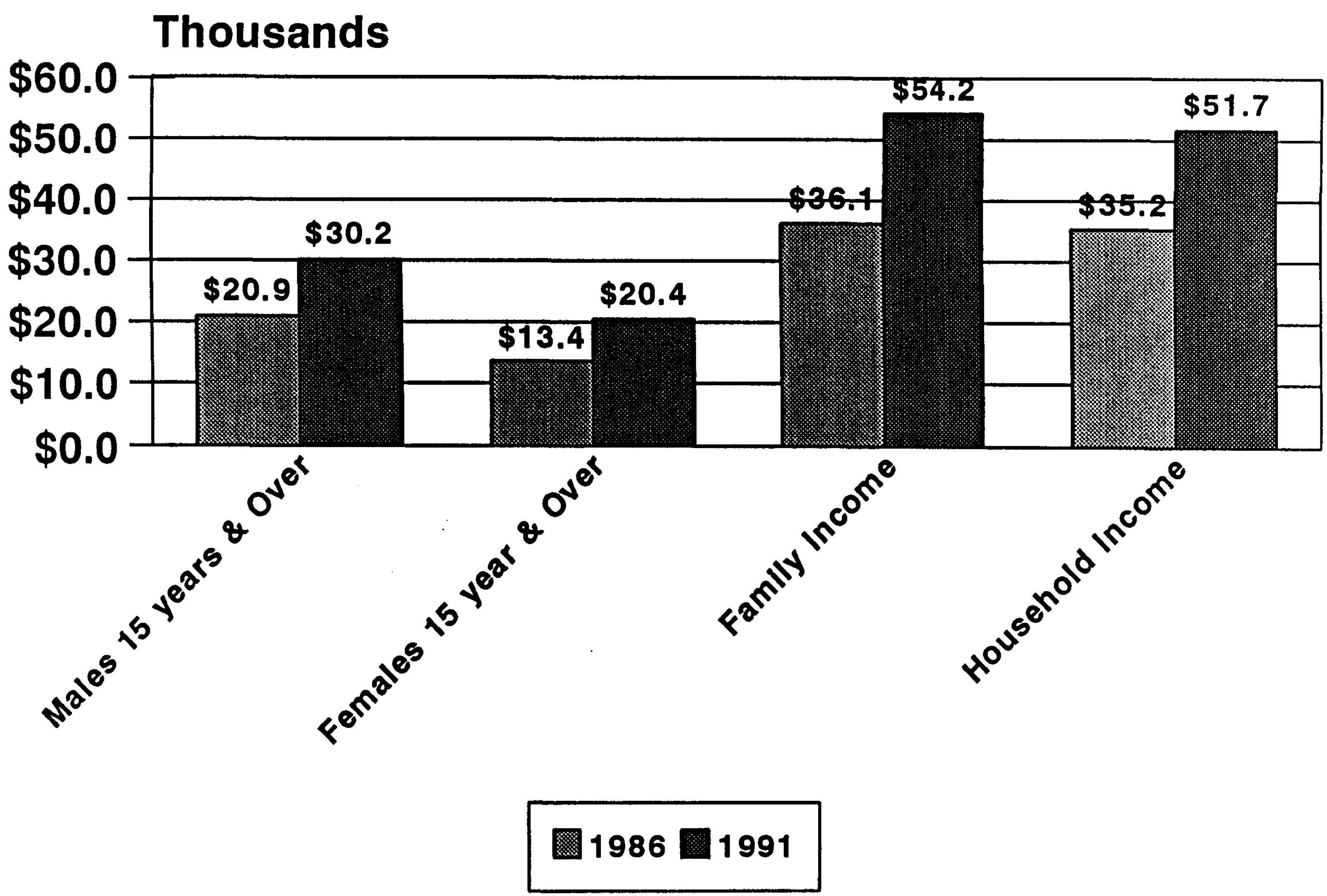
RE - Real Estate

Prepared by: McNeely-Tunnock Ltd.

Figure 3

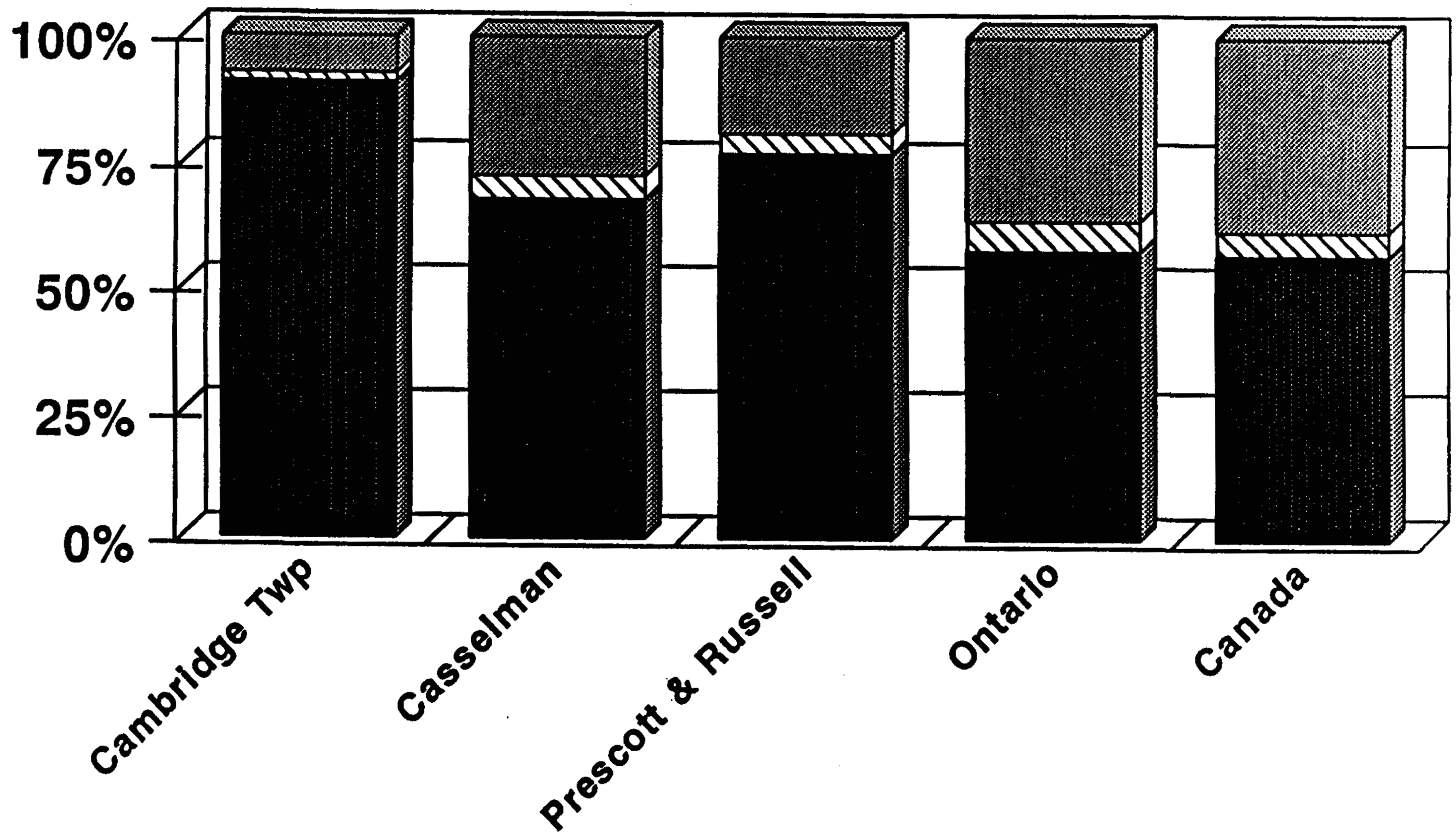
Source: Statisitics Canada

TOWNSHIP OF CAMBRIDGE
AVERAGE INCOME CHARACTERISTICS
1985 and 1990



Sources: Statistics Canada, 1991 (Cat. 95-337)
Statistics Canada, [illegible]

DWELLING UNITS BY TYPE
Single Detached, Semi-Detached and Other Dwellings

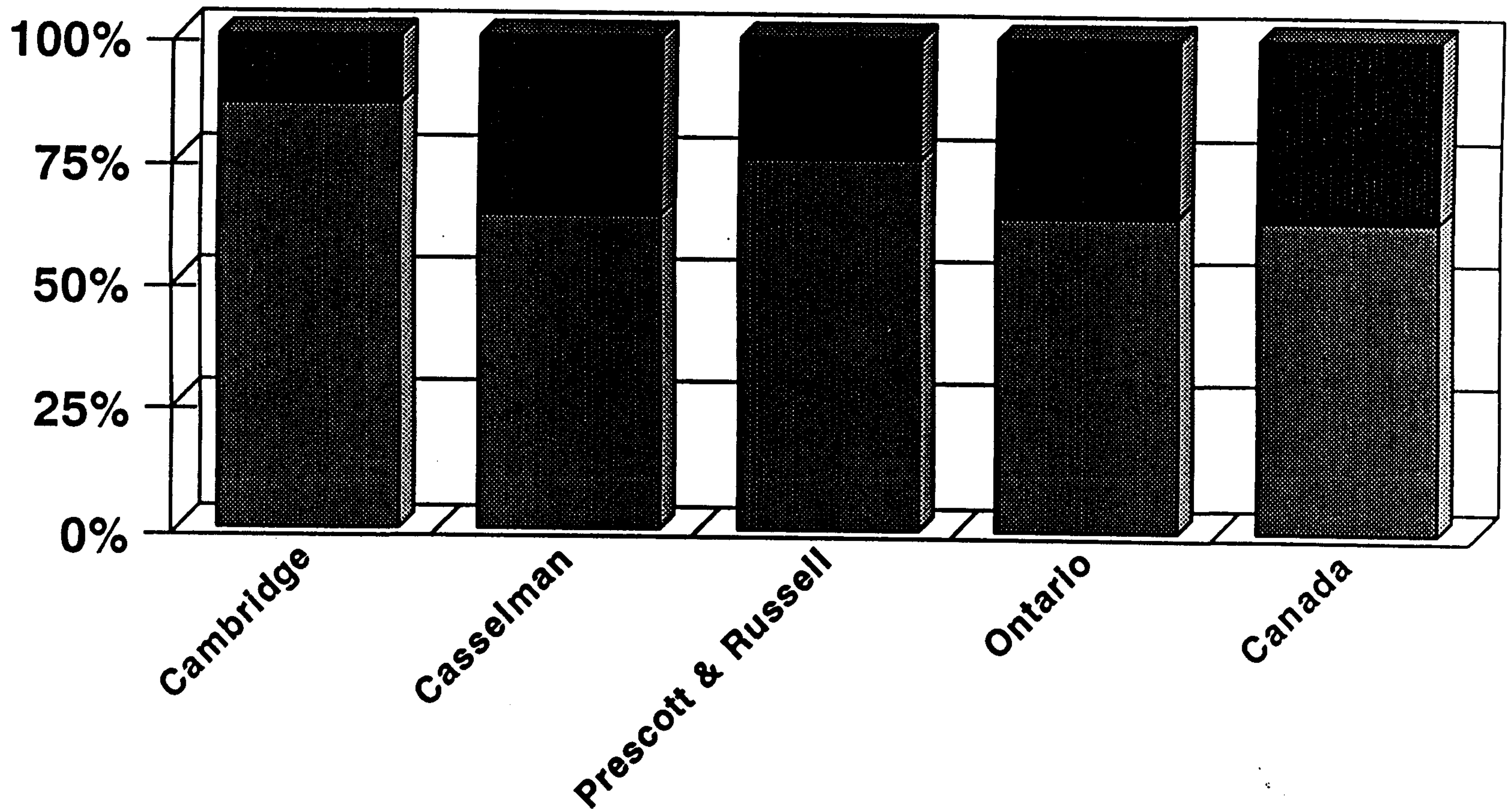


	Cambridge Twp	Casselman	Prescott & Russell	Ontario	Canada
Other	7%	27.5%	18.8%	36.2%	38.4%
Semi-Detached	1.9%	4.8%	4.1%	6.2%	4.7%
Single Detached	91.1%	68.3%	77.3%	57.6%	56.9%

Source: Statistics Canada, 1991 (Cat. 95-337)
Other: Row house, Apartment, duplex, or other single attached house

Figure 6

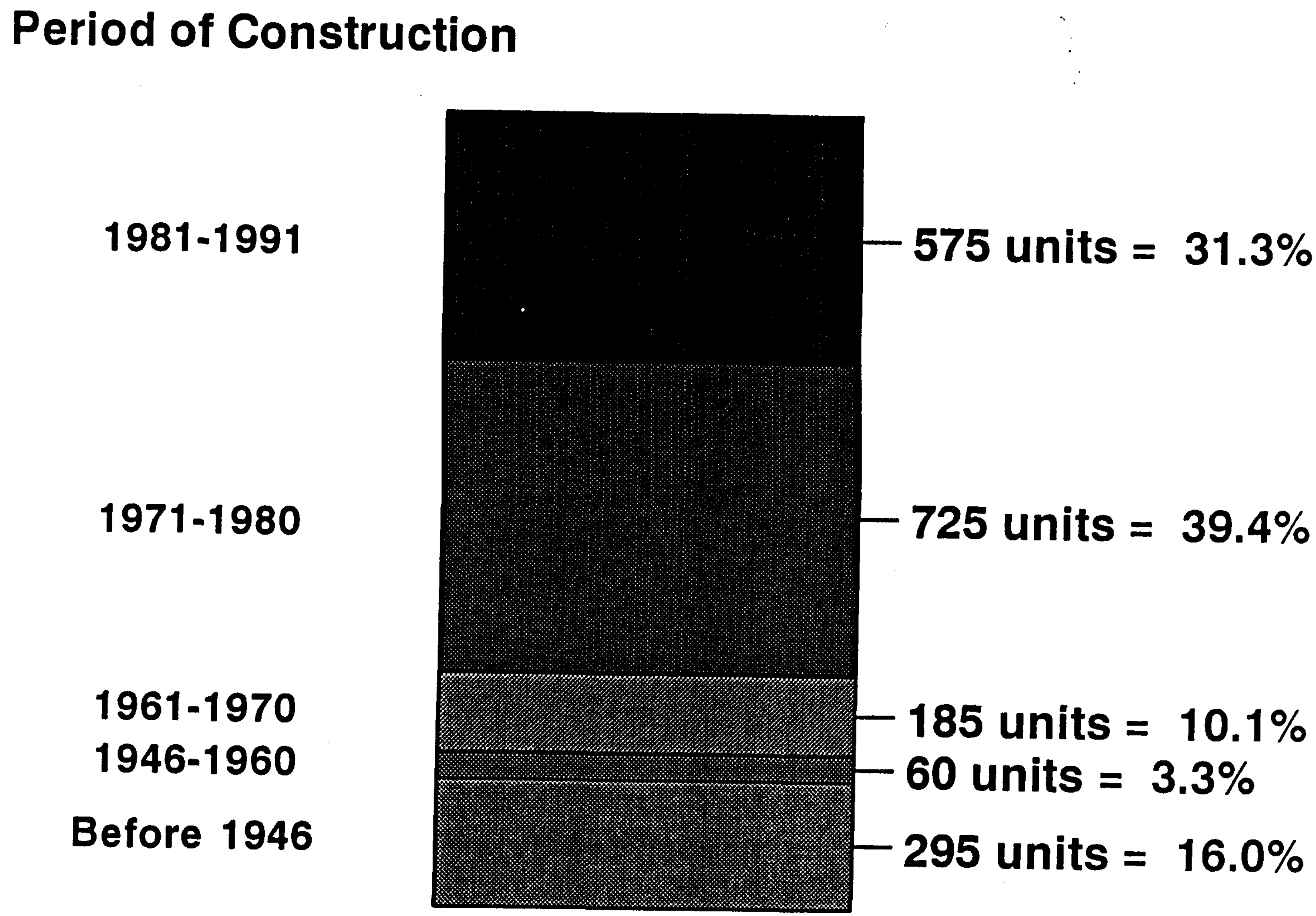
DWELLING UNIT CHARACTERISTICS BY TENURE
OWNED VS. RENTED
1991



	Cambridge	Casselman	Prescott & Russell	Ontario	Canada
Rented	13.8%	36.5%	24.7%	36.3%	37.2%
Owned	86.2%	63.5%	75.3%	63.7%	62.8%

Source: Statistics Canada, 1991 (Cat. 95-337)

TOWNSHIP OF CAMBRIDGE
Dwelling Unit Construction

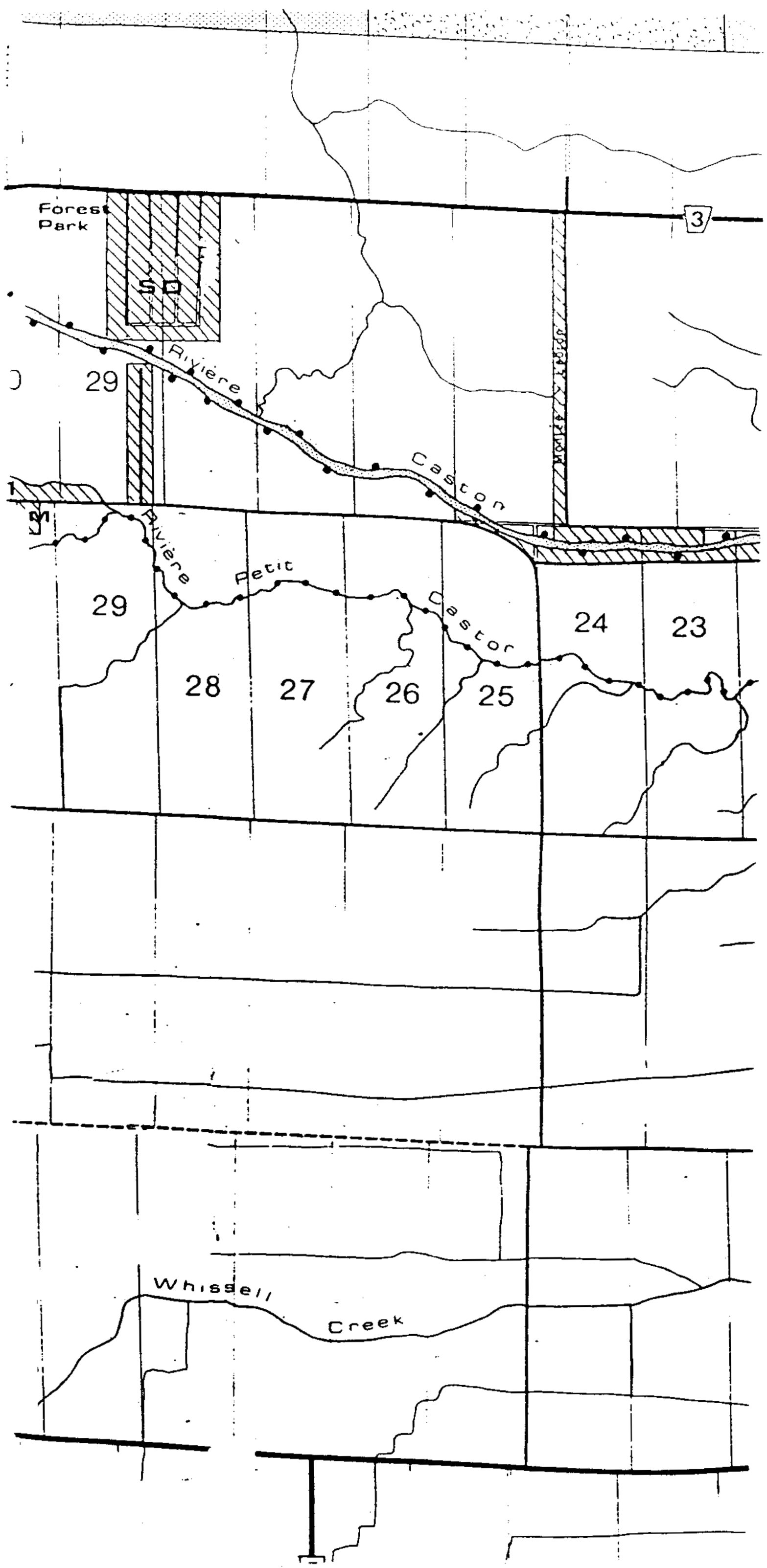


Statistics Canada 1991 (Cat. 95-338)

Figure 8

APPENDIX 1

Township of Cambridge
Official Plan
Schedule "A"



Plan directeur du - Official Plan of th

Canton de/Township of

Cambridge

Cédule/Schedule 'A'

Légende/ Legend

Limite du Canton / Township Boundary
Route provinciale / Provincial Highway
Chemin de comté (ARTERE) / County Road (ARTERIAL)
Chemin municipal (LOCAL) / Municipal Road (LOCAL)
Chemin municipal - saisonnier seulement / Municipal Road - seasonal only
Emprise de chemin / Road Allowance
Chemin de comté (COLLECTEUR) / County Road (COLLECTOR)
Chemin de fer / Railway

SECTEUR RESIDENTIEL/RESIDENTIAL AREA

Village
Parc pour maisons mobiles / Mobile Home Park
Subdivision Rurale / Rural Subdivision
Développement linéaire / Linear Development

SECTEUR RURAL / RURAL AREA

Secteur des ressources agricoles / Agricultural Resource Area
Réserve minérale / Mineral Reserve
Secteur des ressources rurales / Rural Resource Area
Dépotoir / Waste Disposal
Forêt publique / Public Forest
Commerce routier / Highway Commercial
Industrie / Industry

CONTRAINTES A L'AMENAGEMENT/ DEVELOPMENT CONSTRAINTS

Pentes sensibles / Sensitive Slopes
Mouvements de masse / Landslide Potential
Terres inondables / Flood Potential — VOIR LE TEXTE / REFER TO THE TEXT
Bruit / Noise
Sols organics / Organic Soils
Odeurs / Odours — VOIR LE TEXTE / REFER TO THE TEXT

APPENDIX D

EXCERPTS FROM VILLAGE OF LIMOGES
COMMUNAL WATER SUPPLY
PHASE 3 CLASS EA DRAFT REPORT
PREPARED BY LECOMPTE ENGINEERING LTD.

TOWNSHIP OF CAMBRIDGE

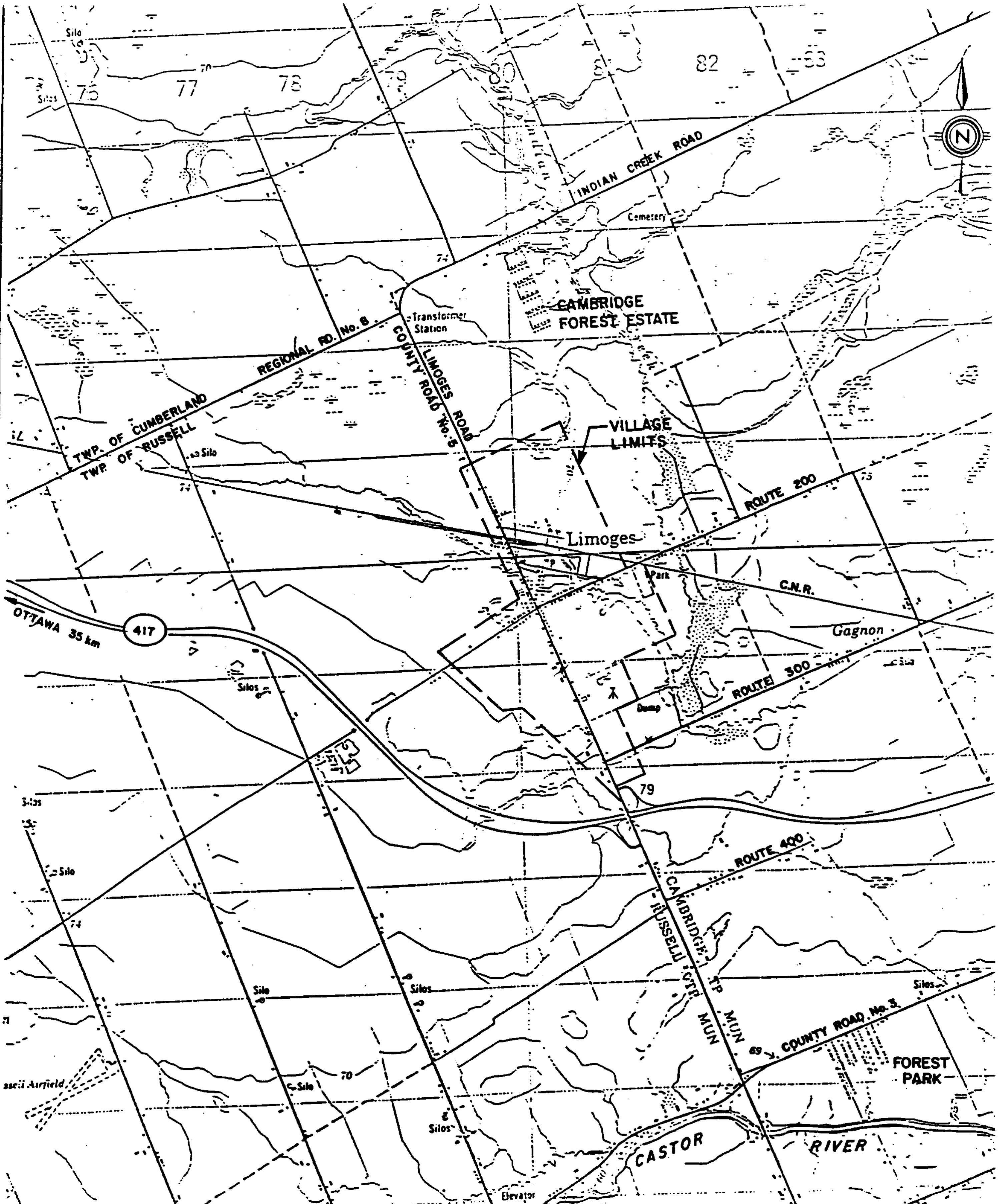
COMMUNAL WATER SUPPLY FOR THE VILLAGE OF LIMOGES

PHASE 3 CLASS EA
DRAFT REPORT

LECOMPTE ENGINEERING LTD

JULY 1995

Our File : 5341.22



TITLE:

LOCATION PLAN

LECOMPTE ENGINEERING LTD

CONSULTING ENGINEERS
INGENIEURS CONSEILS

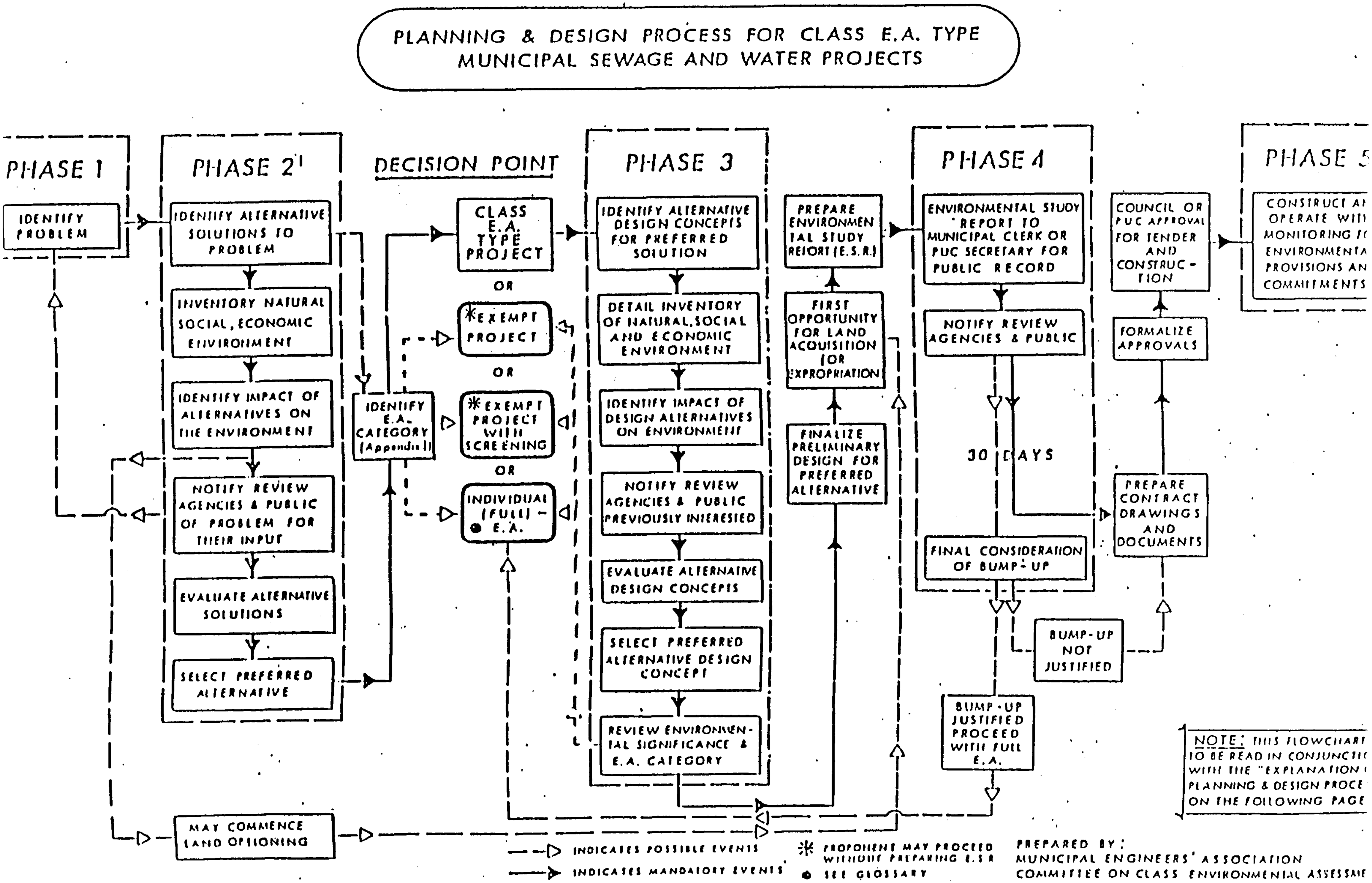
PROJECT:

VILLAGE OF LIMOGES WATER & SEWAGE SYSTEMS

DESIGNED / DRAWN	DATE:
GC / TG	JUNE/94

FILE NO.:	FIGURE:	SCALE:
5341	1	1:50,000

FIGURE 2


PLANNING & DESIGN PROCESS FOR CLASS E.A. TYPE MUNICIPAL SEWAGE AND WATER PROJECTS
PHASE 1
IDENTIFY PROBLEM
PHASE 2
IDENTIFY ALTERNATIVE SOLUTIONS TO PROBLEM
INVENTORY NATURAL SOCIAL, ECONOMIC ENVIRONMENT
IDENTIFY IMPACT OF ALTERNATIVES ON THE ENVIRONMENT
NOTIFY REVIEW AGENCIES & PUBLIC OF PROBLEM FOR THEIR INPUT
EVALUATE ALTERNATIVE SOLUTIONS
SELECT PREFERRED ALTERNATIVE
DECISION POINT
IDENTIFY E.A. CATEGORY (Appendix I)
CLASS E.A. TYPE PROJECT
OR
*EXEMPT PROJECT
OR
*EXEMPT PROJECT WITH SCREENING
OR
INDIVIDUAL (FULL) ● E.A.
PHASE 3
IDENTIFY ALTERNATIVE DESIGN CONCEPTS FOR PREFERRED SOLUTION
DETAIL INVENTORY OF NATURAL, SOCIAL AND ECONOMIC ENVIRONMENT
IDENTIFY IMPACT OF DESIGN ALTERNATIVES ON ENVIRONMENT
NOTIFY REVIEW AGENCIES & PUBLIC PREVIOUSLY INTERESTED
EVALUATE ALTERNATIVE DESIGN CONCEPTS
SELECT PREFERRED ALTERNATIVE DESIGN CONCEPT
REVIEW ENVIRONMENTAL SIGNIFICANCE & E.A. CATEGORY
PREPARE ENVIRONMENTAL STUDY REPORT (E.S.R.)
FIRST OPPORTUNITY FOR LAND ACQUISITION (OR EXPROPRIATION)
FINALIZE PRELIMINARY DESIGN FOR PREFERRED ALTERNATIVE
PHASE 4
ENVIRONMENTAL STUDY REPORT TO MUNICIPAL CLERK OR PUC SECRETARY FOR PUBLIC RECORD
NOTIFY REVIEW AGENCIES & PUBLIC
30 DAYS
FINAL CONSIDERATION OF BUMP-UP
BUMP-UP NOT JUSTIFIED
BUMP-UP JUSTIFIED PROCEED WITH FULL E.A.
COUNCIL OR PUC APPROVAL FOR TENDER AND CONSTRUCTION
FORMALIZE APPROVALS
PREPARE CONTRACT DRAWINGS AND DOCUMENTS
PHASE 5
CONSTRUCT AND OPERATE WITH MONITORING FOR ENVIRONMENTAL PROVISIONS AND COMMITMENTS
MAY COMMENCE LAND OPTIONING
NOTE: THIS FLOWCHART IS TO BE READ IN CONJUNCTION WITH THE "EXPLANATION OF PLANNING & DESIGN PROCESS" ON THE FOLLOWING PAGE
INDICATES POSSIBLE EVENTS
INDICATES MANDATORY EVENTS
* PROPONENT MAY PROCEED WITHOUT PREPARING E.S.R.
● SEE GLOSSARY
PREPARED BY: MUNICIPAL ENGINEERS' ASSOCIATION COMMITTEE ON CLASS ENVIRONMENTAL ASSESSMENT

3.4 WATER SUPPLY SOURCE

Four alternatives were considered for a possible water supply source. Three of the alternatives considered the use of a surface water supply while the fourth considered the use of a ground water source. The alternatives considered are as follows :

1. Ottawa River
2. South Nation River
3. Castor River
4. Sarsfield esker employing a water well located in Part Lot 21, Conc. VII, Township of Russell.

The ground water source employing a water well in the Sarsfield esker in Part Lot 21 Conc VII, Township of Russell was selected as the preferred alternative for the water supply source. The alternative design concepts for this source will be discussed later in the report.

3.5 WATER TREATMENT PLANT LOCATIONS

The following water treatment plant locations were evaluated (Drawing No.1)

1. Well pumping station, Part Lot 21, Conc. VII, Township of Russell

2. Limoges road immediately south of the new St-Viateur School, Township of Cambridge.

3. Limoges road immediately north of the new St-Viateur School, Township of Cambridge.

The Phase 2 report recommended the use of the Limoges Road site immediately south of the new St-Viateur School as the preferred location for the water treatment plant.

3.6 WATER STORAGE FACILITY

The Phase 2 report considered the use of a ground level reservoir at the water treatment plant site and a water tower located at the plant site or at another location within the village.

As there is sufficient land available at the plant site, the report recommended that the water storage facility be located at this location. The type of storage facility would be dependent on geotechnical investigations of the water treatment plant site.

Upon further investigation, it was determined that due to sub-surface conditions on the site, that the ground-level water reservoir as well as the water tower would require the installation of piles. As the water tower would eliminate the need for a fire pump and reduce the number of high lift pumps as well as provide better pressure regulation, it is recommended that it be selected as the preferred alternative.

3.7 WATER SUPPLY MAIN

The route along Russland Road was selected as the preferred alternative for the raw water connecting main. The main will be constructed in the road right-of-way and involve the crossing of the CNR railway line on Russland Road.

3.8 MONITORING AND CONTINGENCY PLAN

The hydrogeological study carried out to locate a suitable ground water source for the project identified possible interference problems associated with the recommended use of the Sarsfield esker as a water supply source.

Therefore a monitoring and contingency plan was developed (Phase 2 report) and will take effect immediately. The plan involves monitoring of the groundwater quantity and quality and a remedial action plan to be undertaken in the event that interference (quantity and/or quality) occurs as a result of the operation of the Limoges water supply system.

5.0 ALTERNATIVE DESIGN CONCEPTS

5.1 STUDIES

A groundwater source employing the Sarsfield esker was the recommended source of supply for the Village of Limoges. A hydrogeological investigation of this esker was carried out by Golder Associates to determine the quality and quantity of the water in the esker. Sufficient quantity of water was found in the esker to provide water to the Village for the 20 years design period. However, it was determined that treatment would be required for iron, manganese, colour, dissolved organic carbon, turbidity and organic nitrogen.

As a result of these findings, treatability studies were undertaken by POLLUTECH Ltd. in May 1994 and Napier-Reid Ltd. in June 1995. The POLLUTECH study investigated the use of aeration, greensand filtration and Granulated Activated Carbon (GAC) units. Dosages and reaction times were determined for various treatment alternatives employing potassium permanganate, hydrogen peroxide, sodium hypochlorite, alum and pH adjustment. The results of these treatability studies may be found in Appendices A and B.

A summary of raw water quality and various treatment options which may be employed to provide treated water which meets the Ontario Drinking Water Objectives may be found in Table 5.1. Design criteria for the parameters requiring treatment are higher than the levels measured in the raw water. These levels were selected to provide a safety margin should groundwater quality deteriorate over time as experienced in the Village of Embrun.

This section of the report outlines the various design concepts that were investigated to provide drinking water which meets the Ontario Drinking Water Objectives.

Table 5.1
Summary of Treatment Options

Parameter	Raw Water Concentration	Design Concentration	Ontario Drinking Water Objectives	Proposed Treatment*
Iron	0.61 mg/L	2.5 mg/L	0.30 mg/L	G.S.F.
Manganese	0.13 mg/L	0.35 mg/L	0.05 mg/L	G.S.F.
Organic Nitrogen	0.24 mg/L	0.24 mg/L	0.15 mg/L	Alum feed + G.S.F.
Dissolved Organic Carbon	4.8 mg/L	4.8 mg/L	5.0 mg/L	Alum feed + G.S.F.
THM Formation Potential	0.176 mg/L	0.176 mg/L	0.100 mg/L *	Alum feed + G.S.F.
Methane	2.7 L/m^3	3.0 L/m^3	3.0 L/m^3	Tray aerator
H_2S	0.04 mg/L	0.05 mg/L	0.05 mg/L	Tray aerator + oxidation
Colour	38 TCU	-	5 TCU	See above ***
Turbidity	5 NTU	5 NTU	1 NTU	See above ***
pH	7.85	-	6.5-8.5	-
Alkalinity	186 mg/L	-	30-500 mg/L	-

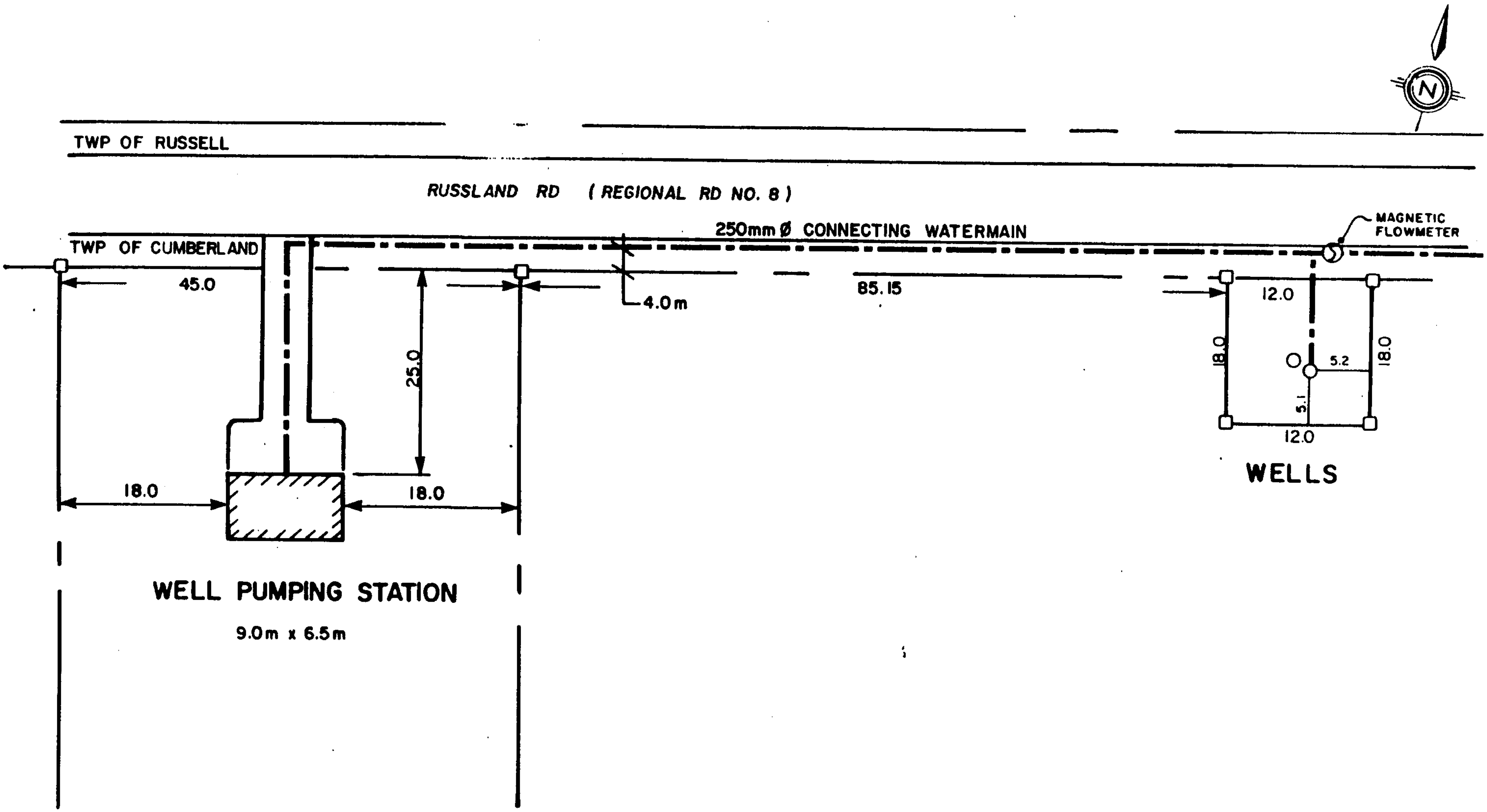
* G.S.F. = Greensand Filtration

** Revised standard to come

*** Colour and turbidity are caused by iron, manganese and organic matter.

Table 5.2
Biofouling Control Equipment Comparison

Parameter	High Water Velocity into Connecting Main Phase II	Chemical Feed (continuous or intermittent Phase II)
Design population	3200 p.	3200 p.
Design flowrate	20.1 L/s	20.1 L/s
Minimum velocity	1.7 m/s	-
Maximum velocity	3.0 m/s	3.0 m/s
Connecting main diameter	100 mm	250 mm
Actual velocity at design flowrate	2.56 m/s	0.41 m/s
Head loss along connecting main	681 m	6.6 m
Static Head	10 m	10 m
Total Dynamic Head	691 m	16.6 m
Maximum pipe Pressure Rating	200 psi	160 psi
Number of pumping stations required including well pumping station	5	1
Average Pump motor size	50 Hp	10 HP



DIMENSIONS ARE SHOWN IN METERS
NOT TO SCALE

TITLE: WELL PUMPING STATION SITE PLAN		LECOMPTE ENGINEERING LTD. CONSULTING ENGINEERS INGÉNIEURS CONSEILS
PROJECT: VILLAGE OF LIMOGES COMMUNAL WATER SUPPLY	DESIGNED / DRAWN: J.H./M.L.	DATE: JULY 17 1995
	FILE NO:	SKETCH NO:

5.2 WELL PUMPING STATION

5.2.1 GENERAL

The well pumping station will be located in Part Lot 21, Conc. VII, Township of Russell (Figure 3). The 10" well (well #1) on this site was used to carry-out pump tests to determine water quantity and quality in the Sarsfield esker. A second well (well #2) will be developed approximately 110 meters west of this well. These wells will be connected by a 200 mm watermain.

Due to space limitations at well #1, the well pumping station will be located at well #2. The well pumping station will consist of a building housing a diesel generator set, a chlorine injection system, and other associated equipment.

A 200 mm diameter magnetic flowmeter will be installed on the connecting watermain below ground level; a digital display will be provided at both well sites.

5.2.2 WELL PUMPS

Submersible and vertical turbine pumps were considered for installation at the water wells. The submersible pump may be installed without above ground facilities while a manhole would be required for the installation of a vertical turbine pump. However, as a flow regulation valve will be required at each site, a heated manhole will also be required, regardless of the type of pump installed.

At well #1, the use of a submersible pump is recommended in order to keep the concrete chamber low. A vertical turbine pump requires an above floor motor that would result in a much higher chamber at this location. Since this chamber is located near a private residence, aesthetic considerations regarding the above ground height of the chamber should be considered.

At well #2, the well pumping station provides sufficient room for the vertical turbine pump motor. Retaining this type of pump here enables the motor to be more readily accessible for maintenance purposes than the submersible pump.

5.3 CONTROL OF BIOFOULING IN CONNECTING WATERMAIN

5.3.1 GENERAL

Due to high levels of organic nitrogen (0.24 mg/l) and dissolved organic carbon (4.9 mg/L) in the raw water, biofouling of the connecting watermain can occur over time. In order to control biofouling and/or remove bacterial growths the following options were examined.

1. Maintain a high water velocity in the connecting watermain.
2. Injection of sodium hypochlorite at the well pumping station.
3. Injection of potassium permanganate at the well pumping station.

4. Injection of hydrogen peroxide at the well.

5. Intermittent injection of sodium hypochlorite into the connecting watermain.

5.3.2 OPTION 1 - HIGH WATER VELOCITY

Velocity in the order of 1.7 m/s would be required in the watermain in order to prevent biofouling. In order to develop this velocity at the well pumping rate at the initial stage of construction (2500 people Q = 15.7 l/s) the connecting main diameter would have to be 100 mm.

5.3.3 OPTION 2 - SODIUM HYPOCHLORITE INJECTION

Sodium hypochlorite would be injected into the connecting watermain on a continuous basis. A larger diameter watermain could then be used, this would result in the installation of a smaller well pump. Using a 250 m diameter main, is recommended.

5.3.4 OPTION 3 - POTASSIUM PERMANGANATE INJECTION

Potassium permanganate would be injected into the connecting watermain in the same manner as sodium hypochlorite. Permanganate addition would initiate the oxidation process for iron and manganese.

According to the POLLUTECH study after 20 minutes contact time with permanganate the iron and manganese will re-solubilize. As the contact time in the connecting watermain is two hours, this process will occur.

5.3.5 OPTION 4 - HYDROGEN PEROXIDE INJECTION

Hydrogen peroxide would be injected into the connecting watermain in the same manner as sodium hypochlorite and potassium permanganate. Hydrogen peroxide injection would provide good control of biofouling without affecting the water treatment plant process.

5.3.6 OPTION 5 - INTERMITTENT INJECTION OF SODIUM HYPOCHLORITE

This option involves the injection of high doses of sodium hypochlorite (300 mg/L) into the connecting watermain twice a year or on an as-needed basis. This highly chlorinated water would be discharged to the sanitary sewer prior to the treatment plant in order not to affect the process.

5.3.7 SELECTED OPTION

It is recommended that Option 5 be selected to control biofouling in the connecting watermain. This method would require the installation of valve chambers along the connecting watermain to allow the insertion and removal of swabs.

The connecting main would be filled with chlorinated water during the night; this would take approximately 4.5 hours at the initial stage pump capacity (15.7 L/s). Since the minimal contact time to disinfect the main is 3 hours, the well pump can continue to run after the chlorine injection is completed.

Table 5.2 compares the pumping facility characteristics of the water velocity option with the chemical injection options. The high water velocity option requires a 100 mm diameter connecting main with five (5) pumping stations, including the well pumping station; the average motor size required is 50 Hp. In comparison, the chemical injection methods require a 250 mm diameter watermain and a 7.5 HP well pump. The high velocity option can be rejected due to the excessive capital and operating cost.

The continuous injection of sodium hypochlorite may lead to the formation of trihalomethanes due to the reaction of chlorine with the dissolved organic matter in the raw water. The trihalomethane formation potential of well #1 water has been established at 0.174 mg/L, while the standard is presently 0.300 mg/L. It is expected that the MOEE will reduce this standard to 0.100 mg/L in the near future.

To meet public health considerations, ideally no trihalomethane should be produced; it is very difficult to remove with the coagulation and filtration process. It is preferable :

- not to produce THM
- to eliminate THM precursors i.e. organic matter.

Therefore the chlorine injection is not a viable option for this process.

As potassium permanganate is used in the treatment process, the injection of potassium permanganate for control of biofouling may leaad to difficulties in process control. Permanganate dosages would be difficult to control and prevent excess quantities from entering the treatment process.

The injection of hydrogen peroxide should be set to maintain a dosage of about 70 mg/L. Dosage is difficult to control, since the raw water retention time within the connecting main is longer during the night (low demand) than during the day (high demand). Over dosage could affect the treatment plant equipment. The use of hydrogen peroxide should then be rejected.

The intermittent injection of chlorine combined with connecting main swabbing will control the bacterial growth. These operations should take place twice a year or on an as-needed basis during the night. No THM will reach the treatment process, since chlorinated water will be discharged to the sanitary sewer. Potassium permanganate and hydrogen peroxide should not be used as excess quantities may affect the Water Treatment Plant.

For the above mentioned reasons, we recommend retaining intermittent chlorine injection method combined with swabbing facilities.

5.4 AERATION FACILITIES

5.4.1 GENERAL

Aearation facilities are required to control the levels of methane and hydrogen sulphide prior to the raw water entering the main treatment process. Although the level of methane is marginally less than the ODWO (2.7 L/m^3 vs 3.0 L/m^3) removal is required in order to prevent excessive accumulation of methane later in the process. Also during the 1995 treatability study hydrogen sulphide gas at highly variable levels was detected in the untreated water.

The following alternatives were investigated for controlling methane and hydrogen sulphide.

1. Tray aeration system
2. Mechanical aeration

5.4.2 OPTION 1 - TRAY AERATION

The tray aeration system consists of a series of trays. The raw water is pumped to the top tray and allowed to splash down over the lower trays. The trays will be constructed of aluminium. No additional pumping is required as the raw water will go directly to the tray aeration system from the connecting raw water main. A ventilation system will be required to disperse the gases driven from the raw water during the aeration process.

5.4.3 OPTION 2 - MECHANICAL AERATION

Raw water from the connecting main will pass through a water filled steel column. A blower will be required to provide an air supply to diffusers at the bottom of the column. A ventilation system will also be required for this system.

5.4.4 SELECTED OPTION

Capital costs are essentially the same for both the tray aerator system and mechanical aeration. However operating and maintenance costs are higher for the mechanical aeration system because of the diffuser system. Therefore, the tray aeration system is selected as the preferred option. Biofouling of the aeration system will be controlled in same manner as the connecting watermain with high doses of sodium hypochlorite at regular intervals.

5.5 CONTROL OF HYDROGEN SULPHIDE

5.5.1 GENERAL

Studies have shown that the control of hydrogen sulphide (H_2S) is dependent on the pH of the water. These studies indicate that sulphur is in a gaseous form (H_2S) at a pH of 6.0 while it is in an ionic form at a pH of 8.0. As the pH of the raw water at Limoges is 7.8 stripping of H_2S through aeration will not significantly reduce the level of sulphur. Potassium permanganate which will be used in the treatment process to control iron and manganese works best at pH's greater than 7.0. It will also oxidize the ionic form of sulphur that is present at a pH of 8.0. Therefore, if the pH of the raw water is lowered to 6.0 to allow stripping of H_2S through aeration, it must be raised to at least 7.8 to allow the potassium permanganate to oxidize the iron, manganese and residual sulphur and to allow the alum to coagulate organic matter.

The following options were considered for pH control.

5.5.2 OPTION 1 - PH CONTROL

In order to provide pH control, an acid metering pump followed by an in-line mixer and pH monitor would be installed upstream of the tray aerator to lower the pH to 6.0 to facilitate the stripping of H_2S. In order to ensure the complete oxidation of iron and manganese, by potassium permanganate, the pH would then have to be raised to 7.8. A soda ash feeding pump, an in-line static mixer and pH monitor would have to be installed after the high lift pumps and prior to the potassium permanganate injection point.

5.5.3 OPTION 2 - NO PH CONTROL

Without pH control approximately 15% of the sulphur will be stripped as H_2S in the tray aerators while the remainder will be oxidized by potassium permanganate. However, varying concentration of H_2S requires frequent adjustment of potassium permanganate feed pump rate. Therefore, this method will require the installation of a continuous potassium permanganate monitor at the mid-level of the greensand filters. A controller would be required to adjust the potassium permanganate feed rate in accordance with the levels of permanganate in the greensand filter.

5.5.4 SELECTED OPTION

The control of pH for hydrogen sulphide removal would require the installation of two pH control systems with chemical feed facilities and would eliminate the buffer capacity of the water supply. Without pH control a continuous potassium permanganate analyzer would be required. However, this system would be required even with pH control to ensure the proper dosages of potassium permanganate. Therefore, as capital and maintenance costs will be lower without pH control, it is recommended that pH control not be used for H_2S removal.

5.6 EQUALIZATION BASIN AND HIGH LIFT PUMPS

The purpose of the equalization basin is to provide a buffer capacity for operation of the high lift pumps. The basin receives water from both the tray aerator (well water) and the recirculation pumps (clarified backwash water). It should be located below the treatment room slab. The equalization basin cannot be used as a chemical injection point as the retention times are too variable.
The high lift pump operating pressure will depend on the type of treated water reservoir, only the pressure loss through the piping, fittings and filters is tanken into consideration. With an elevated storage tank, the maximum static level at the reservoir is also taken into consideration.

5.7 TREATMENT SYSTEM

5.7.1 GENERAL

Treatability studies have been carried out by Pollutech Ltd. and Napier-Reid Ltd. to determine the most appropriate method for treating the raw water supply to meet the ODWO.

The Pollutech study investigated the use of GAC filters to remove all the parameters of concern (iron, manganese, and organics) and also the use of a greensand filter for iron and manganese treatment followed by GAC filters for the removal of organics. Test runs were made using powdered activated carbon and potassium permanganate prior to filtration. Although this process was found to be effective, colour levels could not be reduced to meet the ODWO. The Napier-Reid study was carried out to assess the use of potassium permanganate and alum for the treatment. The study indicated potassium permangante and alum were effective in reducing all the parameters including colour to the ODWO.

The following options for treatment are considered in this section.

1. GAC Filtration
2. Greensand Filtration
3. Greensand filtration followed by GAC Filtration
4. Membrane filtration
5. Biofiltration

5.7.2 OPTION 1 - GAC FILTRATION

This option involves the use of a vessel filled with granulated activated carbon. Water is passed through the vessel under pressure. The media in the vessel absorbes a variety of contaminants which are present in the water. When the absorption capacity of the media has been reached; it must be replaced.

A drawback to this system for Limoges is that it is very efficient in removing organics ; however, it is not suitable for removing iron and manganese.

Iron and manganese exceed the ODWO aesthetic criteria and are expected to rise in the future with the continued use of the aquifer.

Experience in other locations indicates that media replacement schedules may vary considerably depending on the organic content of the raw water and the control of triholomethanes (THM). It is expected that in the near future that the THM in the ODWO will be reduced to 0.1 mg/l for 0.3 mg/l.

5.7.3 OPTION 2 - GREENSAND FILTRATION

This option involves the use of a vessel containing a layer of anthracite on top of a layer of greensand. Potassium permanganate is used to oxidize iron and manganese prior to the water being passed through the filter under pressure. The anthracite layer provides the filtration mechanism while the greensand layer provides for oxidation of manganese.

The Pollutech study found that the greensand filtration system removed iron and manganese effectively; however, colour levels probably due to organic matter exceeded the aesthetic levels indicated in the ODWO. The Napier-Reid study found that the addition of alum along with potassium permanganate produced treated water which met the ODWO. In addition the potential for THM formation is substantially reduced and would meet the expected new objective 0.1 mg/L.

The Napier-Reid study determined that potassium permanganate injection followed by a 5 minute reaction time before alum is injected provides the best removal rate. A further 20 minutes of detention time is provided before the treated water reaches the filtration media.

This method of treatment requires the installation of a wastewater treatment system for the backwash from the filtration system. The presence of the alum floc in the backwash water will assist in the settling process in the treatment system.

5.7.4 OPTION 3 - GREENSAND AND FILTRATION FOLLOWED BY GAC FILTRATION

The option uses a combination of options 1 and 2. The greensand filters would remove the iron and manganese while the GAC filters would remove the organics responsible for colour and formation of THM. Due to the space required for the GAC filters and the associated piping, the size of the plant would have to be increased. This would increase the capital cost for the plant as well as the maintenance costs. As the GAC filters would be installed only to replace the alum addition in the greensand filtration process; this is not a viable option.

5.7.5 OPTION 4 - MEMBRANE FILTRATION

Membrane filters have been used for several years in the United States. This process is effective in removing all types of contaminants including, organic matter, iron, manganese and other minerals present in the feed water. The process uses high pressure filtration employing a nanofiltration membrane. Although this process can be cost competitive, there are no systems in operation in Canada for municipal water supplies.

5.7.6 OPTION 5 - BIOFILTRATION

Biolfiltration has been used in Europe for many years, and two units have been installed in the United States; however, there are no facilities of this type in Canada. The process involves the use of bacteria present in the raw water supply to breakdown organic matter, including the colour and organic nitrogen and the oxidize iron and manganese. The bacteria grow on a granular media and are backwashed on a regular basis. There are no chemical additions to the process.

Process control for this option may be difficult as there are no continuous monitoring facilities available to ensure that all the parameters of concern are reduced to a level that meets the ODWO.

5.7.7 SELECTED OPTION

It is recommended that Option 2 - Greensand Filtration with potassium permanganate and alum injection to control organic carbon, organic nitrogen, H_2S, colour, THM processors, iron, and manganese be selected. This option requires the installation of two chemical feed systems. Positive process control is maintained by providing continuous monitoring of potassium permanganate levels in the greensand filter.

5.8 DISINFECTION

5.8.1 GENERAL

In order to protect the public health of the water users the treated water must be disinfected prior to being discharged from the water reservoir and the distribution system. Due to the proposed treatment process the chlorine demand of the treated water is less than 0.05 mg/l. If chlorination is selected as the preferred solution the chlorine demand for a chlorine residual of 1.0 mg/L would be 3.02 mg/day of chlorine at peak treated water flows of 3024 m^3/day.

The following four options are being considered for disinfection.

1. Gaseous chlorine
2. Sodium hypochlorite
3. Ultra violet radiation
4. Ozonization

5.8.2 OPTION 1 - GASEOUS CHLORINATION

Gaseous chlorine injection systems are used in treatment plants where chlorine demand is greater than 68 kg/day. Since the chlorine demand at this plant is in the order of 3.0 kg/day, gaseous chlorine is not a viable option.

5.8.3 OPTION 2 - SODIUM HYPOCHLORITE

The injection of sodium hypochlorite solution into the treated water would be simple to operate and low in capital and maintenance cost. The system would also allow the maintenance of a chlorine residual in the distribution system as required.

5.8.4 OPTION 3 - ULTRA VIOLET RADIATION

Ultra-violet radiation provides an effective method of disinfection in treated water. However, a chlorination system would still be required to provide the necessary chlorine residual in the water distribution system.

5.8.5 OPTION 4 - OZONIZATION

Ozonization may provide the necessary disinfection at the water treatment plant; however, a chlorine residual is still required to controls bacterial growth in the water distribution system.

5.8.6 SELECTED OPTION

The sodium hypochlorite solution injection system is the only system that can provide disinfection at the water treatment plant and maintain a chlorine residual in the distribution system. The minimum size of a gaseous chlorine system is too large for this water treatment plant.

5.9 FILTER BACKWASH FACILITIES

5.9.1 GENERAL

The greensand filters have to be backwashed on a regular cycle to remove the oxidation products of iron and manganese and the alum sludge which acculumates on the filter surface. In order to reduce the quantity of sludge discharged to the sanitary sewer and recycle the maximum amount of water to the system, backwash settling facilities are required.

In order to clean the filters, the water is drained from the top of the filters prior to air scouring. After scouring, water is pumped to the bottom of the filters to push the sludge to a clarifier. Sludge from the bottom of the clarifier is discharged to the sewage system while the supernatant is returned to the equalization basin.

Three options were considered for backwashing the filters :

1. Backwash water storage tank with a continuous operating clarifier and an in-ground reservoir to supply backwash water.

2. Backwash water storage tank with a continuous operating clarifier and backwash water being supplied from the water tower.

3. Batch settling of backwash water with backwash water supplied from the water tower.

5.9.2 OPTION 1 - BACKWASH RESERVOIR - CONTINUOUS FEED CLARIFIER

The following equipment is required for this option :

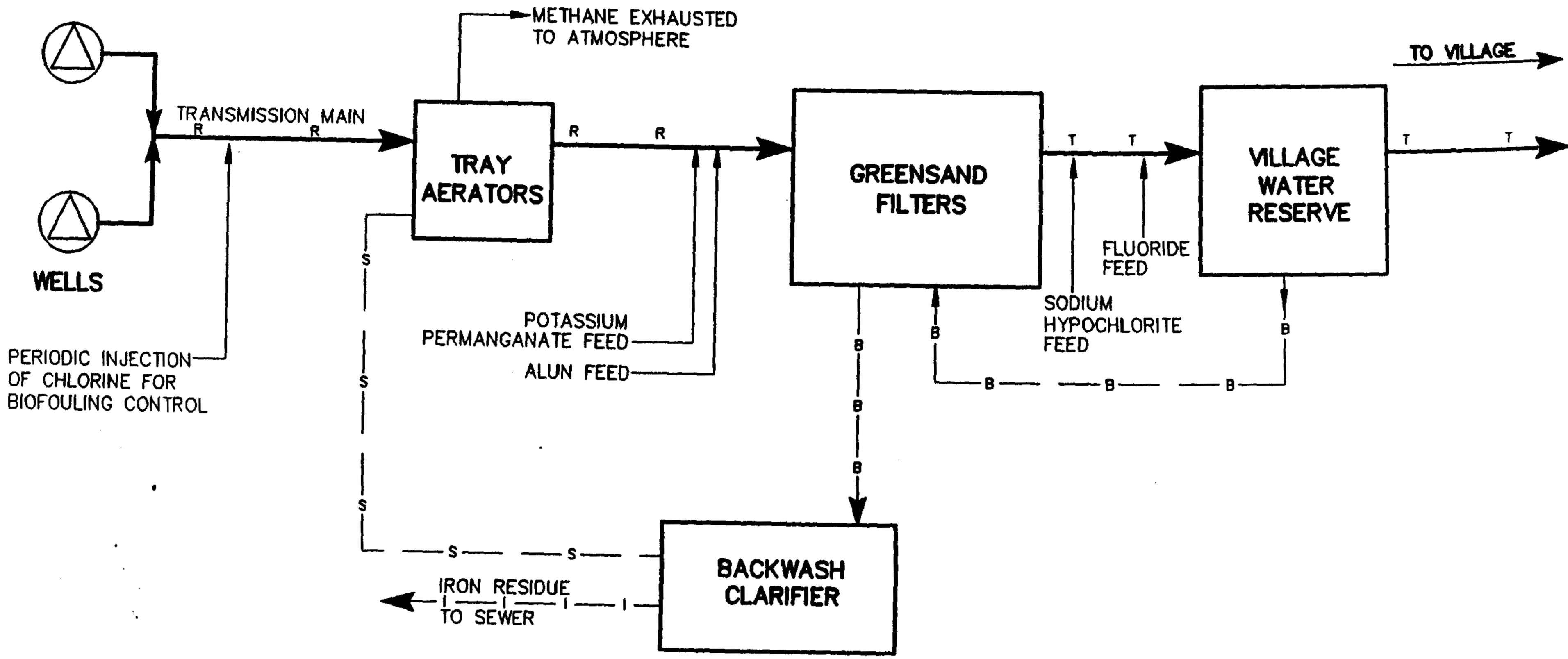
- a backwash water reservoir with a capacity to storage backwash water for four filters
- two backwash pumps to operate in sequence each capable of backwashing one filter
- two air scour compressors to operate in sequence each capable of supplying air to scour one filter
- a storage tank
- two storage tank pumps
- a continuous feed backwash clarifier that receives backwash from the storage tank pumps at a constant rate. The clarifier will be designed to provide a minimum of 2 hour detention tank.

Approximately 75 to 90% of the backwash water will be returned to the equalization tank after clarification. The remainder of the water and sludge will be discharged to the sewer system.

As the top of the filters must be drained by gravity to the storage tank prior to air scouring, the storage tank will need to be built underground below the filter room floor level.

5.9.3 OPTION 2 - BACKWASH WATER FROM WATER TOWER - CONTINUOUS FEED CLARIFIER

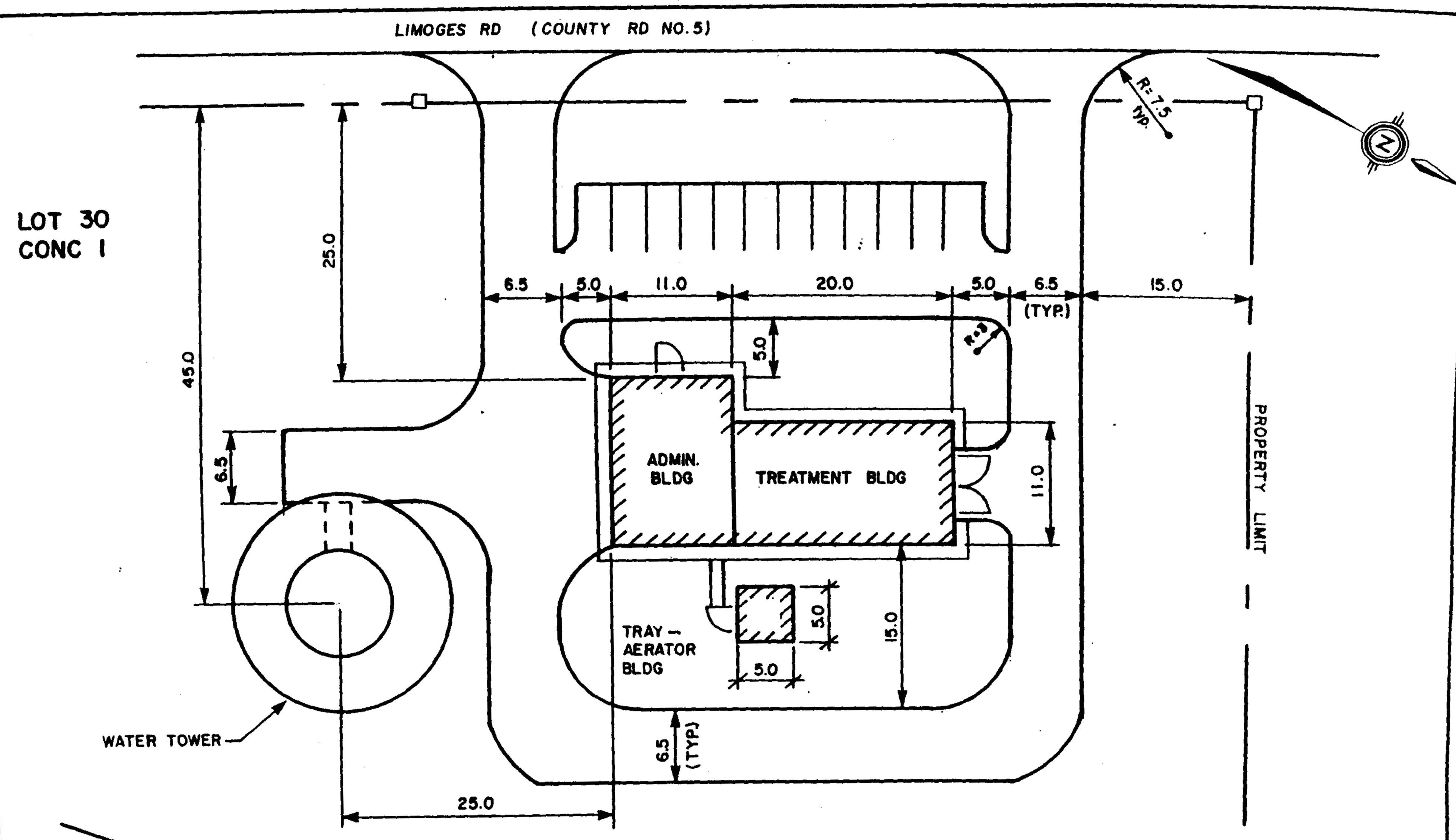
This option operates in the same manner as option 1 except backwash water is supplied from the water tower eliminating the two backwash pumps. However, the water tower has to be taken out of service for up to one week every five to ten years for maintenance. A backwash reservoir and backwash pumps would be require for this one week period every five to ten years.



LEGEND:

- RAW (NON FILTERED) WATER — R R R
- TREATED (FILTERED) WATER — T T T
- BACKWASH WATER — B B
- RECIRCULATED SUPERNATANAT — S S
- IRON RESIDUE CHEMICAL FEED LINE — I I

TITLE VILLAGE OF LIMOGES	LECOMPTE ENGINEERING LTD. CONSULTING ENGINEERS INGÉNIEURS CONSEILS	
PROJECT WATER TREATMENT PROCESS SCHEMATIC	DESIGNED/DRAW JH/TG	DATE JULY/95
	FILE NO.	FIGURE:



PROPOSED SITE PLAN (1:500)

DIMENSIONS ARE SHOWN IN METERS

TITLE: WATER TREATMENT PLANT & WATER TOWER	LECOMPTE ENGINEERING LTD. CONSULTING ENGINEERS INGÉNIEURS CONSEILS	
PROJECT: VILLAGE OF LIMOGES OM[redacted]NAL[redacted]WAT SI Y	DESIGNED / DRAWN: J.H. / M.L.	DATE: JULY 18 1995
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5.9.4 OPTION 3 - BACKWASH WATER FROM WATER TOWER WITH BATCH CLARIFIER

This option still requires the air scour compressors; however, the backwash pumps are eliminated as backwash water will be supplied from the water tower.

The batch clarifier will be sized to store all backwash water from the backwashing of all four filters. As the backwashing sequence will start with the clarifier empty, the water in the top of the filters can be drained to the clarifier by gravity.

After the backwashing sequence is completed, two hours will be allowed for sludge settling prior to supernatant being collected via a floating weir and returned to the equalization basin. The sludge from the bottom of the clarifier will be discharged to the sewer systems.

When the water tower is out of service for maintenance the clarifier will be used as a source for the backwash water. A backwash water pump will be installed at the clarifier to backwash one filter at a time. The backwash water will be discharged directly to the Limoges sanitary sewer without clarification.

5.9.5 SELECTED OPTION

It is recommended that Option 3 be selected. This option eliminates the need for a backwash reservoir and requires less equipment and therefore less maintenance.

5.10 FLUORIDATION

Fluoridation requires the construction of a separate room with special coatings on the floor, ceiling and wall, and with electrical and mechanical equipment that meets the Ministry of Environment and Energy Guidelines for fluoridation systems. A feed line from the fluoride injection systems is connected to the treated water line. A fluoride analyzer is also required.

5.11 WATER STORAGE FACILITIES

5.11.1 GENERAL

Water storage facilities are required to provide for peak hour demand, fire demand, emergency reserve and backwash water reserve. A study was carried out by Fondex of the soil conditions at the water treatment plant site.

The following options were considered :

1. Underground storage reservoir
2. On-ground storage reservoir
3. Elevated storage tank

6.5 OPERATING AND MAINTENANCE COST

The annual operating and maintenance cost for the proposed water supply and distribution system based on an existing population of 1,100 persons and an average flow of 400 m^3 is estimated at $103,000 as detailed in Table 6.5. This amount includes the cost of electricity, chemicals, manpower and a maintenance reserve fund. The average cost per equivalent house is $234 per year as calculated below.

TABLE 6.5

MAINTENANCE COST
WATER SYSTEM

Electricity for well pumps and high lift pumps	$7,000
Electricity for heating and other usage	$3,000
Chemicals: potassium permanganate, alum, sodium hypochlorite and fluoridation	$12,000
Manpower including supervisory staff; assume one person/year; including 30% for fringe benefits	$45,000
Repairs and maintenance; material and services	$8,000
Gasoline and oil for diesel generators	$1,000
Allowance for service vehicle	$4,000
Laboratory cost and testing by staff	$8,000
Repair & maintenance reserve fund	$15,000
Total Estimated Maintenance Cost	**$103,000**

The average cost per equivalent house:

$103,000 - 440 eq. house = $234/house

Prepared by :
LECOMPTE ENGINEERING LTD.

Gilbert Côté, P.Eng.
July 19, 1995

5341-wat.ph3

APPENDIX E

PUBLIC MEETINGS PRESENTATION MATERIAL

EXECUTIVE SUMMARY

BACKGROUND INFORMATION

This Executive Summary summarizes the information contained in the Phases 1 and 2 Preliminary Report for the Community of Forest Park Water Supply Study. This water supply study was initiated in 1994 for the community of Forest Park by the Township of Cambridge in accordance with the 1993 Municipal Class Environmental Assessment (Class EA) Process for Municipal Water and Wastewater projects. The Class EA is a streamlined process vis-à vis the Environmental Assessment Act and includes an extensive public and governmental review agency consultation process.

Forest Park, a community of approximately 508 people, is located in the Township of Cambridge approximately 25 km east of Ottawa between the Villages of Casselman and Embrun. Many residents commute daily to places of employment located primarily in the Regional Municipality of Ottawa-Carleton. The community is serviced by communal water and private sewage systems.

The water supply and distribution system consists of two drilled wells, a well pumphouse, an underground storage reservoir, complete with a pumphouse structure and a distribution network of 150 mm diameter watermains and provides water to about 163 dwellings and an elementary public school.

The existing system has been operated and maintained by the Township of Cambridge since the early 1980's when the Township took over the water works from the original developer of the community.

Increasing demand on the system and a constant deterioration of raw groundwater quality has made it increasingly difficult for the Township to provide good quality water meeting the Provincial objectives to the residents of the Forest Park community.

In June, 1990, the Township of Cambridge submitted an application for funding to the Ministry of the Environment and Energy. This application was for a study to upgrade the existing water quality by finding a new water source or upgrading the existing treatment.

After a lengthy approval process a decision was made to proceed with a water supply study under a Class Environmental Assessment with the Province of Ontario providing financial assistance to the Township of Cambridge through Ontario Clean Water Agency (OCWA).

Completion of the Phases 1 and 2 Preliminary Report has confirmed that the preferred solution will be a Schedule C activity and that an Environmental Study Report (ESR) will be required.

PROBLEM IDENTIFICATION

The following deficiencies with the current water system were identified in Phase 1 of this study:

- poor water quality which does not meet Ministry of Environment and Energy's Ontario Drinking Water Objectives;
- inability of the community to grow and develop existing approved lots; and,
- deterioration and increased maintenance of water works facilities resulting in increased costs to homeowners.

SUMMARY AND EVALUATION OF ALTERNATIVE SOLUTIONS

Several alternative solutions were investigated to address the identified problems with the Forest Park water supply system.

These alternatives are divided into two categories:

The first category includes alternatives that restrict growth and offer no or only partial solutions to the identified problems. This group includes alternatives such as:

- "do nothing";
- limit community growth;
- upgrade existing system;
- a combination of communal and private systems.

None of the above alternatives offer a long term, reliable solution to the existing water quality problem.

The second category includes alternatives that provide good quality water to the existing dwellings and allow for future growth in the community. This group includes alternatives such as:

- construction of a new water treatment plant (surface supply);
- connection to an "area type" water supply system;
- obtaining water from Limoges; and,
- development of a new well field.

During discussion at Liaison Committee Meetings and with the Forest Park Community Association it was established that the preferred solution should not only resolve poor water quality but also allow for future community growth as per the existing approved Official Development Plan. All alternatives from the second category would meet those criteria, however, due to the complex treatment requirements and distance from surface water sources, the construction of a surface water treatment plant is too costly to implement for the Forest Park Community. The existing population density in Cambridge Township and adjacent municipalities

does not warrant the development of an "Area Type" water supply system in the foreseeable future. Thus, the alternatives of obtaining water from Limoges or development of new wells appear to be the only technically and economically feasible alternatives for a Forest Park water supply.

SELECTION OF RECOMMENDED ALTERNATIVES

As explained above, two alternatives are selected for further evaluation. They are:

- obtaining water from Limoges, and
- developing of a new groundwater supply.

The recommended alternative solution should provide good quality and quantity of water for the projected 20-year design population of 1,000 people, without posing severe financial burden on either the existing community or future development.

Alternative A - Obtaining Water from Limoges

The Village of Limoges is located about 4.0 km north - west of the Forest Park development, just north of Highway 417 along County Road No. 5. The Township of Cambridge is currently proceeding with a Class Environmental Assessment for the provision of a new water supply system to serve the Village of Limoges. The Phase 2 Report of the Class EA recently completed by Lecompte Engineering Ltd. recommends the construction of a communal water supply system for the Village using groundwater as the raw water supply source, together with water treatment and storage. Because of the proximity of Limoges to Forest Park, the provision of water from Limoges appears to be economically and technically feasible. Oversizing of the proposed Limoges water works together with the construction of a feedermain will be required to accommodate the Forest Park Community.

Alternative B - Develop New Wells

The development of a new well field having an acceptable quality and quantity of ground water could be a viable alternative to solve water problems in the Forest Park Community. In July, 1993 Jacques Whitford Environmental Limited was retained to carry out the hydrogeologic investigations necessary to locate an adequate groundwater source. The investigation concluded that there is good quality groundwater near Route 400 about 3 km north of Forest Park and that a minimum of three production wells would be required to meet the projected 20-year water demand.

The hydrogeological report also recommended that a multi-well pump test be conducted to determine interference effects and the long term safe yield of the system. The recommended 72 hour multi-well pump test was conducted in June 1995. The results indicated that a projected maximum safe yield of 4.5 l/s was attainable, which is well below the 12 l/s design flow required to accommodate future development. This testing included water quality sampling which revealed the groundwater was not as good quality as previously believed, however, it was still within treatable limits.

PREFERRED SOLUTION

Based on the fact that the identified groundwater source is not capable of providing the required quantity of water, the recommended alternative is that of "Obtaining Water from Limoges". The preliminary capital cost estimate for this alternative including oversizing of the proposed Limoges water works is estimated at $ 2,500,000.

An application for provincial funding to cover $ 2,125,000 (85%) of capital costs will be made to the Ontario Clean Water Agency. The capital funding rate is 85% which is the maximum permissible rate according to present regulations. A lower grant (i.e. 70%) could possibly be considered. Although yet to be formally endorsed by the Council, it is expected that the balance

($ 375,000) will be levied on existing houses and the Cambridge Elementary School, resulting in an average charge per household of approximately $ 2,100. Alternatively, should the level of subsidy be lower, the net lot charge would increase. As well, there are some 70 existing houses and approved building lots in the proposed service area which are not connected to the water system. The Township Council may choose to include them in the assessment of charges. Should Council decide to include these future lots in the cost apportionment scenario, the resulting average charge per household could then be reduced to $1,500. The same lot charge will also be levied on all new development and recovered money will be allocated to the future capital reserve fund.

The selection of the preferred solution will not be finalized by the Township Council until comments from public and review agencies (following the public meeting scheduled for Wednesday, July 19, 1995) have been received and reviewed.

TOWNSHIP OF CAMBRIDGE

NOTICE OF PUBLIC MEETING

CLASS ENVIRONMENTAL ASSESSMENT
SCHEDULE " C "

WATER SUPPLY STUDY
FOR THE
COMMUNITY OF FOREST PARK

The Corporation of the Township of Cambridge is undertaking a Class Environmental Assessment Study to correct water quality problems with the existing Forest Park communal water supply system.

A public information session is being held to satisfy Phases 1 & 2 of the approved planning procedures contained in the Class Environmental Assessment for Municipal Water and Wastewater Projects.

An Information Session for individual discussions will be held at the **Limoges Community Center, 171 Mabel Street, Limoges** on:

Wednesday, July 19, 1995 from 2:00 p.m. to 4.00 p.m.

Following the Information Session a Public Meeting will be held at the same location on:

Wednesday, July 19, 1995 at 7: 30 p.m.

The purpose of the session and meeting is to inform the residents and other interested members of the public of the need for the project, to present the proposed alternative solutions and to provide an opportunity for public input and comments so they can be addressed and incorporated into the planning and design process. Comments will be received until August 4, 1995.

For further information or to submit written comments, please contact:

Mr. Fernand Dicaire
McNeely Engineering Consultants Ltd.
880 Taylor Creek Drive
Orleans, Ontario
K1C 1T0

Tel: (613) 830 - 7500
Fax: (613) 830 - 7506

Mr. Roger Brunette
Township of Cambridge
958 West Route 500, R.R. 3
Casselman, Ontario
K0A 1M0

Tel: (613) 764 - 5444
Fax: (613) 764 - 3310

This notice is issued on July 12, 1995.

Municipalité du Canton de Cambridge
Corporation of the Township of Cambridge

958 West Route 500 Ouest,
R.R. 3, Casselman, Ontario KOA 1MO

Tél.: (613) 764-5444
Fax: (613) 764-3310

CLASS ENVIRONMENTAL ASSESSMENT

INFORMATION SESSION AND PUBLIC MEETING
ON JULY 19, 1995

**WATER SUPPLY STUDY
FOR THE
COMMUNITY OF FOREST PARK
PHASES 1 AND 2**

Please provide to the Township of Cambridge prior to August 4, 1995 any comments or concerns you may have on any aspect of the proposed Project. Your comments are important and appreciated.

NAME : ______________________________

MAILING ADDRESS : ______________________________

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COMMENTS :

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______________________________ *Use other side if required........*

McNEELY
ENGINEERING
CONSULTANTS LTD.

530 Taylor Creek Drive, Orleans, Ontario K1C 1T1
(613) 830-7500 Fax (613) 830-7506

RÉSUMÉ

RENSEIGNEMENTS GÉNÉRAUX

Le présent document résume l'information contenue dans le Rapport préliminaire concernant les phases 1 et 2 de l'étude sur l'approvisionnement en eau de la localité de Forest Park. Cette étude sur l'approvisionnement en eau pour la localité de Forest Park a été amorcée en 1994 par le canton de Cambridge conformément au processus de planification d'une évaluation environnementale de portée générale pour les ouvrages d'eau et d'égouts municipaux de 1993. L'évaluation environnementale de portée générale est un processus rationalisé destiné à respecter la Loi sur les évaluations environnementales et comporte une consultation approfondie auprès d'agences d'examen gouvernementales et du public.

Forest Park, une collectivité de 508 personnes, est situé dans le canton de Cambridge, à environ 25 km à l'est d'Ottawa entre les villages de Casselman et d'Embrun. Un bon nombre de résidants font quotidiennement la navette entre le domicile et le lieu de travail situé principalement dans la Municipalité régionale d'Ottawa-Carleton. La localité a accès à un système communautaire d'approvisionnement en eau et des systèmes d'égout privés.

Le système d'approvisionnement et de distribution d'eau consiste en deux puits forés, une pompe pour puits, un réservoir d'entreposage souterrain, complet avec structure de filtration et un réseau de distribution à conduites principales de 150 mm de diamètre; le système fournit de l'eau à 163 habitations et une école élémentaire publique.

Le système actuel est exploité et entretenu par le canton de Cambridge depuis le début des années 1980 alors que le canton a pris charge des ouvrages d'eau jusque là la responsabilité de l'entrepreneur domiciliaire de la localité.

Une demande d'eau accrue et une détérioration constante de la qualité de la nappe d'eau souterraine a rendu de plus en plus difficile pour le canton de fournir, aux résidants de la localité de Forest Park, une eau de bonne qualité qui respecte les objectifs provinciaux.

En juin 1990, le canton de Cambridge a présenté une demande de financement au ministère de l'Environnement et de l'Énergie pour procéder à une étude visant à améliorer la qualité de l'eau, soit en trouvant une nouvelle source d'eau ou en améliorant le système de traitement existant.

Suite à un long processus d'approbation, il a été décidé de procéder à l'étude sur l'approvisionnement en eau en conformité avec l'évaluation environnementale de portée générale; la Province de l'Ontario allait assurer l'aide financière au canton de Cambridge par l'entremise de l'Agence ontarienne des eaux (AOE).

L'achèvement du rapport préliminaire des phases 1 et 2 confirme que la solution privilégiée, une activité de catégorie C, rendra nécessaire la présentation d'un rapport d'étude environnementale.

IDENTIFICATION DU PROBLÈME

La phase 1 de la présente étude du système actuel d'approvisionnement en eau a permis de cerner les lacunes suivantes:

- mauvaise qualité de l'eau qui ne respecte pas les objectifs de qualité d'eau potable en Ontario;
- la collectivité ne peut procéder à l'expansion et développer les terrains sur lesquels la construction a été approuvée; et
- détérioration et entretien accru des ouvrages d'eau qui entraînent une augmentation des coûts pour les propriétaires.

RÉSUMÉ ET ÉVALUATION DES SOLUTIONS DE RECHANGE

Plusieurs solutions de rechange ont été examinées en vue d'aborder les problèmes cernés relatifs au réseau de distribution d'eau de Forest Park.

Ces solutions de rechange sont divisées en deux catégories:

La première catégorie comprend des solutions qui restreignent l'expansion et n'offrent pas de solutions aux problèmes identifiés ou n'offrent que des solutions partielles. Ce groupe comprend des solutions comme:

- «ne rien faire»;
- limiter la croissance de la collectivité;
- améliorer le réseau actuel;
- opter pour une combinaison de systèmes collectif et privé.

Aucune des solutions énumérées ci-dessus n'offre de solution fiable à long terme au problème actuel de qualité de l'eau.

La deuxième catégorie comporte des solutions de rechange qui permettent de fournir de l'eau de bonne qualité aux habitations actuelles et permettent l'expansion future de la collectivité. Ce groupe comprend les solutions de rechange suivantes:

- construire une nouvelle usine de traitement des eaux (approvisionnement de surface);
- raccorder le réseau de distribution à un système d'approvisionnement d'eau de «zone»;
- obtenir de l'eau de Limoges; et
- aménager un nouveau champ de captage.

Au cours des délibérations lors des réunions du comité de liaison et de l'Association de la collectivité de Forest Park, il a été établi que la solution privilégiée devrait non seulement résoudre le problème de la qualité de l'eau mais également permettre l'expansion future de la collectivité conformément au Plan d'aménagement officiel. Toutes les solutions de rechange de la deuxième catégorie respectent ces critères; toutefois, en raison des exigences complexes du traitement des eaux et de la distance qui sépare Forest Park de sources d'eaux de surface, la construction d'une usine de traitement des eaux de surface serait trop coûteuse pour la collectivité de Forest Park. La densité de la population actuelle dans le canton de Cambridge et les municipalités adjacentes ne justifie pas l'aménagement d'un réseau d'approvisionnement en eau de «zone» dans un avenir prévisible. Ainsi, l'obtention d'eau de Limoges ou l'aménagement d'un champ de captage semblent être les seules solutions d'approvisionnement en eau de Forest Park techniquement et économiquement possibles.

SÉLECTION DES SOLUTIONS DE RECHANGE RECOMMANDÉES

Comme il a déjà été expliqué plus haut, deux solutions de rechange ont été retenues pour une évaluation plus poussée:

- obtenir de l'eau de Limoges, et
- aménager un nouvel approvisionnement d'eau de surface.

La solution privilégiée devrait fournir une eau de bonne qualité en quantité suffisante pour desservir une population de 1000 personnes projetée sur 20 ans, sans imposer de fardeau financier important sur la collectivité actuelle ou tout développement à venir.

Solution A - Obtenir de l'eau de Limoges

Le village de Limoges est situé à environ 4,0 km au nord-ouest de Forest Park, juste au nord de la grande route 417, le long de la route de comté n° 5. Le canton de Cambridge procède actuellement à une évaluation environnementale de portée générale pour l'aménagement d'un nouveau système d'approvisionnement d'eau devant desservir le village de Limoges. Le rapport de Phase 2 de l'évaluation environnementale de portée générale complété récemment par Lecompte Engineering Ltd. recommande la construction d'un système collectif d'approvisionnement en eau pour le village utilisant de l'eau de surface comme source d'approvisionnement en eau brute avec traitement et entreposage de l'eau. À cause de la proximité de Limoges à Forest Park, l'approvisionnement en eau à partir de Limoges semble économiquement et techniquement possible. L'agrandissement des ouvrages d'eau proposés pour Limoges ainsi que la construction d'une conduite principale seraient nécessaires pour pouvoir accommoder la collectivité de Forest Park.

Solution B - Aménager un nouveau champ de captage

L'aménagement d'un nouveau champ de captage d'eau de surface de qualité acceptable et en quantité suffisante pourrait être une solution de rechange viable pour résoudre les problèmes d'eau de la localité de Forest Park. En juillet 1993, les services professionnels de Jacques Whitford Environmental Limited ont été retenus pour effectuer l'examen hydrogéologique nécessaire pour localiser une source d'eau de surface adéquate. L'enquête a conclu qu'il existait de l'eau de surface de bonne qualité près de la route 400 à environ 3 km au nord de Forest Park et qu'il faudrait au moins trois puits de production pour répondre aux besoins en eau projeté sur 20 ans.

Le rapport hydrogéologique recommandait également de mener un test de pompage multipuits afin de déterminer les effets d'interférence et le débit de production assuré du système à long terme. Le test de pompage multipuits sur une période de 72 heures a été mené en juin 1995. Les résultats ont indiqué un débit de production assuré maximum de 4,5 l/s ce qui est bien inférieur au débit de 12 l/s jugé nécessaire pour accommoder l'expansion prévue. Ce test comprenait l'échantillonnage de la qualité de l'eau qui a révélé que l'eau de surface n'était pas d'aussi bonne qualité qu'on l'avait d'abord cru; toutefois elle se trouvait quand même à l'intérieur des limites qu'il est possible de traiter.

SOLUTION PRIVILÉGIÉE

Étant donné que la source d'eau de surface n'est pas en mesure de fournir la quantité requise d'eau, il est recommandé d'«obtenir de l'eau de Limoges». L'estimé préliminaire des coûts des immobilisations reliés à cette solution qui comporte l'agrandissement prévu des ouvrages d'eau s'élève à 2 500 000 $.

Une demande de financement de 2 125 000 $ (85 %) du coût des immobilisations sera présentée à l'Agence ontarienne des eaux. Le taux de financement des immobilisations de 85 % constitue le taux maximum autorisé en vertu des règlements actuels. Il se pourrait que soit considérée une subvention moins élevée (c.-à-d. de 70 %). Même si l'on attend encore que le Conseil approuve la demande officiellement, il est prévu que la balance de 375 000 $ sera imposée aux propriétés existantes et à l'école élémentaire de Cambridge à raison d'une redevance moyenne d'environ 2 100 $ par ménage. Toutefois, dans le cas où la subvention serait moins élevée, la redevance nette par terrain augmenterait. De plus, quelques 70 maisons et terrains sont prêts à bâtir dans le secteur proposé du service ne sont pas raccordés au système d'approvisionnement en eau. Il se peut que le Conseil du canton choisisse de les inclure dans l'évaluation des redevances. Si le Conseil procède avec un tel scénario, la répartition des coûts individuels serait basée sur quelques 253 équivalences de lots ou 1 500 $ par équivalence de lot. La même redevance sera également prélevée sur tout nouveau développement et l'argent récupéré sera versé au fonds de réserve des investissements futurs.

Le choix définitif de la solution privilégiée ne sera déterminé par le Conseil du canton qu'une fois examinés les commentaires du public et des agences d'examen (à la suite de l'assemblée publique prévue pour le mercredi 19 juillet 1995).

CANTON DE CAMBRIDGE

SÉANCE D'INFORMATION PUBLIQUE

ÉVALUATION ENVIRONNEMENTALE DE PORTÉE GÉNÉRALE
ANNEXE "C"

**ÉTUDE SUR L'APPROVISIONNEMENT EN EAU POTABLE
POUR LA
COMMUNAUTÉ DE FOREST PARK**

La corporation du canton de Cambridge planifie présentement un projet d'évaluation environnementale de portée générale afin de corriger les problèmes existants d'approvisionnement en eau potable pour la communauté de Forest Park.

Une séance d'information publique aura lieu conformément aux exigences et procédures de la Phase 1 et 2 et selon le processus de planification et de conception d'évaluation environnementale de portée générale pour des projets de système d'égout et d'approvisionnement en eau.

Un séance d'information individuelle aura lieu au **Centre Communautaire Limoges, 171 rue Mabel, Limoges** le:

Mercredi, 19 juillet 1995 de 14h à 16 h

Suivi d'une séance d'information publique au même endroit le:

Mercredi, 19 juillet 1995 à 19h 30

Le but de la séance et de la présentation est d'informer les résidants et les personnes du publique concernés de la nécessité du projet, de présenter des solutions alternatives et de permettre au public d'examiner les renseignements et d'émettre des commentaires à l'équipe d'étude pour être incluse dans le processus d'évaluation. Les commentaires vont être reçus jusqu'au 4 août 1995.

Pour obtenir de plus amples renseignements ou pour faire parvenir vos commentaires, veuillez communiquer avec:

M. Fernand Dicaire
McNeely Engineering Consultants Ltd.
880 promenade Taylor Creek
Orléans, Ontario
K1C 1T1
Téléphone: (613) 830-7500
Télécopieur: (613) 830-7506

M. Roger Brunette
Canton de Cambridge
958 route 500 ouest, R.R. 3
Casselman, Ontario
K0A 1M0
Téléphone: (613) 764-5444
Télécopieur: (613) 764-3310

Ce document émis le 12 juillet, 1995.

Municipalité du Canton de Cambridge
Corporation of the Township of Cambridge

958 West Route 500 Ouest,
R.R. 3, Casselman, Ontario K0A 1M0

Tél.: (613) 764-5444
Fax: (613) 764-3310

ÉVALUATION ENVIRONNEMENTALE DE PORTÉE GÉNÉRALE
SÉANCE D'INFORMATION INDIVIDUELLE ET PUBLIQUE
MERCREDI, LE 19 JUILLET 1995

ÉTUDE SUR L'APPROVISIONNEMENT EN EAU POTABLE
POUR LA
COMMUNAUTÉ DE FOREST PARK
PHASE 1 ET 2

Veuillez, SVP nous indiquer vos commentaires vis-a-vis la portée du projet à l'étude, le contenu du rapport, la solution retenu ainsi que toutes autres informations annexes avant le 4 août, 1995.

NOM: ____

ADRESSE: ____

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COMMENTAIRES:

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______________________________________ *Vous pouvez utiliser l'endos...*

McNEELY
ENGINEERING
CONSULTANTS LTD.

500 Taylor Creek Drive, Orleans, Ontario K1C 1T1
(613) 830-7500 Fax (613) 830-7506

INFORMATION BRIEF

In Ontario, all municipal water projects must be planned in accordance with the Environmental Assessment Act. This Act provides for the protection, conservation and wise management of the environment by seeking the public involvement and providing a responsible and accountable process of decision making.

The Class Environmental Assessment (Class EA) is a streamlined process which was developed to standardize the planning process for the projects that are:

- recurring;
- usually similar in nature;
- usually limited in scale;
- have a predictable range of environmental effects; and,
- be responsive to mitigating measures.

The planning and design process for the Class EA consists of five phases which may have to be undertaken before the project is completed.

- Phase 1 - Identify the problem;
- Phase 2 - Identify all alternative solutions to the problem;
- Phase 3 - Identify alternative design concepts;
- Phase 4 - Document all findings in an Environmental Study Report (ESR); and
- Phase 5 - Complete contract drawings, tender documents and proceed to construction, operation and monitoring.

The Class EA also classifies projects according to three Schedules: A, B, and C. The Schedule type dictates which of the five phases are required as follows:

- Schedule A: project approved without further delay;
- Schedule B: follows phases 1, 2, and 5; and
- Schedule C: follows all five phaess.

On July 12, 1995 a copy of the Executive Summary of Class EA Phase 1 and 2 Report was sent to the Forest Park residents for the Forest Park Water Supply Study together with the notice of the open house and the first public meeting. The meeting was held on July 19, 1995 to comply with the requirements of the Class EA.

The Forest Park project is being planned as a Schedule C project under the Class Environmental Assessment for Municipal Water and Wastewater Projects. The project is in Phase 3 of the process. Next, the Draft Environmental Study Report (ESR) will be prepared and circulated to review agencies, mandatory contacts and interested public.

A public meeting is planned for Tuesday August 15, 1995 to provide further information to the public and to receive input and comments (please see a copy of enclosed "Notice of Public Meeting").

Subject to comments received, the draft ESR will be finalized and placed on the public record.

The Phase 1 and 2 report concluded that "Obtaining Water from Limoges" was the preferred solution to correct the water quality problems with the existing Forest Park Supply System and to allow for housing development in the community. After reviewing comments from the public and review agencies, the Township of Cambridge Council passed a resolution officially endorsing the Limoges option and instructing Lecompte Engineering Ltd. to include the Forest Park Community in the proposed service area for the communal water supply for the Village of Limoges and to make all the necessary changes in the proposed works.

The following recommended design concept is based on Phase 3 Class EA draft report for the Village of Limoges proposed water supply prepared by Lecompte Engineering Ltd. and proposed transmission watermain line from Limoges to the Forest Park reservoir.

- Two production wells and a well pumping station located in Part Lot 21, Con. VII, Township of Russell, (Russland Road west of Dunning Road).

- A 250 mm dia connecting raw watermain, approximately 5.2 km long, between the well pumping station and the water treatment plant.

- A water treatment plant located on the east side of Limoges immediately south of the new St-Viateur school.

- Oversizing of watermain on Limoges Road between Des Pins and the south Village limits (530 m).

- Transmission low pressure watermain between south limit of Village of Limoges and storage reservoir and pumphouse in the Forest Park.

- Installation of water meters at each house to promote water efficiency.

The capital cost estimate for this project, including the cost for oversizing of the Limoges Water Works to feed Forest Park is estimated at **$2,500,000.**

An application for provincial funding to cover **$2,125,000** (85%) of capital cost will be made to the Ontario Clean Water Agency. The capital funding rate is 85% which is the maximum permissible rate according to present regulations. The grant, however, may be lower (i.e. 70%). The balance **$375,000** (15%) will be levied on the existing houses, the Cambridge Elementary School and 40 approved building lots, resulting in an average charge per household of approximately **$1,700**, if the level of subsidy is lower, the net lot charge would increase. The same lot charges will also be levied on all new development and recovered money will be allocated to the future Capital Reserve Fund.

The annual operating and maintenance cost, including a repair and maintenance reserve fund, is expected to rise from the current **$205** per household to approximately **$320.** More detailed information about the project can be found in the Draft Environmental Study Report which will be available for review following the August 15th Public Meeting at the Township of Cambridge office.

TOWNSHIP OF CAMBRIDGE
CLASS ENVIRONMENTAL ASSESSMENT
WATER SUPPLY STUDY
FOR THE
COMMUNITY OF FOREST PARK

NOTICE OF PUBLIC MEETING

Recent water supply studies for the Community Forest Park have now been concluded. Based on the results of these studies, the Township of Cambridge is considering obtaining water from the proposed communal water system in the Village of Limoges as a solution to correct water quality problems with the existing Forest Park supply system and to allow for future housing development in the community.

This project is being planned as a Schedule C project under the Class Environmental Assessment for Municipal Water and Wastewater Projects. A public meeting is planned to provide further information to the public on the proposal and to receive input and comment from the interested persons.

Public Meeting : 7:30 pm
Tuesday, August 15, 1995

Limoges Community Center
171 Mabel Street, Limoges

Following the public meeting further comments are invited, for incorporation into the planning and design of this project , and will be received until August 25, 1995.

Subject to comments received as a result of this Notice, the Township plans to instruct the consultant to proceed with the planning for this project and an Environmental Study Report will be prepared and placed on the public record.

For future information or to submit written comments, please contact:

Mr. Fernand Dicaire
McNeely Engineering Consultants Ltd.
880 Taylor Creek Drive
Orleans, Ontario
K1C 1T1

Tel: (613) 830 - 7500
Fax: (613) 830 - 7506

Mr. Roger Brunette
Township of Cambridge
958 West Route 500, R.R.3
Casselman, Ontario
K0A 1M0

Tel: (613) 764 - 5444
Fax: (613) 764 - 3310

This notice is issued on August 9, 1995.

DOCUMENT D'INFORMATION

En Ontario, tous les projets d'eau municipaux doivent être planifiés conformément à la Loi sur les évaluations environnementales. Cette Loi vise la protection, la conservation et la gestion intelligente de l'environnement en invitant la participation du public et en prévoyant un processus décisionnel responsable.

L'Évaluation environnementale de portée générale est un processus rationalisé qui a été développé pour normaliser le processus de planification de projets qui sont:

* répétitifs;
* habituellement de nature similaire;
* habituellement de portée limitée;
* sujets à un éventail d'effets environnementaux prévisibles; et,
* sensibles aux mesures de protection.

Le processus de planification et de conception pour l'évaluation environnementale de portée générale comporte cinq étapes:

* Phase 1- Identifier le problème;
* Phase 2- Déterminer toutes les solutions de rechange;
* Phase 3- Identifier des concepts de rechange;
* Phase 4- Documenter toutes les conclusions sous forme de rapport d'étude environnementale (REE); et,
* Phase 5- Compléter les dessins du contrat, les documents d'appel d'offre et procéder à la construction, l'exploitation et la surveillance.

L'Évaluation environnementale de portée générale classifiée. Les projets selon trois annexes: A, B et C.

- Annexe A: projet est approuvé sand plus d'étude;
- Annexe B: suit phases 1, 2 et 5; et,
- Annexe C: suit tout les cinque phases.

Le 12 juillet 1995, une copie du résumé du rapport sur les phases 1 et 2 de l'évaluation environnementale de portée générale de l'étude sur l'approvisionnement en eau de Forest Park a été envoyée aux résidants de Forest Park avec un avis d'une journée d'accueil et de la première assemblée publique. L'assemblée a eu lieu le 19 juillet 1995 de façon à respecter les exigences relatives à l'évaluation environnementale de portée générale.

Le projet de Forest Park est planifié comme projet d'annexe C conformément à l'évaluation environnementale de portée générale pour les ouvrages d'eau et d'égouts municipaux. Présentement, la phase 3 du processus est en voie d'être complétée. L'ébauche du rapport d'étude environnementale sera rédigé puis distribué aux agences d'examen, aux personnes qui doivent en prendre connaissance et au public intéressé.

Une assemblée publique sera tenue le mardi 15 août 1995 dans le but de fournir d'autres renseignements au public et de recevoir ses suggestions et commentaires (veuillez consulter l'avis d'assemblée publique ci-joint).

Une fois les commentaires du public reçus, la version définitive de l'ébauche du rapport d'étude environnementale sera rédigée et le document sera déposé aux dossiers publics.

Le rapport des phases 1 et 2 a conclu que «obtenir l'eau de Limoges» est la solution privilégiée pour corriger les problèmes relatifs à la qualité de l'eau du système existant d'approvisionnement en eau de Forest Park et tenir compte du développement domiciliaire dans la communauté. Après avoir examiné les commentaires reçus du public et des agences d'examen, le Conseil du canton de Cambridge a adopté une résolution appuyant officiellement l'option de Limoges et demandant à Lecompte Engineering Ltd. d'inclure la collectivité de Forest Park dans le secteur de service proposé pour l'approvisionnement collectif d'eau du village de Limoges et d'apporter toutes les modifications nécessaires aux travaux projetés.

Le concept recommandé qui suit est basé sur l'ébauche du rapport de phase 3 de l'étude environnementale de portée générale pour le projet relatif à l'approvisionnement en eau du village de Limoges préparé par Lecompte Engineering Ltd., et propose une conduite principale de raccordement entre Limoges et le réservoir de Forest Park.

* Deux puits de production et une station de pompage situés en partie sur le lot 21, concession VII, canton de Russell (chemin Russland à l'ouest du chemin Dunning).

* Une conduite principale de connexion de l'eau à filtrer de 250 mm de diamètre, sur une longueur d'environ 5,2 km, entre la station de pompage du puits et l'usine de traitement de l'eau.

* Une usine de traitement de l'eau située du côté est de Limoges, immédiatement au sud de la nouvelle école St-Viateur.

* Le surdimentionnement de la conduite principale sur le chemin Limoges entre Des Pins et les limites sud du village (530 m).

* Un raccordement de la conduite principale à faible pression entre la limite sud du village de Limoges et le réservoir d'entreposage, et la station de pompage de Forest Park.

* L'installation de compteurs d'eau à chaque domicile pour encourager une consommation raisonnable d'eau,

Il est prévu que le coût des immobilisations du projet, y compris le surdimentionnement des ouvrages d'eau de Limoges, s'élèvera à 2 500 000 $.

Une demande de financement provincial devant couvrir 2 125 000 $ (85 %) du coût des immobilisations sera présentée à l'Agence ontarienne des eaux. Le taux de financement des immobilisations de 85 % constitue le taux maximum autorisé en vertu des règlements actuels. La subvention peut être moins élevée (c.-à-d.de 70 %). La balance,375 000 $ (15 %) sera imposée aux propriétés existantes, à l'école élémentaire de Cambridge et aux 40 terrains sur lesquels il est autorisé de construire, ce qui se traduirait en une redevance moyenne d'environ 1700 $ par ménage. Par contre, si la subvention accordée est moins élevée, la redevance nette par lot augmenterait. Les mêmes redevances seront imposées à tout nouveau développement et l'argent récupéré sera versé au fonds de réserve des investissements futurs.

Il est prévu que le coût annuel d'exploitation et d'entretien, y compris le fonds de réparation et d'entretien, passera de l'actuel 205 $ à environ 320 $ par ménage. Vous pouvez trouver de l'information plus détaillée sur le projet dans l'ébauche du rapport de l'étude environnementale qui sera à la disposition du public pour fin d'examen à la suite de l'assemblée publique d'août au bureau du canton de Cambridge.

MISC\M2963AUG.95(tn)

CANTON DE CAMBRIDGE
ÉVALUATION ENVIRONNEMENTALE DE PORTÉE GÉNÉRALE
ÉTUDE SUR L'APPROVISIONNEMENT EN EAU POTABLE
POUR LA COMMUNAUTÉ DE FOREST PARK
SÉANCE D'INFORMATION PUBLIQUE

Les études récentes en approvisionnement d'eau potable pour la communauté de Forest Park sont présentement terminées. Selon les résultats des études, le Canton de Cambridge propose de se raccorder au système d'aqueduc municipale du Village de Limoges comme solution afin de corriger les problèmes de qualité de l'eau du système existant d'approvisionnement en eau potable de la communauté de Forest Park et pour permettre le développement futur dans la communauté.

Ce projet est planifié selon les exigences de la **Cédule "C"** du document intitulé **"Class Environmental Assessment for Municipal Water and Wastewater Projects, June 1993"**. **Une réunion publique aura lieu afin de fournir de l'information additionnelle au public sur le projet proposé et de recevoir les commentaires de la part des personnes intéressées.**

Réunion publique: 19h30
mardi le 15 août, 1995

Centre communautaire Limoges
171, rue Mabel, Limoges

Après la réunion publique, le public est invité à soumettre d'ici le 25 août, 1995, leurs commentaires pour considération dans la planification et la conception de ce projet. Sujet aux commentaires reçus suite à la parution de cet avis, le canton a l'intention d'aviser le consultant de procéder avec la planification de ce projet et un rapport de l'étude environnementale sera préparée et sera disponible au public.

Pour obtenir de plus amples renseignements ou pour faire parvenir vos commentaires, veuillez communiquer avec:

Fernand Dicaire
McNeely Engineering Consultants Ltd.
880, promenade Taylor Creek
Orléans, ON K1C 1T1

Téléphone: (613) 830-7500
Télécopieur: (613) 830-7506

Roger Brunette
Canton de Cambridge
958 route 500 ouest, R.R. 3
Casselman, ON K0A 1M0

Téléphone: (613) 764-5444
Télécopieur: (613) 764-3310

Ce document émis le 9 août, 1995.

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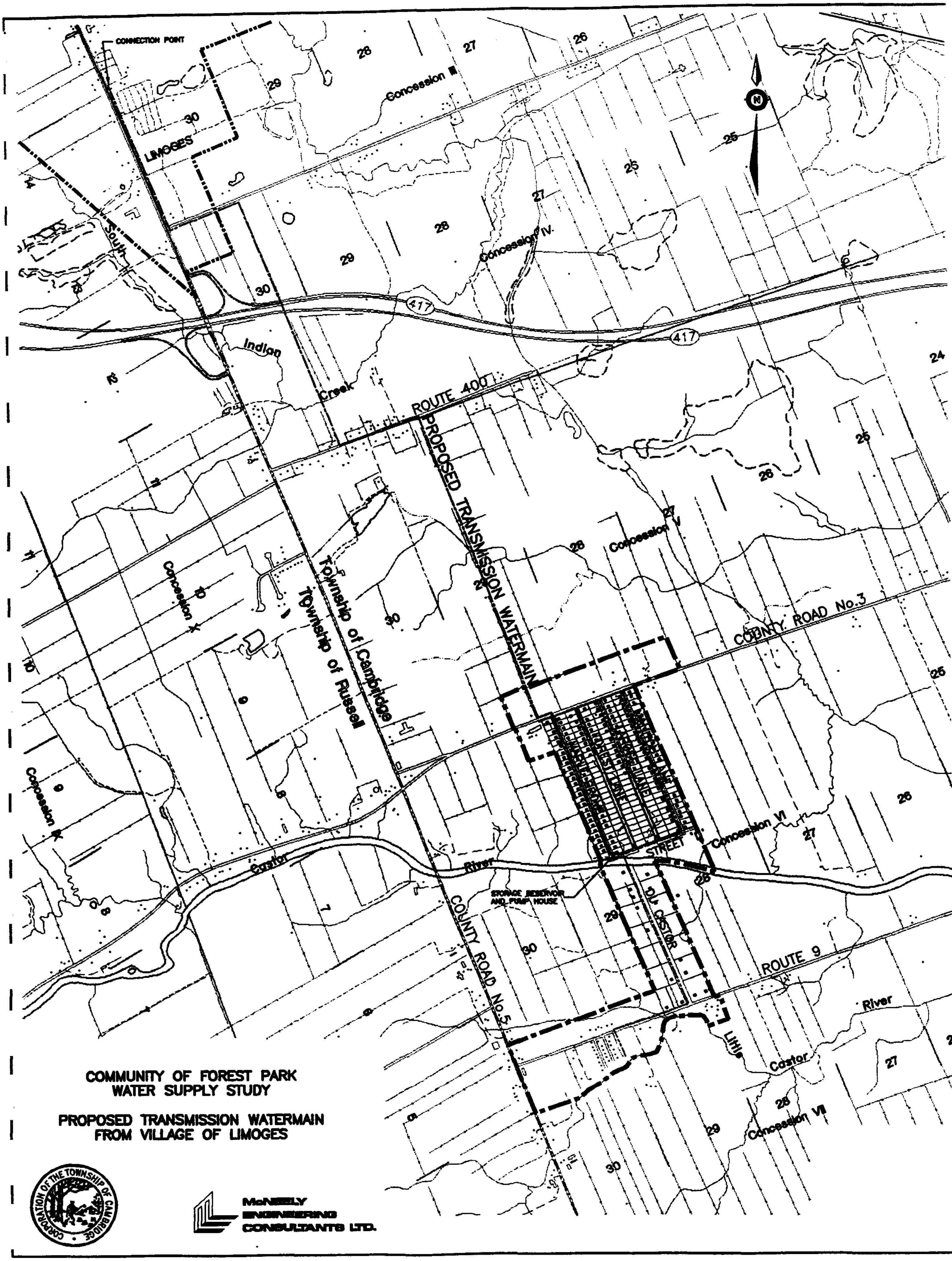

COMMUNITY OF FOREST PARK
WATER SUPPLY STUDY

PROPOSED TRANSMISSION WATERMAIN
FROM VILLAGE OF LIMOGES

CORPORATION OF THE TOWNSHIP OF CAMBRIDGE

McNEELY ENGINEERING CONSULTANTS LTD.

Municipalité du Canton de Cambridge
Corporation of the Township of Cambridge

958 West Route 500 Ouest,
R.R. 3, Casselman, Ontario K0A 1M0

Tél.: (613) 764-5444
Fax: (613) 764-3310

CLASS ENVIRONMENTAL ASSESSMENT

PUBLIC MEETING ON AUGUST 15, 1995

WATER SUPPLY STUDY
FOR THE
COMMUNITY OF FOREST PARK
PHASE 3

Please provide to the Township of Cambridge prior to August 25, 1995 any further comments or concerns you may have on any aspect of the proposed Project. Your comments are important and appreciated.

NAME : ______________________________

MAILING ADDRESS : ______________________________

____

COMMENTS :

____

____

____

____

____

____

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____

____

____

______________________________ *Use other side if required ....*

McNEELY
ENGINEERING
CONSULTANTS LTD.

880 Taylor Creek Drive, Orleans, Ontario K1C 1T1
(613) 830-7500 Fax (613) 830-7506

CANTON DE CAMBRIDGE

EVALUATION ENVIRONNEMENTALE DE PORTEE GENERALE ANNEXE 'C'

ETUDE SUR L'APPROVISIONNEMENT EN EAU POTABLE POUR LA COMMUNAUTE DE FOREST PARK

SEANCE D'INFORMATION PUBLIQUE

PHASES 1 & 2

JULY 19, 1995

McNEELY
ENGINEERING
CONSULTANTS LTD.

TOWNSHIP OF CAMBRIDGE

CLASS ENVIRONMENTAL ASSESSMENT
SCHEDULE 'C'

WATER SUPPLY STUDY
FOR THE
COMMUNITY OF FOREST PARK

PUBLIC MEETING No.1

PHASES 1 & 2

JULY 19, 1995

McNEELY
ENGINEERING
CONSULTANTS LTD.

PROJECT PRESENTATION

- Introduction
- Municipal Class EA Process
- Existing Infrastructure
- Problem Definition
- Alternative Solutions
- Recommended Solution
- Financial Considerations
- Questions and Discussion

McNEELY
ENGINEERING
CONSULTANTS LTD.

PRESENTATION

- Introduction
- Processus d'évaluation environmentale
- Infrastructure existante
- Problématique
- Solutions de rechange
- Solution Privilégiée
- Considérations Financières
- Questions et Discussion

McNEELY
ENGINEERING
CONSULTANTS LTD.

Purpose of the meeting:

Present the findings of Phase 1 and 2 of the study

But de la rencontre:

Présenter les résultats des phases 1 et 2 de l'étude

McNeely Engineering Consultants Ltd.

THE ENVIRONMENTAL ASSESSMENT ACT

The Environmental Assessment Act (EA Act) provides for the protection, conservation and wise management of the environment in Ontario by providing a responsible and accountable process of decision-making.

ACTE SUR L'ÉVALUATION ENVIRONNEMENTALE

L'acte sur l'évaluation environnementale (EA act) pourvoie à la protection, conservation et à l'administration de l'environnement en Ontario en fournissant un procédé décisionnel équitable et responsable.

McNEELY ENGINEERING CONSULTANTS LTD.

CLASS EA - SCHEDULES

Municipal water and sewer projects are classified in terms of Schedules.

SCHEDULE A

- Projects in this classification are limited in scale, have minimal adverse effects.

SCHEDULE B

- Projects in this classification have the potential for some adverse environmental effects.

SCHEDULE C

- Projects in this classification have the potential for significant environmental effects.

ÉVALUATION ENVIRONNEMENTALE DE PORTÉE GÉNÉRALE

CÉDULES

L' APPROVISIONNEMENT EN EAU ET LES PROJETS DE SYSTÈME D'ÉGOUT SONT CLASSIFIÉS EN TERME DE CÉDULES

CÉDULE A
- Les Projets dans cette catégorie sont d'une ordre de grandeur moindre et ont peu de conséquences défavorables

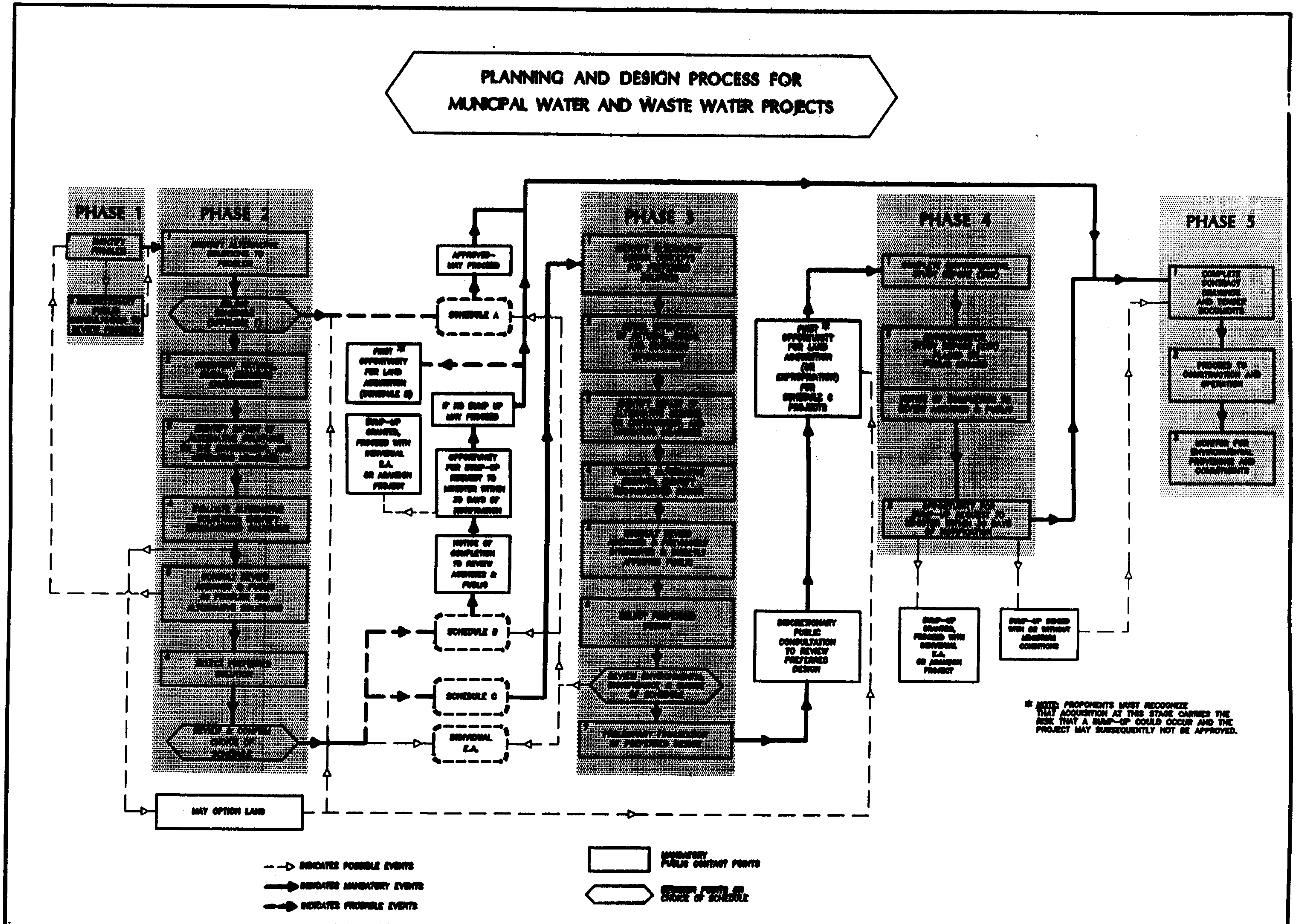
CÉDULE B
- Les Projets dans cette catégorie peuvent avoir des conséquences environnemental défavorables

CÉDULE C
- Les Projets dans cette catégorie peuvent avoir des conséquences importantes sur l'environnement

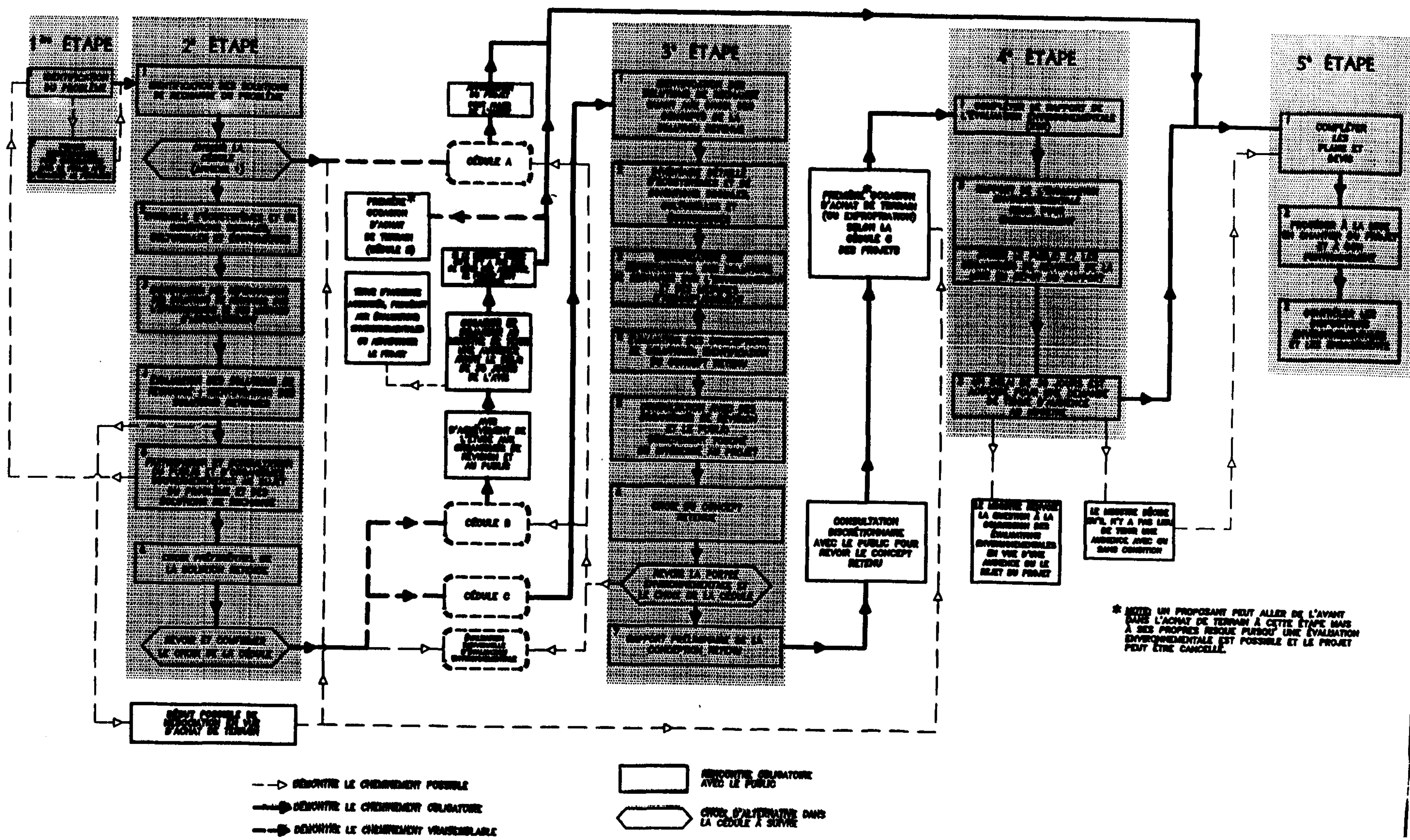
McNEELY
ENGINEERING
CONSULTANTS LTD.

CLASS EA PLANNING PROCESS / PROCESSUS D'ÉVALUATION ENVIRONNEMENTALE

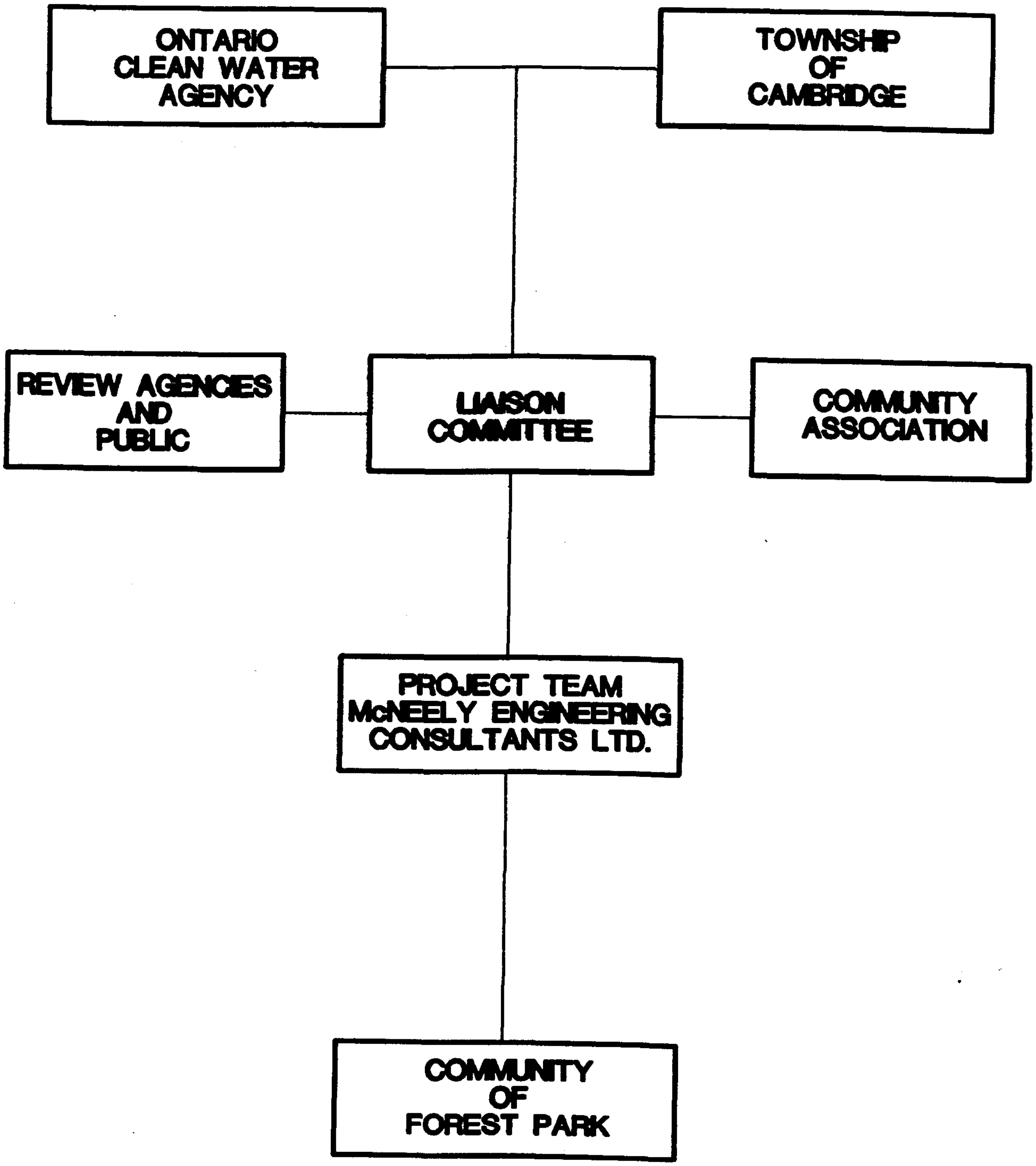
- PHASE 1 — **- Identification of Problems**
  - Identification des problèmes
- PHASE 2 — **- Identification of Alternative Solutions**
  - Identification des solutions de rechange
- PHASE 3 — **- Evaluation of Alternative Design Concepts**
  - Évaluation des alternatives de conception
- PHASE 4 — **- Environmental Study Report**
  - Rapport sur l'évaluation environnementale
- PHASE 5 — **- Detailed Design**
  - Conception détaillé


PLANNING AND DESIGN PROCESS FOR
MUNICIPAL WATER AND WASTE WATER PROJECTS
PHASE 1
PHASE 2
PHASE 3
PHASE 4
PHASE 5
APPROVED- MAY PROCEED
SCHEDULE A
FIRST * OPPORTUNITY FOR LAND ACQUISITION (SCHEDULE B)
IF NO BUMP UP MAY PROCEED
BUMP-UP GRANTED, PROCEED WITH INDIVIDUAL E.A. OR ABANDON PROJECT
OPPORTUNITY FOR BUMP-UP REQUEST TO MINISTER WITHIN 30 DAYS OF NOTIFICATION
NOTICE OF COMPLETION TO REVIEW AGENCIES & PUBLIC
SCHEDULE B
SCHEDULE C
INDIVIDUAL E.A.
MAY OPTION LAND
FIRST * OPPORTUNITY FOR LAND ACQUISITION (OR EXPROPRIATION) FOR SCHEDULE C PROJECTS
DISCRETIONARY PUBLIC CONSULTATION TO REVIEW PREFERRED DESIGN
BUMP-UP GRANTED, PROCEED WITH INDIVIDUAL E.A. OR ABANDON PROJECT
BUMP-UP DENIED WITH OR WITHOUT ADDITIONAL CONDITIONS
COMPLETE CONTRACT DRAWINGS AND TENDER DOCUMENTS
PROCEED TO CONSTRUCTION AND OPERATION
MONITOR FOR ENVIRONMENTAL PROVISIONS AND COMMITMENTS
* NOTE: PROPONENTS MUST RECOGNIZE THAT ACQUISITION AT THIS STAGE CARRIES THE RISK THAT A BUMP-UP COULD OCCUR AND THE PROJECT MAY SUBSEQUENTLY NOT BE APPROVED.
INDICATES POSSIBLE EVENTS
INDICATES MANDATORY EVENTS
INDICATES PROBABLE EVENTS
MANDATORY PUBLIC CONTACT POINTS

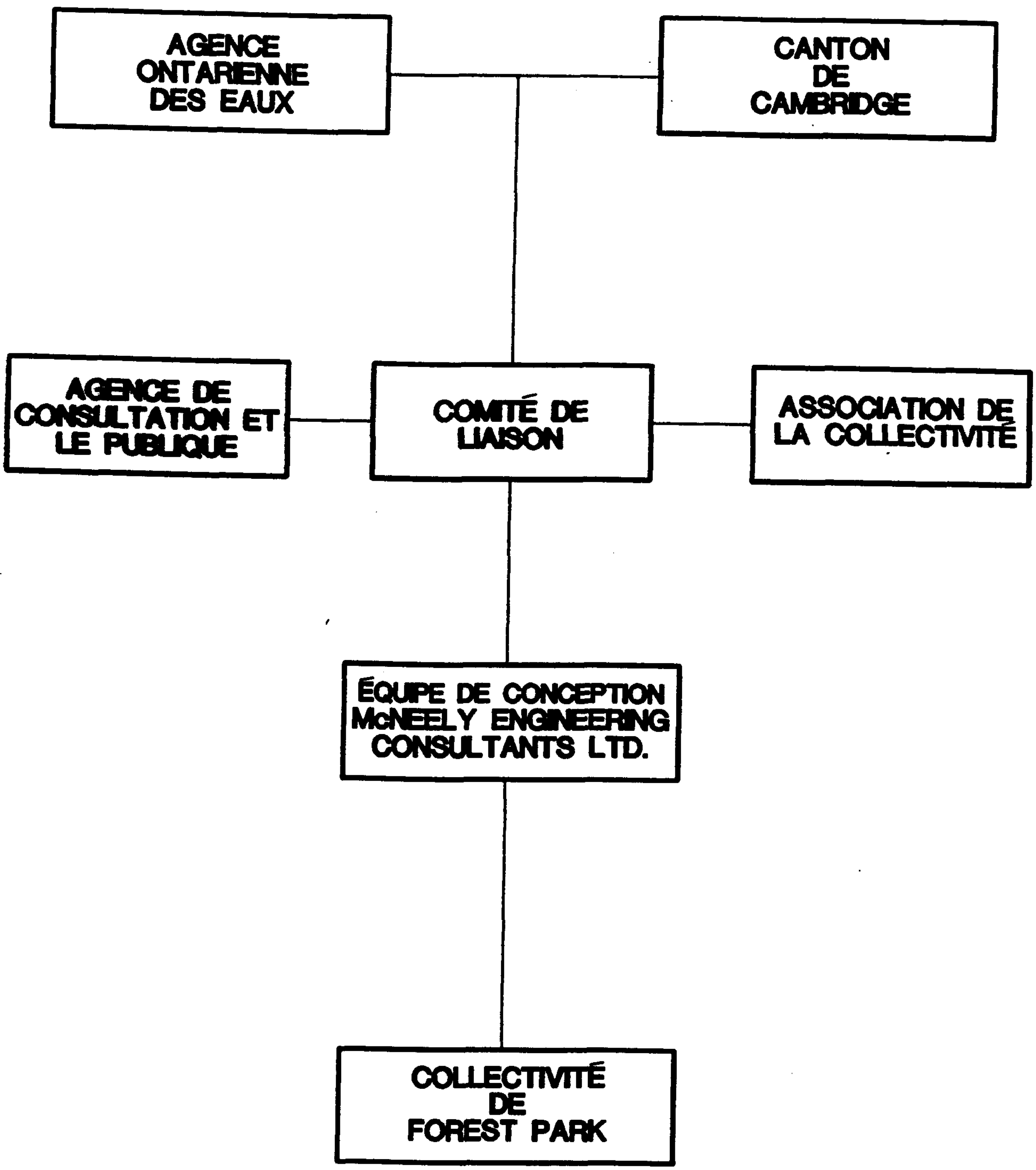
PROCESSUS DE PLANIFICATION ET DE CONCEPTION D'ÉVALUATION ENVIRONNEMENTALE DE PORTÉE GÉNÉRALE POUR DES PROJETS DE SYSTÈME D'ÉGOUT ET D'APPROVISIONNEMENT EN EAU



ORGANIZATIONAL CHART



ORGANIGRAMME



THE LIAISON COMMITTEE

- The liaison committee meets to provide guidance and input into the decision making process.
- The liaison committee brings the various interests to one table for incorporation into the planning process.
- The liaison committee generally meets at project milestones.

COMITÉ DE LIAISON

- Le Comité de Liaison se rencontre afin de fournir les renseignements nécessaires dans le procédé décisionnel.

- Le Comité de Liaison présente les différentes solutions de rechange a être incluses durant le procédé de planification.

- Le Comité de Liaison se rencontre généralement avant chaque étape décisionnelle.

McNEELY ENGINEERING CONSULTANTS LTD.

REVIEW AGENCIES

MUNICIPALITIES

Township of Cambridge
Township of Russell

ONTARIO GOVERNMENT MINISTRIES

Ministry of Agriculture and Food
Ministry of Community and Social Services
Ministry of Culture and Communications
Ministry of Environment and Energy
Ministry of Housing
Ministry of Municipal Affairs
Ministry of Natural Resources
Ministry of Transportation

OTHER ORGANIZATIONS

Forest Park Community Association
Ontario Clean Water Agency
Eastern Ontario District Health Unit
South Nation River Conservation Authority
United Counties of Prescott and Russell

SCHOOL BOARDS

Prescott-Russell County Board of Education
Prescott-Russell County Separate School Board

PUBLIC UTILITIES

Ontario Hydro
Bell Canada
Consumers Gas
Rogers Cable

AGENCES DE CONSULTATION

MUNICIPALITÉS

Canton de Cambridge
Canton de Russell

MINISTÈRES DU GOUVERNEMENT DE L'ONTARIO

Agriculture, Alimentation et Affaires Rurales
Services Sociaux et Communautaires
Culture, Tourisme et Loisirs
Environnement et Énergie
Logement
Affaires Municipales
Richesses Naturelles
Transport

AUTRES ORGANISATIONS

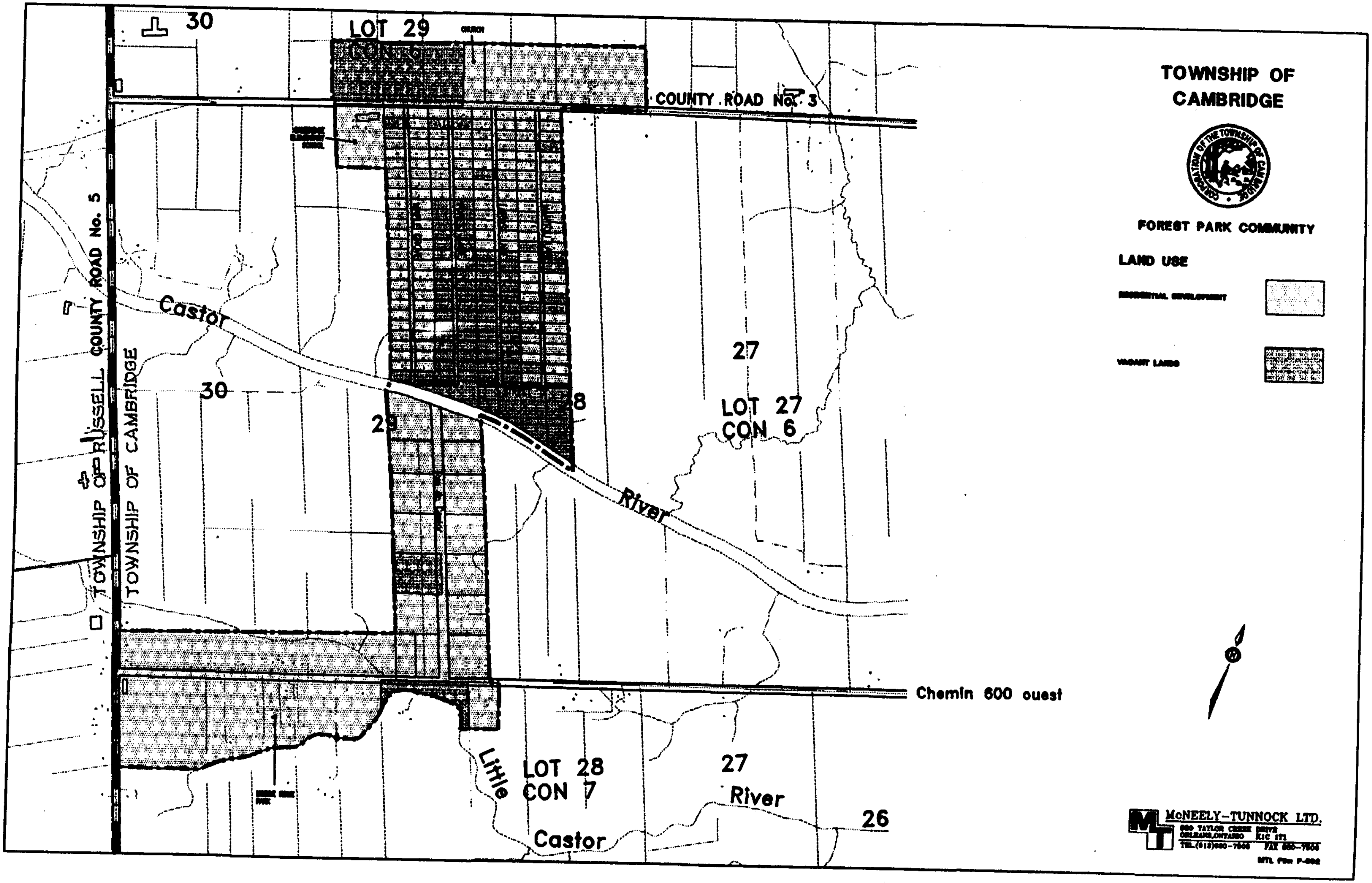
Association Communautaire de Forest Park
Agence Ontarienne des Eaux
Unité Sanitaire du District de l'est de l'Ontario
Société d'Aménagement de la Rivière Nation Sud
Les Comtés Unis de Prescott et Russell

CONSEILS SCOLAIRES

Le Conseil d'Éducation des Comtés de Prescott-Russell
Le Conseil des Écoles Séparées de Prescott-Russell

UTILITÉ PUBLIQUE

Hydro Ontario
Bell Canada
Consumers Gas
Cable Vision



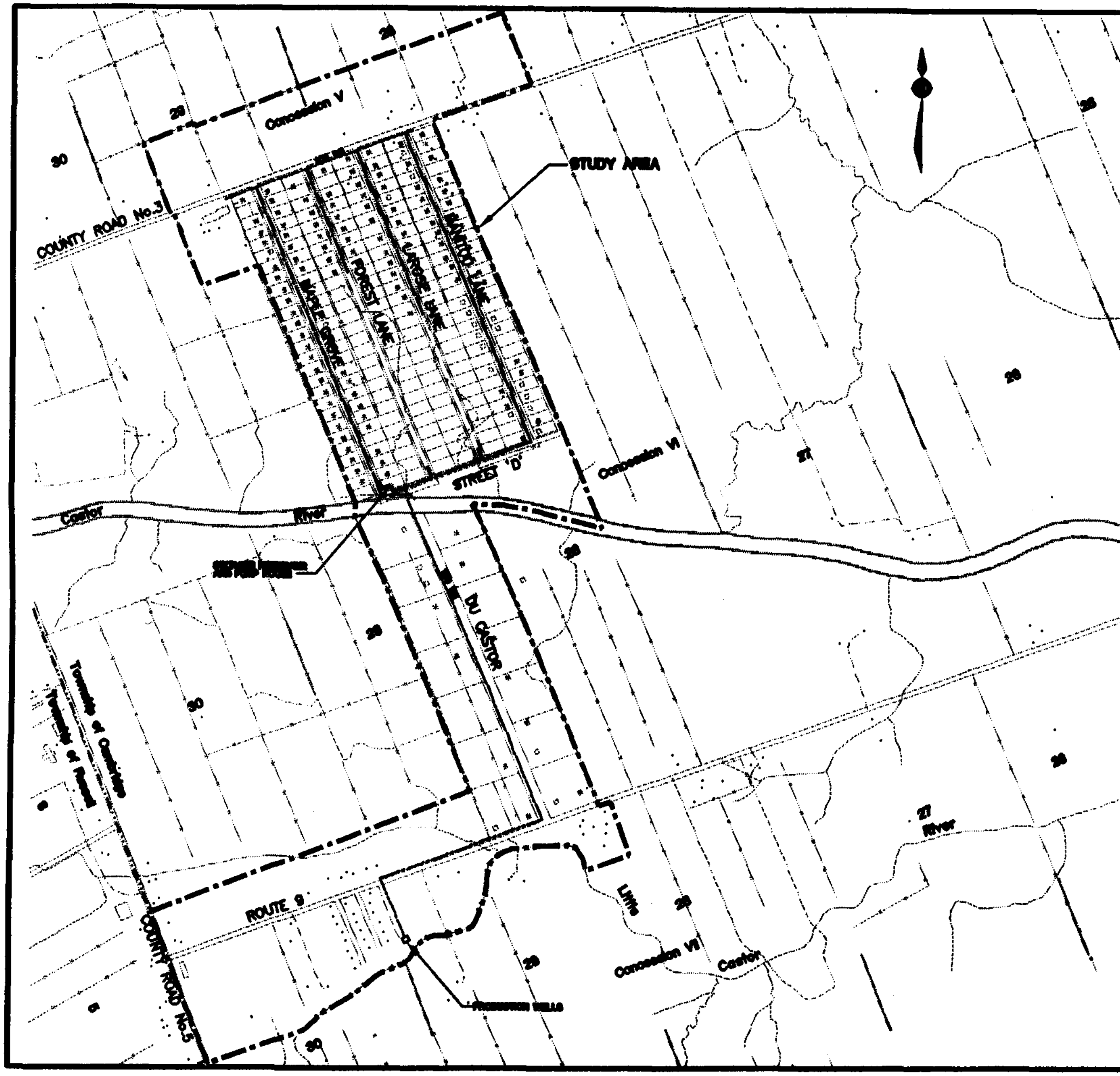
TOWNSHIP OF CAMBRIDGE
FOREST PARK COMMUNITY
LAND USE
LOT 29
CON 6
COUNTY ROAD No. 3
30
27
LOT 27
CON 6
Castor
River
29
LOT 28
CON 7
Little
Castor
River
27
26
Chemin 600 ouest
TOWNSHIP OF RUSSELL COUNTY ROAD No. 5
TOWNSHIP OF CAMBRIDGE
McNEELY-TUNNOCK LTD.

**COMMUNITY OF FOREST PARK
WATER SUPPLY STUDY**

STUDY AREA

TOWNSHIP OF CAMBRIDGE

McNEELY ENGINEERING CONSULTANTS LTD.



COMMUNITY OF FOREST PARK
WATER SUPPLY STUDY

EXISTING WATER WORKS

TOWNSHIP OF CAMBRIDGE

McNEELY ENGINEERING CONSULTANTS LTD.

IDENTIFIED PROBLEMS WITH FOREST PARK PUMPHOUSE

- High lift pumps need replacement - rusted and leaking.
- Fire pump would always start before the second high lift pump - defective controls.
- Neighbours are consistently complaining about diesel engine noise.
- In case of power outages, louvers remain shut - no air exchange.

CLASS ENVIRONMENTAL ASSESSMENT

WATER SUPPLY STUDY FOR THE
COMMUNITY OF FOREST PARK

ONTARIO CLEAN WATER AGENCY
DIRECT GRANT PROJECT No. 7-5051-01

McNEELY
ENGINEERING
CONSULTANTS LTD.

IDENTIFICATIONS DES PROBLÈMES DE LA STATION DE POMPAGE DE FOREST PARK

- Les pompes à haute pression doivent être remplacées
  - rouillées et fuite d'eau.
- La pompe d'incendie démarre toujours avant la deuxième pompe à haute pression - contrôles défectueux.
- Les voisins se plaignent continuellement du bruit du moteur diésel.
- Dans les cas d'une panne électrique le clapet reste fermé
  - aucun changement d'air.

POTENTIAL ALTERNATIVE SOLUTIONS TO IDENTIFIED PROBLEMS

- DO NOTHING
- LIMIT COMMUNITY GROWTH
- UPGRADE EXISTING SYSTEM
- COMBINATION OF COMMUNAL AND PRIVATE SYSTEMS

- CONSTRUCT A SURFACE WATER TREATMENT PLANT
- CONNECTION TO AN "AREA TYPE" WATER SUPPLY SYSTEM
- OBTAINING WATER FROM LIMOGES
- DEVELOP NEW WELLS

CLASS ENVIRONMENTAL ASSESSMENT
WATER SUPPLY STUDY FOR THE COMMUNITY OF FOREST PARK
ONTARIO CLEAN WATER AGENCY
DIRECT GRANT PROJECT No. 7-3061-01

McNEELY ENGINEERING CONSULTANTS LTD.

RESUMÉ ET ÉVALUATION DES SOLUTIONS DE RECHANGE

- "NE RIEN FAIRE"
- LIMITÉ LA CROISSANCE DE LA COLLECTIVITÉ
- AMÉLIORER LE RÉSEAU ACTUEL
- OPTER POUR UNE COMBINAISON DE SYSTÈMES COLLECTIFS ET PRIVÉS

- CONSTRUIRE UNE NOUVELLE USINE DE TRAITEMENT DES EAUX
- RACCORDER LE RÉSEAU DE DISTRIBUTION À UN SYSTEME D'APPROVISIONNEMENT D'EAU DE "ZONE"
- OBTENIR DE L'EAU DE LIMOGES
- AMÉNAGER UN NOUVEAU CHAMP DE CAPTAGE

ÉVALUATION ENVIRONNEMENTALE
ÉTUDE SUR L'APPROVISIONNEMENT EN EAU POUR LA LOCALITÉ DE FOREST PARK
AGENCE ONTARIENNE DES EAUX
PROJET DE L'AGENCE ONTARIENNE DES EAUX
No. 7-3061-01

McNEELY ENGINEERING CONSULTANTS LTD.

SELECTION OF RECOMMENDED ALTERNATIVES

ALTERNATIVE A - OBTAINING WATER FROM LIMOGES

ALTERNATIVE B - DEVELOP NEW WELLS

CLASS ENVIRONMENTAL ASSESSMENT
WATER SUPPLY STUDY FOR THE
COMMUNITY OF FOREST PARK
ONTARIO CLEAN WATER AGENCY
DIRECT GRANT PROJECT No. 7-3061-01

McNEELY
ENGINEERING
CONSULTANTS LTD.

SÉLECTION DES SOLUTIONS DE RECHANGE RECOMMANDÉES

SOLUTION A - OBTENIR DE L'EAU DE LIMOGES

SOLUTION B - AMÉNAGER UN NOUVEAU CHAMP DE CAPTAGE

ÉVALUATION ENVIRONNEMENTALE
ÉTUDE SUR L'APPROVISIONNEMENT EN EAU POUR LA LOCALITÉ DE FOREST PARK
AGENCE ONTARIENNE DES EAUX
PROJET DE L'AGENCE ONTARIENNE DES EAUX
No. 7-3061-01

McNEELY ENGINEERING CONSULTANTS LTD.

PREFERRED SOLUTION:

ALTERNATIVE A - OBTAINING WATER FROM LIMOGES

PRELIMINARY COST ESTIMATE -	$2,500,000
PROVINCIAL FUNDING -	$2,125,000
COMMUNITY SHARE -	$375,000

NOTE : ASSUMING 85% OF CAPITAL FUNDING RATE
FUNDING RATE MAY BE LOWER

CLASS ENVIRONMENTAL ASSESSMENT
WATER SUPPLY STUDY FOR THE
COMMUNITY OF FOREST PARK
ONTARIO CLEAN WATER AGENCY
DIRECT GRANT PROJECT No. 7-3061-01

McNEELY
ENGINEERING
CONSULTANTS LTD.

SOLUTION PRIVILÉGIÉE

SOLUTION A - OBTENIR DE L'EAU DE LIMOGES

ESTIMÉ PRÉLIMINAIRE -	$2,500,000
FINANCEMENT PROVINCIAL -	$2,125,000
PART DE LA COLLECTIVITÉ -	$375,000

NOTE : L'ON ASSUME QUE 85% DES COÛTS EN CAPITAUX SERONT SUBVENTIONNÉS PAR LA PROVINCE. UNE SUBVENTION MOINS ÉLEVÉS EST POSSIBLE.

COMMUNITY OF FOREST PARK
WATER SUPPLY STUDY

TOWNSHIP OF CAMBRIDGE

PROPOSED TRANSMISSION WATERMAIN
FROM VILLAGE OF LIMOGES

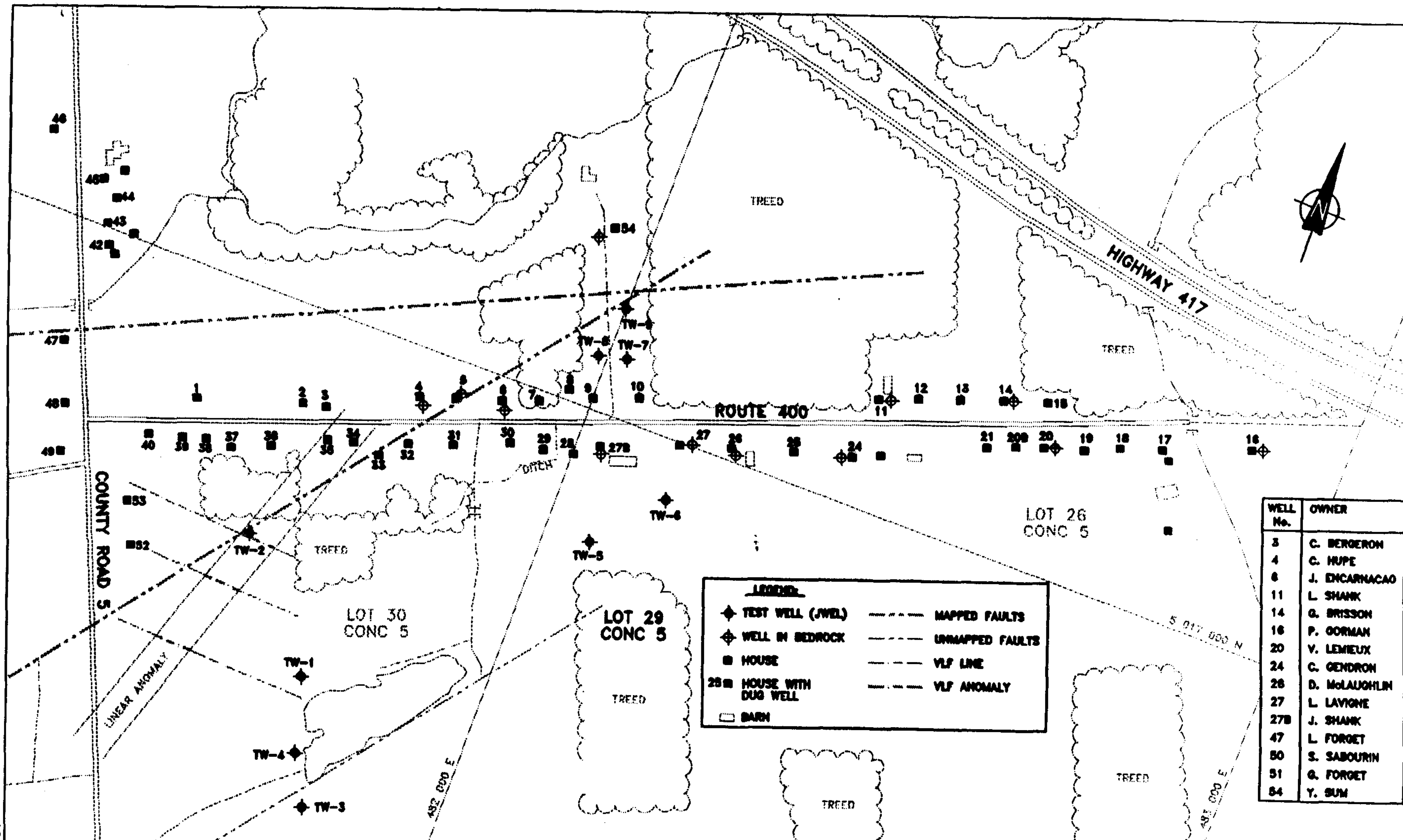
McNEELY ENGINEERING CONSULTANTS LTD.

COMMUNITY OF FOREST PARK
WATER SUPPLY STUDY

ALTERNATIVE WATERMAIN ROUTES
FROM NEW PRODUCTION WELLS

TOWNSHIP OF CAMBRIDGE

McNEELY ENGINEERING CONSULTANTS LTD.



WELL No.	OWNER
3	C. BERGERON
4	C. HUPE
6	J. ENCARNACAO
11	L. SHANK
14	G. BRISSON
16	P. GORMAN
20	V. LEMIEUX
24	C. GENDRON
26	D. McLAUGHLIN
27	L. LAVIGNE
27B	J. SHANK
47	L. FORGET
50	S. SABOURIN
51	G. FORGET
54	Y. SUM

Jacques Whitford

TOWNSHIP OF CAMBRIDGE

FOREST PARK COMMUNAL WATER SUPPLY INVESTIGATION

TOWNSHIP OF CAMBRIDGE, ONTARIO

EXPLORATION TARGET AREAS

DRAWING No.: 30340-104

FILE 30340-04

THE NEXT STEPS/ LES PROCHAINES ÉTAPES

1. Comments on /
   Commentaires sur

   - Design population /
     Population projetée
   - Capital cost recovery /
     Récupération des coûts capitaux
   - Preferred alternative /
     Solution retenue

McNeely Engineering Consultants Limited

THE NEXT STEPS/
LES PROCHAINES ÉTAPES

2. Review public and agency comments /
Révision des commentaires soumis par le public et les agences.

3. Proceed to Phase 3 /
Passer à la phase 3

TOWNSHIP OF CAMBRIDGE

CLASS ENVIRONMENTAL ASSESSMENT
SCHEDULE 'C'

WATER SUPPLY STUDY
FOR THE
COMMUNITY OF FOREST PARK

PUBLIC MEETING No.2

PHASE 3

AUGUST 15, 1995

McNEELY
ENGINEERING
CONSULTANTS LTD.

CANTON DE CAMBRIDGE

ÉVALUATION ENVIRONNEMENTALE DE PORTÉE GÉNÉRALE ANNEXE 'C'

ÉTUDE SUR L'APPROVISIONNEMENT EN EAU POTABLE POUR LA COMMUNAUTÉ DE FOREST PARK

SEANCE D'INFORMATION PUBLIQUE No.2

PHASE 3

AUGUST 15, 1995

McNEELY
ENGINEERING
CONSULTANTS LTD.

PROPOSED WATER WORKS FOR FOREST PARK

PART 1 - SHARING WITH LIMOGES

- Two production wells and a well pumping station located in Part Lot 21, Con. VII, Township of Russell, (Russland Road west of Dunning Road).
- A 250 mm dia. feedermain, approximately 5.2 km long, between the well pumping station and the water treatment plant.
- A water treatment plant located on the east side of County Road No.5 immediately south of the new St-Viateur school.
- Common watermain on County Road No. 5 through Limoges (530m).

TRAVAUX PROPOSÉ POUR L'APPROVISIONNEMENT EN EAU DE FOREST PARK

1ière PARTIE - PARTAGE DES COÛTS AVEC LIMOGES

- Deux puits de production et une station de pompage situés sur une partie du lot 21, Concession VII, canton de Russell (chemin Russland à l'ouest du chemin Dunning).
- Une conduite principale de 250mm de diamètre, d'une longueur d'environ 5.2 km, entre la station de pompage et l'usine de traitement de l'eau.
- Une usine de traitement de l'eau située du côté est du chemin des comtés No. 5, immédiatement au sud de la nouvelle école St-Viateur.
- La conduite principale conjointe sur le chemin des comtés No.5 à travers Limoges (530m).

PROPOSED WATER WORKS FOR FOREST PARK

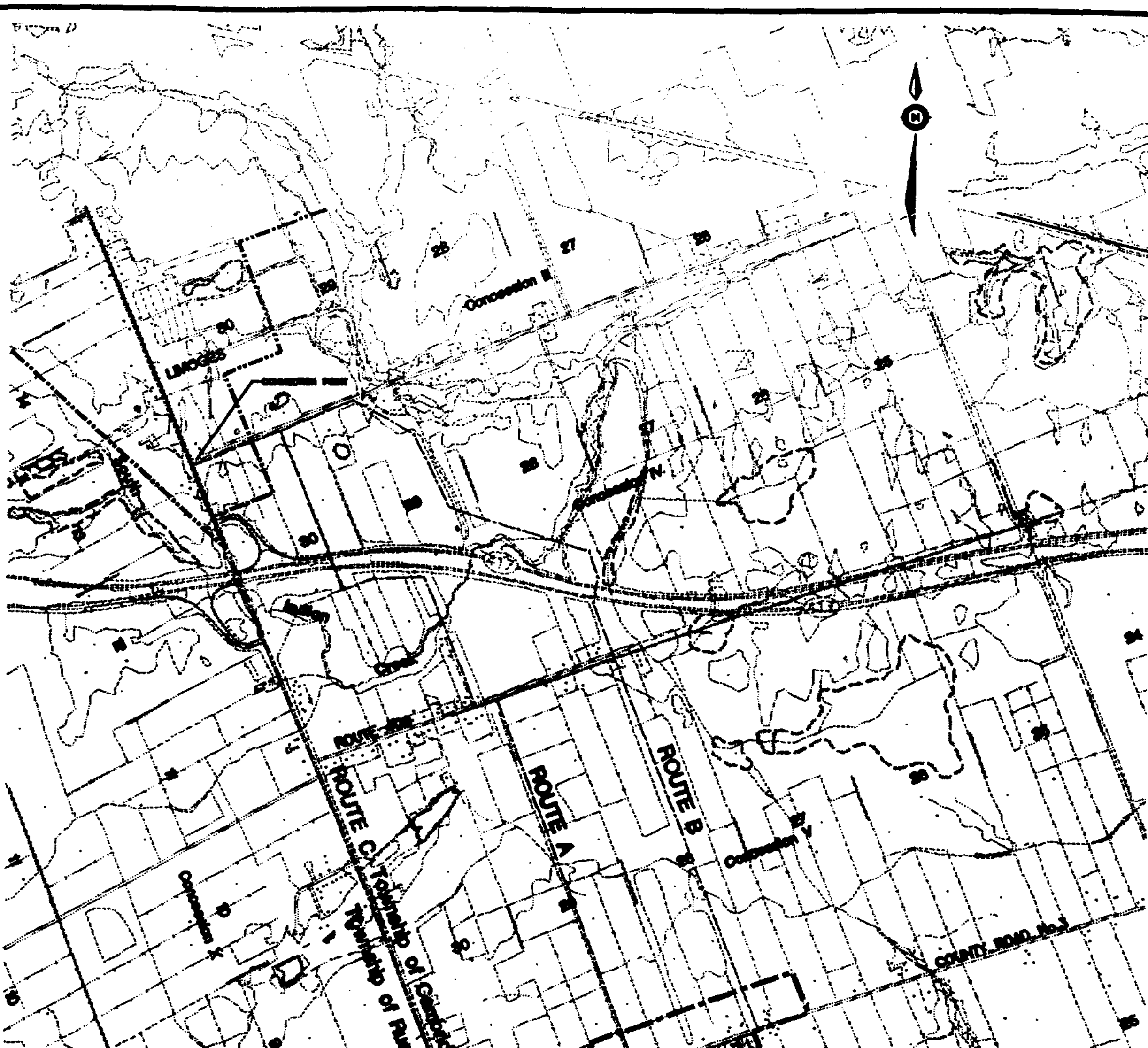
PART 2 - FOREST PARK ONLY

- Low pressure transmission watermain between south limit of Village of Limoges and storage reservoir and pumphouse in Forest Park.
- Upgrading of existing pumphouse.
- Installation of water meters at each house to promote water efficiency and user pay principal.

TRAVAUX PROPOSÉ POUR L'APPROVISIONNEMENT EN EAU DE FOREST PARK

2ième PARTIE - LA COMMUNAUTÉ DE FOREST PARK SEULEMENT

- Une conduite principale à faible pression entre la limite sud du village de Limoges et le réservoir d'entreposage, et la station de pompage de Forest Park.
- L'amélioration de la station de pompage.
- L'installation de compteurs d'eau à chaque maison pour encourager une consommation raisonnable d'eau et l'utilisateur payant.



COMMUNITY OF FOREST PARK
WATER SUPPLY STUDY

TOWNSHIP OF CAMBRIDGE

ALTERNATIVE WATERMAIN ROUTES
FROM VILLAGE OF LIMOGES

McNEELY ENGINEERING CONSULTANTS LTD.

IDENTIFIED PROBLEMS WITH CURRENT WATER SYSTEM

1) POOR WATER QUALITY WHICH DOES NOT MEET M.O.E.E. ONTARIO DRINKING WATER OBJECTIVES

2) INABILITY OF THE COMMUNITY TO GROW AND DEVELOP EXISTING APPROVED LOTS

3) DETERIORATION AND INCREASED MAINTENANCE OF WATER WORKS FACILITIES RESULTING IN INCREASED COSTS TO HOMEOWNERS

McNEELY
ENGINEERING
CONSULTANTS LTD.

IDENTIFICATION DES PROBLÈMES AVEC L'APPROVISIONNEMENT EN EAU EXISTANTE

1) MAUVAISE QUALITÉ DE L'EAU QUI NE RESPECTE PAS LES OBJECTIFS DE QUALITÉ D'EAU POTABLE EN ONTARIO

2) LA COLLECTIVITÉ NE PEUT PROCÉDER À L'EXPANSION ET DÉVELOPPER LES TERRAINS SUR LESQUELS LA CONSTRUCTION A ÉTÉ APPROUVÉE

3) DÉTÉRIORATION ET ENTRETIEN ACCRU DES OUVRAGES D'EAU QUI ENTRAÎNENT UNE AUGMENTATION DES COÛTS POUR LES PROPRIÉTAIRES

RECOMMENDATIONS FOR PUMPHOUSE UPGRADE

- Replace all three high lift pumps.
- Upgrade control system to eliminate fire pump start before second pump start.
- Replace diesel engine exhaust muffler to eliminate noise problem.
- Replace fire pump impeller.
- Improve ventilation.

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RECOMMENDATIONS POUR L'AMÉLIORATION DE LA STATION DE POMPAGE

- Remplacer les trois pompes à haute pression.
- Améliorer le système de contrôle afin d'éliminer la mise en marche de la pompe d'incendie avant que la deuxième pompe se mettre en marche.
- Remplacer le moteur diesel du tuyau d'échappement afin d'éliminer le problème de bruit.
- Remplacer la pompe impulseur.
- Améliorer la ventilation.

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FINANCIAL IMPLICATIONS OF THE PROPOSED WORKS

ESTIMATED PROJECT CAPITAL COSTS -	$2,500,000
PROVINCIAL FUNDING -	$2,125,000
COMMUNITY SHARE -	$375,000

NOTE : ASSUMING 85% OF CAPITAL FUNDING RATE. FUNDING RATE MAY BE LOWER.

PROJECTED OPERATING AND MAINTENANCE COST - $320 per HOUSEHOLD per YEAR, ON AVERAGE

NOTE : CURRENT CHARGE IS $205 per HOUSEHOLD per YEAR.
INCREASE REFLECTS COST OF WATER TREATMENT.

CLASS ENVIRONMENTAL ASSESSMENT
WATER SUPPLY STUDY FOR THE COMMUNITY OF FOREST PARK
ONTARIO CLEAN WATER AGENCY
DIRECT GRANT PROJECT No. 7-3051-01

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CONSULTANTS LTD.

IMPLICATION FINANCIÈRE DU PROJET PROPOSÉ

COÛT ESTIMÉ DES IMMOBILISATIONS DU PROJET - $2,500,000

SUBVENTION PROVINCIAL - $2,125,000

PART DE LA COMMUNAUTÉ - $375,000

NOTE : L'ON ASSUME UN TAUX DE FINANCEMENT DE 85%. UNE SUBVENTION MOINS ÉLEVÉE EST POSSIBLE.

LE COÛT PROJETÉ D'EXPLOITATION ET D'ENTRETIEN - $320 par MÉNAGE par ANNÉE

NOTE : PRÉSENTEMENT LE COÛT EST DE $205 par MÉNAGE par ANNÉE.
L'AUGMENTATION REPRÉSENTE LE COÛT DE TRAITEMENT DE L'EAU.

ÉVALUATION ENVIRONNEMENTALE
ÉTUDE SUR L'APPROVISIONNEMENT EN EAU
POUR LA LOCALITÉ DE FOREST PARK
AGENCE ONTARIENNE DES EAUX
PROJET DE L'AGENCE ONTARIENNE DES EAUX
No. 7-3051-01

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THE NEXT STEPS

- Receive and review public and agency comments.
- Finalize Environmental Study Report.
- Prepare "Notice of Completion of ESR" and place ESR on the public record for 30 day review period.
- Apply to Ontario Clean Water Agency for Capital Cost Funding.

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LES PROCHAINES ÉTAPES

- Recevoir et revoir les commentaires du publique et des agences.
- Compléter le rapport d'étude environnementale.
- Préparer l' "avis d'achèvement" et déposer le rapport d'étude environnementale aux dossiers publics pour une période de 30 jours afin que le public puisse le consulter.
- Appliquer à l'agence ontarienne des eaux pour des fonds d'immobilisations.

Municipalité du Canton de Cambridge
Corporation of the Township of Cambridge

958 West Route 500 Ouest,
R.R. 3, Casselman, Ontario KOA 1MO

Tél.: (613) 764-5444
Fax: (613) 764-3310

CLASS ENVIRONMENTAL ASSESSMENT

PUBLIC MEETING ON AUGUST 15, 1995

**WATER SUPPLY STUDY
FOR THE
COMMUNITY OF FOREST PARK
PHASE 3**

Please provide to the Township of Cambridge prior to August 25, 1995 any further comments or concerns you may have on any aspect of the proposed Project. Your comments are important and appreciated.

NAME : ____

MAILING ADDRESS : ____________________________________

____

COMMENTS :

____

____

____

____

____

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____

____

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_________________________________ *Use other side if required ....*

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CONSULTANTS LTD.

880 Taylor Creek Drive, Orleans, Ontario K1C 1T1
(613) 830-7500 Fax (613) 830-7506

APPENDIX F

CORRESPONDENCE WITH REVIEW AGENCIES AND PUBLIC

July 10, 1995
File Ref: M-2963

(Addressee) **(Note - See attached list)**

<u>Reference</u> : Township of Cambridge
Water Supply Study for the Community of Forest Park
Class Environmental Assessment

Dear Sir / Madam,

The Township of Cambridge is undertaking a Class Environmental Assessment (Class EA) Study to correct water quality problems with the existing Forest Park communal water supply system. The project is planned under Schedule C of the MEA Class EA for Municipal Water and Wastewater Projects.

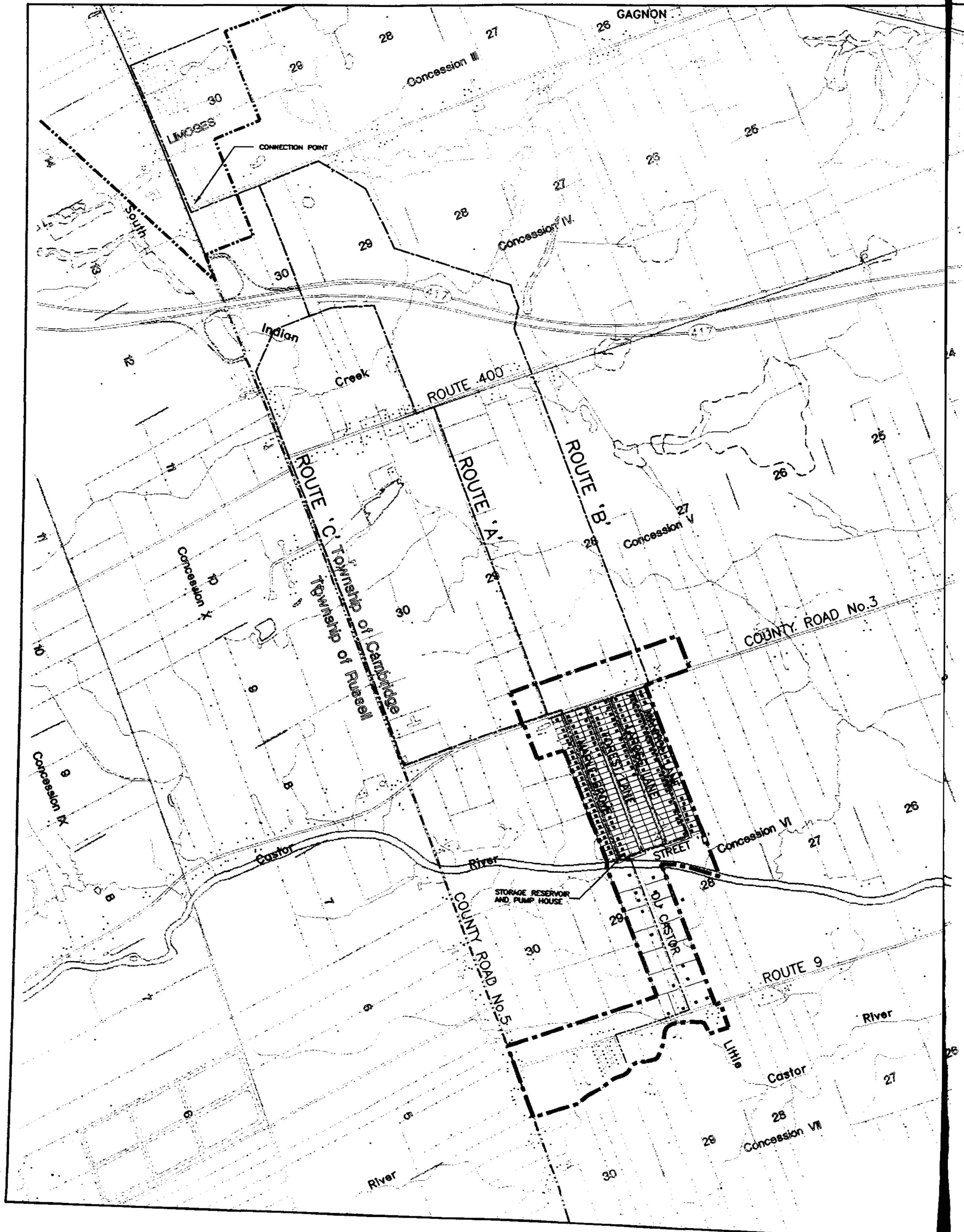
The purpose of this letter is to notify your agency of the proposed project and to solicit any comments or concerns you may have so they can be incorporated into the planning process. Enclosed is a copy of Executive Summary of the Preliminary Phase 1 and 2 Report for your information. As a part of the Class EA process the Township of Cambridge will be hosting an information session and a public meeting on July 19, 1995 (see attached notice). The objective of this meeting is to discuss the project with the public and to solicit their input.

Should you have any questions or require additional information you may contact either individual noted below. Please direct your written comments before August 12, 1995 indicating whether you wish to be further notified or involved during the Class EA process. We look forward to hearing from you.

Sincerely,

M. Joseph Zagorski, P.Eng.
Project Manager
McNeely Engineering
Consultants Ltd.
Tel No. (613) 830-7500
Fax No. (613) 830-7506

Fernand Dicaire, C.E.T.
V.P. Marketing
McNeely Engineering
Consultants Ltd.
Tel No. (613) 830-7500
Fax No. (613) 830-7506



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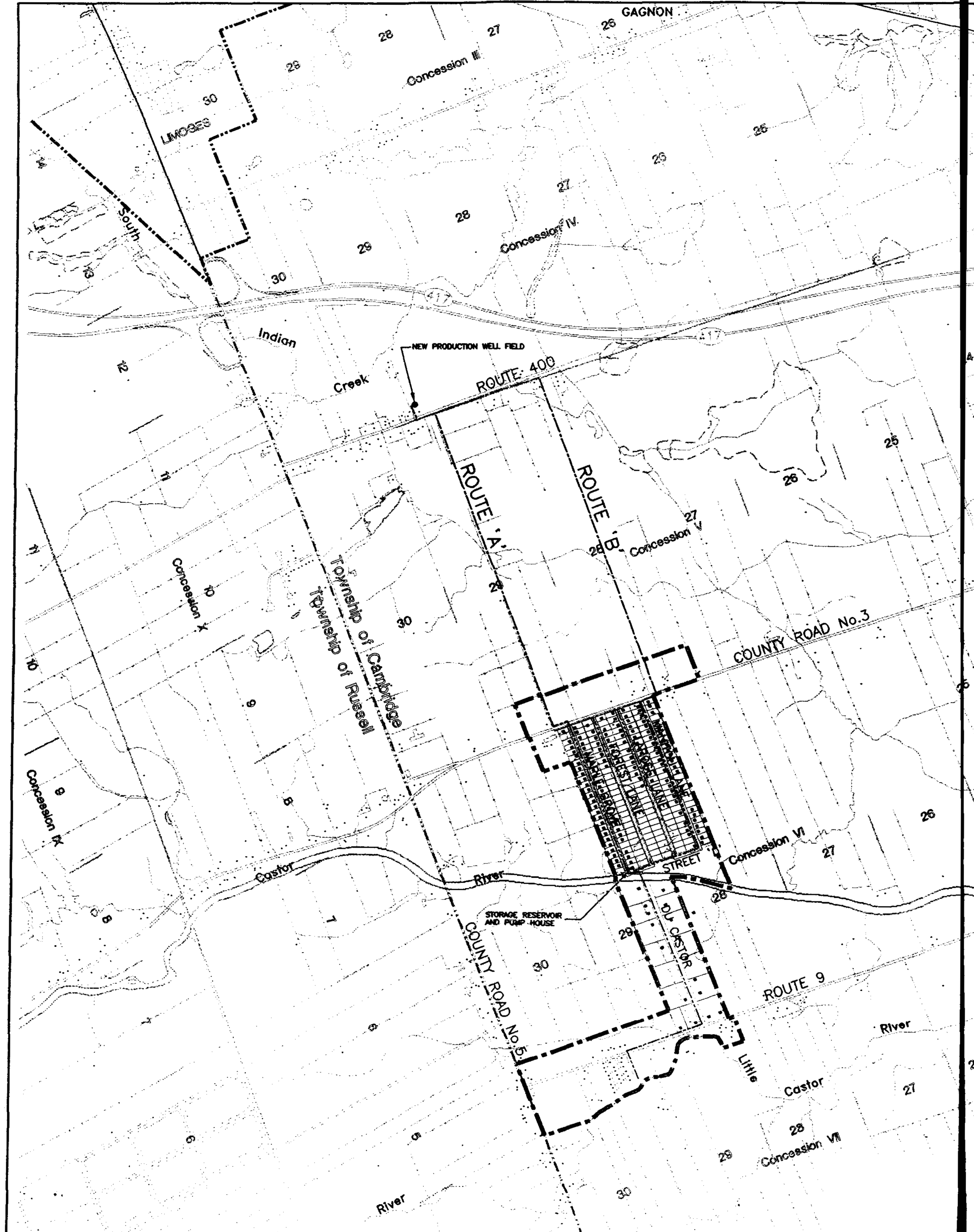
STUDY AREA

McNEELY ENGINEERING CONSULTANTS LTD.

COMMUNITY OF FOREST PARK
WATER SUPPLY STUDY

ALTERNATIVE WATERMAIN ROUTES
FROM VILLAGE OF LIMOGES

PROJECT	M2963
DATE	JULY 1995
FIG. No.	Fig. 8–1



CORPORATION OF THE TOWNSHIP OF CAMBRIDGE

0 250 500m

STUDY AREA

McNEELY ENGINEERING CONSULTANTS LTD.

COMMUNITY OF FOREST PARK
WATER SUPPLY STUDY

ALTERNATIVE WATERMAIN ROUTES
FROM NEW PRODUCTION WELLS

PROJECT	M2963
DATE	JULY 1995
FIG. No.	Fig. 8–2

however, it was still within treatable limits. In addition, the safe yield obtainable in the vicinity explored to date is severely constrained by the depth of the aquifer, i.e. fracture zone, which limits the available drawdown.

8.2 IMPACT ON NATURAL ENVIRONMENT

Both alternatives will have similar short term negative environmental effects during construction. Those effects can be largely minimized by using appropriate mitigation measures and construction techniques. For Alternative A, if Route C is selected there will be a temporary traffic disruption on Limoges Road and Route 500 and the potential for road surface damage during construction exists as well as potential conflict with existing utilities.

Assuming that Route A or B is selected for both options, easements will be required for an alignment on private property.

For Alternative B there is a potential to permanently lower the groundwater table in the well field area and domestic wells within 200 meters of production wells be affected.

Tables 8-1 and 8-2 summarize the impacts of each alternative on the environment.

TABLE 8-1

IMPACTS ON THE ENVIRONMENT - ALTERNATIVE A

ALTERNATIVE A - OBTAINING WATER FROM LIMOGES

DESCRIPTION OF THE ENVIRONMENT	IMPACTS	MITIGATIVE MEASURES	NET EFFECTS
AIR QUALITY	• noise • odour from equipment during construction •blasting will create dust	• limit hours of work • minimize blasting	• disturbance to many residents living along road
AQUATIC	• potential for spills near ditch crossings • potential for siltation of ditch during construction	• equipment to maintain setback from ditches • be prepared for dealing with spills • silt traps	• minor impact during construction
ECONOMICS	• $ spent in Twp of Cambridge • Twp assume long term debt • create jobs	• keep construction costs realistic • increase revenue from other sources to minimize cost to existing users	• long term debt

TABLE 8-1 (cont'd)

IMPACTS ON THE ENVIRONMENT - ALTERNATIVE A

ALTERNATIVE A - OBTAINING WATER FROM LIMOGES

DESCRIPTION OF THE ENVIRONMENT	IMPACTS	MITIGATIVE MEASURES	NET EFFECTS
GEOLOGY	• disturbance to surficial soils along roadway • rock excavation if route "C" is selected.	• keep work to within road right of way •use preblast surveys and keep blasting to a minimum	• some local siltation in ditch • interference with existing utilities within road allowance
HERITAGE	no impact		
HYDROGEOLOGICAL	no impact		
LAND USE	• easements would be required for alignment on private land	• keep alignment on municipal road allowances	• minor impact
VEGETATION	• disruption to surface vegetation along watermain alignment	• minimize construction work area	• damage to surface vegetation
MINERALS	• significant rock excavation required if Route "C" is selected	• restrict use of blasting • pre-blast survey required	• impact on residences bordering highway 417
SOCIAL	• visual impact of construction activities •traffic control during excavation will cause nuisances • entrances to properties along highway to be disrupted	• limit hours of work - keep work on weekends to a minimum •repairs to driveways to be done as soon as possible	• moderate impact on social activities

TABLE 8-1 (cont'd)

IMPACTS ON THE ENVIRONMENT - ALTERNATIVE A

ALTERNATIVE A - OBTAINING WATER FROM LIMOGES

DESCRIPTION OF THE ENVIRONMENT	IMPACTS	MITIGATIVE MEASURES	NET EFFECTS
TOPOGRAPHY	no impact		
TRANSPORTATION	• increased truck traffic on roads during construction • damage to road surface during construction • traffic disruption • potential for traffic accidents	• use designated haul routes • limit hours for hauling • clean roads daily • use flagperson for traffic control	• significant impact on all road users during construction
UTILITIES	• potential for breaking utilities during construction	• inform utilities - get locates done before excavating	• some utilities to be relocated /repaired
WILDLIFE	• excavation for feedermain will disturb habitat for some wildlife	• none	• moderate impact on wildlife

TABLE 8-2

IMPACTS ON THE ENVIRONMENT - ALTERNATIVE B

ALTERNATIVE B - DEVELOP NEW WELLS

DESCRIPTION OF THE ENVIRONMENT	IMPACTS	MITIGATIVE MEASURES	NET EFFECTS
AIR QUALITY	• noise • odour from equipment during construction	• limit hours of work	• disturbance to many residents living along road
AQUATIC	• potential for spills near ditch crossings • potential for siltation of ditch during construction	• equipment to maintain setback from ditches • be prepared for dealing with spills • silt traps	• minor impact during construction
ECONOMICS	• $ spent in Twp of Cambridge • Twp assume long term debt • create jobs	• keep construction costs realistic • increase revenue from other sources to minimize cost to existing users	• long term debt

TABLE 8-2 (cont'd)

IMPACTS ON THE ENVIRONMENT - ALTERNATIVE B

ALTERNATIVE B - DEVELOP NEW WELLS

DESCRIPTION OF THE ENVIRONMENT	IMPACTS	MITIGATIVE MEASURES	NET EFFECTS
GEOLOGY	• disturbance to surficial soils along watermain alignment	• keep work to within road right of way	• some local siltation in ditch • interference with existing utilities within road allowance
HERITAGE	no impact		
HYDROGEOLOGICAL	Potential for permanently lowering groundwater table in the vicinity of production wells	Monitoring plan for residential well to determine the effect	Redrill affected wells
LAND USE	• easements would be required for alignment on private land	• keep alignment on municipal road allowances	• minor impact
VEGETATION	• disruption to surface vegetation along watermain alignment	• minimize construction work area	• damage to surface vegetation
SOCIAL	• visual impact of construction activities •traffic control during excavation will cause nuisances • entrances to properties along highway to be disrupted	• limit hours of work - keep work on weekends to a minimum •repairs to driveways to be done as soon as possible	• moderate impact on social activities

TABLE 8-2 (cont'd)

IMPACTS ON THE ENVIRONMENT - ALTERNATIVE B

ALTERNATIVE B - DEVELOP NEW WELLS

DESCRIPTION OF THE ENVIRONMENT	IMPACTS	MITIGATIVE MEASURES	NET EFFECTS
TOPOGRAPHY	no impact		
TRANSPORTATION	• increased truck traffic on roads during construction • damage to road surface during construction	• use designated haul routes • limit hours for hauling • clean roads daily • use flagperson for traffic control	• minor impact on all road users during construction
UTILITIES	• potential for breaking utilities during construction	• inform utilities - get locates done before excavating	• some utilities to be relocated /repaired
WILDLIFE	• excavation for feedermain will disturb habitat for some wildlife	• none	• moderate impact on wildlife

9.0 SELECTION OF RECOMMENDED SOLUTION

9.1 DESIGN CRITERIA

The preferred alternative solution should satisfy the following design criteria

Design Population

The 20 year design population * was established based on the following assumptions :

- occupancy rate 3.5 persons per dwelling
- existing development 187 housing units
- potential future development 73 housing units
- total approved development 260 units = 910 persons
- Cambridge school population 361 = 73 persons (equivalent) **
- total design population 1000 persons

* Please refer to section 3.0 PLANNING ISSUES for detail discussion on development potential and projected population growth.

** Equivalent school population is calculated as follows : 361 @ 70 / 365 = 70 where 361 is school population (students plus staff) , 90 L/cap day water usage for school population , 365 L/cap day residential water usage rate.

20 - year Design Flows

The following factors are used for calculation of design flows :

Water Consumption Rate	365 L / capita / day
Maximum Day Factor	2.75
Peak Hour Factor	4.13
Fire Flow Allowance	38 L / sec for 2 hours

Design Flows

Average Day Demand (1000 persons x 365 L / c / d)	4.22 L / s
Maximum Day Demand (4.22 L / s x 2.75)	11.60 L / s
Peak Hour Demand (4.22 L / s x 4.13)	17.4 L / s
Max. Day plus Fire Rate (11.60 L / s + 64)	75.60 L / s

Reservoir Storage Requirements

Fire	(38 L / s x 2 hours)	274 cu.m
Equalization	(25 % of Max. Day Demand)	250 cu.m
Emergency	(25 % (Fire + Equalization))	131 cu.m
Total Storage		**655 cu.m**

Design Operating Pressures

Minimum During Fire Flow	140 kPa
Minimum During Peak Hour Demand	275 kPa
Range During Maximum Day Demand	350 - 550 kPa
Maximum During Any Condition	700 kPa

9.2 RECOMMENDED SOLUTION

Based on the fact that the identified groundwater source is not capable of providing the required quantity of water and the safe yield obtainable in the vicinity explored to date is severely constrained by the depth of the aquifer, the recommended solution is that of "Obtaining Water from Limoges". This option will correct the water quality problems with the existing Forest Park supply system and allow for housing development in the community. After reviewing comments from the public and review agencies, the Township of Cambridge Council passed a resolution officially endorsing the Limoges option and instructing Lecompte Engineering Ltd. to include the Forest Park Community in the proposed service area for the communal water supply for the Village of Limoges and to make all the necessary changes in the proposed works.

9.3 IDENTIFICATION OF CLASS EA CATEGORY

It is determined that this project fails under Schedule "C" of the Class Environmental Assessment for Municipal Water and Wastewater Projects, and that an Environmental Study Report (ESR) is required.

10.0 PUBLIC INPUT

10.1 PUBLIC CONSULTATION

The first principle of successful planning under the EA Act, as stated in the municipal Class EA report for water and wastewater projects, is "consultation with affected parties early on, such that the planning process is a co-operative venture". To this end, the communication plan followed to date has involved:

- meetings between the Consultant and the Township of Cambridge Council
- meetings between the Consultant, Township and Forest Park Homeowner's Association
- meetings between the Consultant and Forest Park Residents

Phase 1 of Class EA Process

The project study began in January, 1994 as soon as the Engineering Agreement was executed by the Township of Cambridge.

The proponent during Phase 1 of the project study invited public input into the process by:

- inviting one member of the Forest Park Community Association to join the Liaison Committee
- holding several information sessions at the beginning of the monthly Council meetings to discuss the water supply problems being experienced in Forest Park.

Phase 2 of Class EA Process

A public information session and a public meeting to satisfy Phase 1 and 2 of the Class EA were held on July 19, 1995. Prior to a public meeting, copies of Phase 1 and 2

Report Executive Summary in both official languages were delivered to all Forest Park residences. The copies of Phase 1 and 2 Report were available at the Township offices and at Limoges Public Library so that interested public could have an easy access to the report for review and comments.

The comments received from the Forest Park residents after the first public meeting and copies of letters responding to them can be found in Appendix F.

Phase 3 of Class EA Process

The preliminary Environmental Study Report (ESR) was presented during Phase 3 public meeting on August 15, 1995. Similarly to Phase 1 and 2 Report, copies of this preliminary ESR were available for public review at Township offices and at Limoges Public Library.

The comments received from the residents after the Phase 3 public meeting and responding letter can be found in Appendix F.

10.2 MANDATORY CONTACTS

The following is a list of the agencies that have been contacted and forwarded information during the review process:

Municipalities	Township of Cambridge Township of Russell
Ontario Government Ministries	Ministry of Agriculture and Food Ministry of Community and Social Services Ministry of Culture and Communications Ministry of Environment and Energy Ministry of Housing Ministry of Municipal Affairs Ministry of Natural Resources

	Ministry of Transportation
Other Organizations	Forest Park Community Association Ontario Clean Water Agency Eastern Ontario District Health Unit South Nation River Conservation Authority United Counties of Prescott & Russell
School Boards	Prescott-Russell County Board of Education Prescott-Russell County Separate School Board
Public Utilities	Ontario Hydro Bell Canada Consumers Gas Rogers Cable

To date, the following agencies responded to the sent information:

- Ministry of Community and Social Services
- Ministry of Municipal Affairs and Housing
- Ministry of Transportation
- Eastern Ontario Health Unit
- Ontario Hydro
- Prescott-Russell County Board of Education
- United Counties of Prescott & Russell
- South Nation River Conservation Authority

The Ministry of Community and Social Services wrote to advise that they wish to be kept informed about the result of the assessment, and requested a copy of the ESR.

Ministry of Municipal Affairs and Housing responded by calling our office requesting a copy of the Phase 1 and 2 Report for review and comments.

Ministry of Transportation wrote to advise that they wish to be notified about E.A. study outcome.

Eastern Ontario Health Unit called to advise that it fully supports the project and recommended solution.

Ontario Hydro responded with the request to be notified once proposed location of watermain and other works is established so that they can comment on any conflicts with their existing plants.

Prescott-Russell County Board of Education inquired regarding formula used to establish household equivalent for Cambridge Elementary Public School to determine allocation of capital cost charges.

The Department of Public Works of the United Counties of Prescott and Russell wrote to advise that it has no objections to the project, however, they do expect to be involved in detail planning for the location of the proposed watermain within the county roads right-of-way.

The South Nation River Conservation Authority wrote to advise that SNRCA has no comments or concerns at this time; however, they would like to be notified about Class EA developments.

Copies of correspondence with review agencies can also be found in Appendix F.

11.0 SELECTED DESIGN FOR RECOMMENDED SOLUTION

11.1 DESIGN CONCEPT

The following recommended design concept is based on Phase 3 Class EA draft report for the Village of Limoges proposed water supply prepared by Lecompte Engineering Ltd. and proposed transmission watermain line from Limoges to the Forest Park reservoir.

The proposed works can be divided into two distinctive parts; water works that will be shared with the Village of Limoges and the one required for Forest Park only.

Part I - Works Shared with Limoges

- Two production wells and a well pumping station located in Part Lot 21, Con. VII, Township of Russell (Russland Road west of Dunning Road).
- A 250 mm diameter feedermain, approximately 5.2 km long between the well pumping station and the water treatment plant.
- A water treatment plant located on the east side of County Road No. 5 immediately south of the new St-Viateur School.
- Common watermain along County Road No. 5 through Limoges (530 m).

The two production wells will be taking water from the Sarsfield esker. A well pumping station will be constructed at the westerly well and will include a diesel generator set and chlorine injection system as well as other valves and appurtenances.

In general, the water quality meets the Ontario Drinking Water Objectives; however, a number of aesthetic parameters are exceeded. The parameters requiring treatment are iron, manganese, colour, organic carbon, organic nitrogen, methane and hydrogen sulphide. A number of treatment options were investigated to reduce these parameters to the Ontario Drinking Water Objectives. A chemical injection system followed by filtration was the recommended design concept. After filtration the water will be chlorinated and fluoridated prior to delivery to the distribution system.

The above proposed works have been planned and designed by Lecompte Engineering Ltd. More information can be found in Appendix "D" which contains excerpts from Phase 3 Class EA Draft Report prepared by Lecompte Engineering for the Village of Limoges communal water supply.

Part II - Works for Forest Park Only

- Low pressure transmission watermain between south limit of the Village of Limoges and storage reservoir and pumphouse in the Forest Park.

- Upgrading of existing pumphouse.

- Installation of water meters at each house to promote water efficiency and user pay principal.

11.2 TRANSMISSION WATERMAIN

200 mm diameter low pressure transmission watermain will start at the south limit of the Village of Limoges and terminate at the storage reservoir and pumphouse in the Forest Park. The watermain will be designed to convey 20-year maximum day flow of 12 L/s.

Three different alignments were considered (see Section 8.1.1 and Figure 8-1).

McNEELY ENGINEERING CONSULTANTS LTD.	COMMUNITY OF FOREST PARK WATER SUPPLY STUDY RECOMMENDED WATERMAIN ALIGNMENT	PROJECT M2963 DATE AUGUST 1995 FIG. No. Fig. 11-1

Modified Route "A" as shown on Figure 11-1 is selected as a proposed alternative being the most direct end less expensive to construct.

Offers to purchase required easement are currently being finalized with involved property owners. The easement will be shared with proposed sewage main from the Village of Limoges to the proposed sewage lagoons located at east side of Forest Park community.

The pipes will be located about 4 meters apart and would cross Highway #417 at separate casing pipes using a trenchless technology such as jacking and boring.

11.3 ENVIRONMENTAL SURVEY ALONG PROPOSED ALIGNMENT

The following is a summary of the findings of a field survey, conducted on August 4, by Jacques Whitford Ltd. Senior Biologist, to assess the natural environment along proposed watermain alignment. The entire length of the route was walked and the natural features, flora, fauna and vegetation habitats, where identified and significance assessed.

Terrestrial Habitats

The following 4 terrestrial habitats were identified within the Right-of-Way along the route:

- Recently Abandoned Agricultural Field/Pasture
- Regenerating Abandoned Agricultural Field
- Hedge Rows
- Immature Mixed Forest

In addition to the above, the following 2 terrestrial habitats were identified adjacent to the ROW:

- Active Agricultural Land
- Immature Deciduous Forest

Over 80% of the route passes through abandoned agricultural field. No significant, rare or unique terrestrial habitats were identified along the route. The area's vegetation is typical of the local area and the region.

Flora/Fauna/Wildlife

No significant flora or fauna was identified during the field survey. The flora along the route is typical of abandoned agricultural fields which are in various stages of natural regeneration.

No significant wildlife habitat is found within the ROW or adjacent to the route. In addition, no significant wildlife corridor was evident along the route.

Aquatic Habitat

Two aquatic habitats were identified along the route. The route will cross Indian Creek just north of Route 400. The Creek is a permanent water course with an average width of 3 meters and a depth which ranges from 1 to 0.5 meters. Based on the Ministry of Natural Resources guidelines for the assessment of fish habitat, the fish habitat within the creek is Type 2 habitat. Type 2 habitat is important to the fish population of the creek, but is not a limiting factor for the productive capacity of the creek. This type of habitat requires a moderate level of protection and mitigation measures to limit down stream siltation during construction will be required.

The second aquatic habitat is an intermittent, seasonal, water course located between Route 400 and County Road 3. The water course represents an agricultural drainage ditch/channel in an abandoned agricultural field. The ditch is dry throughout most of the summer, water is only present during major rain events. Emergent aquatic vegetation is limited to a narrow (1 meter) channel of the ditch and are species which typically inhabit areas which experience summer dry down conditions. This ditch does not represent fish habitat and therefore no mitigation measures are required for this crossing.

In summary, no significant impact to the existing natural environment will occur as a result of the construction and operation of a watermain along Alternative Route A. The crossing of Indian Creek is the only location along the route which has the potential for negative impact on Type 2 fish habitat. However, typical mitigation measures for creek crossings during construction would significantly reduce this potential impact.

11.4 UPGRADES TO THE EXISTING FOREST PARK PUMPHOUSE

Forest Park pumphouse was constructed in 1992, is located at the end of Maple Grove Lane and contains all pumps, diesel engine and electrical controls (see Section 5.1.3).

During the recent field inspection and discussion with the Township's operator, the following problems with pumphouse were identified:

- High lift pumps need replacement - rusted and leaking.
- Fire pump would always start before the second high lift pump during high water demands - defective controls.
- Neighbours are consistently complaining about diesel engine noise.

- In case of power outages, building ventilation louvres remain shut - no air exchange.

The following are recommendations for the pumphouse upgrade:

- Replace all three high lift pumps.
- Upgrade control system to eliminate fire pump start before the second pump start.
- Replace diesel engine exhaust muffler to eliminate noise problem.
- Replace fire pump impeller.
- Improve building ventilation.

12.0 FINANCIAL IMPLICATIONS

12.1 CAPITAL COST

The capital cost estimate for this project, including the cost for oversizing of the Limoges Water Works to feed Forest Park is estimated at **$2,500,000.** Detailed cost estimate is presented in Table 12-1.

An application for provincial funding to cover **$2,125,000** (85%) of capital cost will be made to the Ontario Clean Water Agency. The capital funding rate is 85% which is the maximum permissible rate according to present regulations. The grant, however, may be lower (i.e. 70%). The balance **$375,000** (15%) will be levied on the existing houses, the Cambridge Elementary School and 40 approved building lots, resulting in an average charge per household of approximately **$1,700,** if the level of subsidy is lower, the net lot charge would increase. The same lot charges will also be levied on all new development and recovered money will be allocated to the future Capital Reserve Fund.

Table 12-1

	Community of Forest Park Water Supply Study				
	Estimated Project Capital Cost				
	Obtaining Water from Limoges				
No.	**Item Description**	**Unit**	**Unit Price**	**Estimated Quantity**	**Amount**
	Existing Works				
1	Upgrade of Existing Pumphouse	L.S.	$ 60,000.00	L.S.	$ 60,000.00
2	Flushing Distribution Lines	m	$ 2.20	4500	$ 9,900.00
3	Installation of Water Meters	each	$ 200.00	163	$ 32,600.00
	New Construction.				
3	New Land Easement	ha.	$ 2,500.00	3	$ 7,500.00
4	Feedermain Along County Road # 5	m	$ 160.00	1200	$ 192,000.00
5	Hwy. 417 Crossing	L.S.	$ 200,000.00	L.S.	$ 200,000.00
6	Feedermain Along Easement	m	$ 135.00	4300	$ 580,500.00
7	Oversizing of Limoges Works	L.S.	$ 661,200.00	L.S.	$ 661,200.00
	Sub - total				**$ 1,743,700.00**
9	Contingencies				$ 174,370.00
10	Environmental Study Report incl. Hydrogeological Work				$ 243,000.00
11	Cost of Limoges ESR Amendment				$ 15,130.00
12	Detail Design (8 %)				$ 139,496.00
13	Legal Costs				$ 10,000.00
14	Construction Supervision and Contract Administration (10%)				$ 174,370.00
	TOTAL CAPITAL COST				**$ 2,500,066.00**
Note: Above Cost Estimates Are In 1995 Dollars. GST Is NOT Included.					August14 1995

12.2 OPERATING COSTS

In addition to the non-funded portion of capital cost, the Forest Park residents will be responsible for operating and maintenance costs of the proposed works. Based on maintenance cost presented in Lecompte Engineering (see Appendix H) Phase 3 Report for Limoges water supply system and current cost for Forest Park water works. The annual operating and maintenance cost, including reserve fund is expected to rise from the current $205 per household to approximately $320.

13.0 CONCLUSIONS AND RECOMMENDATIONS

1. The existing water supply system for the Forest Park community provides poor quality water that does not meet the Ontario Drinking Water Objectives. This impacts the quality of life for community residents and lowers their property values.

2. As a direct consequence of poor water quality, community development has been on hold for the last several years and no new houses have been built.

3. The existing population of the serviced area is approximately 570 persons including equivalent population for the Cambridge Elementary School (331 students and 30 staff).

4. The 20-year design period and equivalent population of 1000 people is proposed for the new source of water and other upgrading of existing water works. This translates to a growth rate of approximately 3.0% over a 20-year period.

5. The hydrogeological assessment completed for this study concluded that there is a good quality ground water resource near route 400 around 3.4 km north of Forest Park and that a minimum of three production wells would be required to meet the projected 20-year design demand for water. However, an additional 72-hour pump testing revealed that the

projected safe yield from identified aquifer is not capable of providing the required quantity of water for future development.

6. After evaluation of many others alternative solutions it is recommended that "Obtaining Water from Limoges" should be a preferred solution to resolve existing problems with Forest Park water system and allow for future housing development in the community.

7. The following design is recommended for the selected solution:

Part I - Works Shared with Limoges

- Two production wells and a well pumping station.
- A 250 mm diameter feedermain between the well pumping station and the water treatment plant.
- A water treatment plant.
- Watermain on County Road No. 5.

Part II - Works for Forest Park Only

- Low pressure transmission watermain from Limoges to Forest Park.
- Upgrading of existing Forest Park pumphouse.
- Installation of water meters at each household.

8. The project capital cost is estimated at $2,500,000 an application for provincial funding to cover 85 of capital cost will be made to OCWA. The remaining 15% will be levied on existing houses, approved building lots and Cambridge Elementary School.

9. The annual operating and maintenance cost, including reserve fund are estimated at $320 per household.

APPENDIX A

MINUTES OF LIAISON COMMITTEE MEETINGS

McNEELY
ENGINEERING
CONSULTANTS LTD.

July 5, 1995
File Ref.: M-2963-006

MINUTES OF MEETING

LIAISON COMMITTEE
TOWNSHIP OF CAMBRIDGE

Date & Time: June 20th, 1995 @ 9:00 p.m.

Location: Township Offices

Present:
Denis Pommainville, Township of Cambridge
Robert Gratton, Township of Cambridge
Claude Lafrance, Township of Cambridge
Ronald Drouin, Township of Cambridge
Suzanne Laflèche, Township of Cambridge
Robert Dormer, OCWA - Toronto
Gilbert Côté, Lecompte Engineering
Sue Gervais, Forest Park Homeowners Association
Roger Bishop, Forest Park Homeowners Association
Jan Sistek, Forest Park Homeowners Association
Fernand Dicaire, McNeely Engineering Consultants Ltd. (MECL)

Purpose: **To update status of project with representatives of the Forest Park Homeowners Association.**

---

1. A summary of what has been done and upcoming activities were presented by the consultants, members of Council and the OCWA to the Forest Park Association representatives. Two options are presently being investigated as follows:

   a) New underground supply located on Sum's property and summarized as follows:

   - limited growth to 1,000 people
   - least expensive after two proposals as per preliminary estimate
   - provision of treatment as required although there is a possibility that future production well may be okay (i.e. blending)
   - a minimum of 3 wells necessary
   - viability subject to ongoing well testing

   b) Limoges' supply and summarized as follows:

   - treated underground water
   - more capacity
   - higher cost due to oversizing, and need for larger feedermain.

880 Taylor Creek Drive, Orleans, Ontario K1C 1T1
(613) 830-7500 Fax (613) 830-7506

.../2

McNEELY
ENGINEERING
CONSULTANTS LTD.

2. Additional hydrologic testing is presently ongoing at Sum's property. Those results would be available by July 7th, 1995.

3. The Liaison Committee endorse the suggestion that meters would be installed as part of the capital project.

4. Details of the Phase 1 and 2 report to be made public have been resolved as follows:

   - Open House:
     - 2:00 p.m. to 4:00 p.m.
     - Thursday, July 13, 1995 or Wednesday, July 19, 1995
     - Baptist Evangelic Church

   - Public Meeting:
     - 7:30 p.m.
     - Thursday, July 13, 1995 or Wednesday, July 19, 1995
     - Public School or Limoges' Community Centre

   The above remains to be confirmed and reserved by the Resident Association of Forest Park.

5. It was resolved and agreed that a notice of meeting would be mailed or delivered to the affected owners of Forest Park. The executive summary of this Phase 1 and 2 report will be sent with the notice.

6. It was suggested that a sample of the proposed underground water (i.e. Sum's property) be available during the open house and public meeting should this alternative be retained.

Prepared by:

McNeely Engineering Consultants Ltd.

Fernand Dicaire

MINUTES\M2963JUL.95(sg)

McNEELY
ENGINEERING
CONSULTANTS LTD.

January 9, 1995
File Ref.: M-2963 -006

MINUTES OF MEETING

TOWNSHIP OF CAMBRIDGE
FOREST PARK WATER PROJECT

PLACE/DATE/TIME: **TOWNSHIP OF CAMBRIDGE OFFICES**
JANUARY 4, 1995 - 8:00 P.M.

IN ATTENDANCE:
Denis Pommainville, Reeve
Suzanne Laflèche, Councillor
Ronald Drouin, Councillor
Claude Lafrance, Councillor
Fern Dicaire, McNeely Engineering Consultants Ltd.
Begonia Lojk, McNeely Engineering Consultants Ltd.
Jeff Parker, Jacques Whitford Environmental Ltd.
Steve Livingstone, Jacques Whitford Environmental Ltd.

The purpose of this meeting was to advise council of the status of the project and to get direction from council regarding action to be taken

---

1. Reeve Pommainville proceeded to introductions.

2. Fern Dicaire summarized the background of the project as follows:

The Existing System

- the existing system was built in 1971 without any approvals from any agencies,
- the system was deficient; the watermains had to be replaced in 1983;
- although there is sufficient quantity of water, the quality is a problem since it is not meeting Ontario Drinking Water Objectives (ODWO's); the water quality has been deteriorating since 1976:
    - chlorides were 484 mg/l (1991), 524 mg/l (1994), versus objective of 250 mg/l;
    - total dissolved solids (TDS) are 1500 mg/l, versus the objective of 500 mg/l;
    - water has a high chlorine demand due to slime build-up in the system;
    - the iron concentration is increasing; and
    - nitrogen is a problem;
- as a result, development is almost at a freeze;

.../2

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(613) 830-7500 Fax (613) 830-7500

Current Study

- in 1990, McNeely Engineering, on behalf of the Township of Cambridge, applied for a grant from the Ministry of the Environment (now the MOEE);
- funding for an ESR was approved under the direct grant program at 85% subsidy;

3. Fern Dicaire explained the Class EA Process as follows:

The Class EA Process

- the Class EA Process has been in effect since 1984 and was revised in 1992;
- the process consists of five phases (see attachment "A) and involves evaluating all feasible alternatives;
- the alternatives for the Forest Park water supply include:
    - putting individual treatment units for home owners and keeping the existing water source;
    - putting communal treatment unit;
    - obtaining water from Limoges;
    - obtaining water from Casselman;
    - tying in to the Regional scheme, obtaining water from the Ottawa River; and
    - developing a new well field with acceptable quality water, including some treatment;
    - etc.

4. Fern Dicaire proceeded to give an update on the status of the project as follows:

- the Township will need to apply for capital dollars once the ESR is completed and approved;
- the deadline for applying is October 1st, 1995, to get dollars for 1996;
- the next opportunity for applying for capital dollars will likely be in 1997 to get funding for 1998;
- currently, we know there is some water (about 50 gpm proven), but require approximately 130 gpm; (full potential)
- the water quality is good except for colour which exceeds ODWO's (19 TCU versus the objective of 5 TCU's);
- it is believed the aquifer is a good source of water but will likely need to confirm the quantity of water to get a Certificate of Approval;
- to do this would involve putting in the well field at a cost of about $150,000; (including $50,000 for treatability study)
- this would delay the ESR and would involve increasing the budget of the ESR (rather than getting the money as capital dollars later);
- the positive side is that under the ESR, if a budget increase were approved, funding would be at 85% and there is no guarantee the same level will be provided for capital dollars, the negative side is the delay of two years.

.../3

- council asked about getting water from Limoges and Fern noted that it appears there may be some interference between Limoges and Vars. This may not be a solution. Additional works may be required. To prove the viability of a supply from Limoges.

5. Steve Livingstone gave a summary of their hydrogeological work done to date and their findings (see attachment "B").

6. Discussion took place which resulted in other options being brought forth:
   - to blend water with the existing supply to meet ODWO's if not enough water is available, and
   - to simultaneously pump Mr. Sum's well and TW-9 to try to verify the yield of the aquifer.

7. The Reeve outlined the following course of action:
   - that we proceed to request OCWA for more funds to carry out simultaneous pump testing of Sum's well and TW-9;
   - that we then meet the MOEE with the results (assuming positive);
   - that McNeely prepare phases I and 2 of the ESR concurrently; and
   - the McNeely do everything possible to complete the ESR in time to apply for funding by October 1st, 1995.

If there are any errors or omissions, please contact the undersigned.

Prepared by:

McNeely Engineering Consultants Ltd.

B. Lojk

Begonia Lojk, P.Eng.

Attach.

Distribution: All attending

MINUTES\M2963JAN.95(sg)

LECOMPTE ENGINEERING LTD.

CONSULTING ENGINEERS - INGÉNIEURS CONSEILS

251 BANK ST., SUITE 301, OTTAWA, ONTARIO K2P 1X3
TEL (613) 236-6662 FAX 613-236-2945

M2963-0036

MINUTES OF MEETING

DATE: May 19, 1995 at 2:00 p.m.

LOCATION: Township of Cambridge Municipal Office

PREPARED BY: Gilbert Côté, P.Eng.

PROJECT: Communal Sewage System for the Village of Limoges

FILE NO: 5341

PURPOSE: Coordination Meeting for the Limoges and Forest Park Studies

PRESENT:
Denis Pommainville, Reeve, Twp of Cambridge
Robert Dormer, P.Eng., OCWA
Roger Brunette, Clerk-Adm., Twp of Cambridge
Fernand Dicaire, McNeely Engineering
Gilbert Côté, P.Eng. Lecompte Engineering Ltd.

COPIES TO: All present

FORM 101

LECOMPTE ENGINEERING LTD.

CONSULTING ENGINEERS
INGENIEURS CONSEILS

DATE May 19, 1995

FILE No. 5341

DETAILS	ACTION TAKEN BY

1.0 STATUS OF ESR FOR LIMOGES WATER SYSTEM

Phase 2 of the ESR is completed. A study of the recharge area of the Sarsfield esker will be completed in order to address the concern raised by the RMOC. Phase 3 of the ESR is being initiated.

2.0 STATUS OF ESR FOR FOREST PARK WATER SYSTEM

The taking of water from Limoges is one of the option indicated in the Terms of Reference for the Forest Park study. The Phase 2 public meeting for the Forest Park study is planned for mid-June.

The capacity of the water source located near Route 400 could be reached if areas other than Forest Park are included. The water from that source has high colour but other parameters are acceptable. At a minimum, two wells would be needed and three wells are recommended by the hydrogeologist if the source near Route 400 is selected.

3.0 REVIEW OF COUNCIL RESOLUTION

Council Resolution no 191-95 as adopted by the Township of Cambridge on May 1st, 1995 is reviewed.

4.0 ALTERNATIVE ROUTES FOR FORCEMAIN AND WATERMAIN

Three routes are examined for the forcemain to the lagoon and for the watermain between Limoges and Forest Park (see attached sketch).

<u>Route A</u>

This is the most direct route for the watermain. Discussions were held earlier with the owners between Route 400 and Route 500 to obtain easements. Route A is also the most advantageous to service the Cambridge Public School with the sewage forcemain.

FORM 101A

DETAILS	ACTION TAKEN BY

Route B

This route has been examined to provide an alternative location to cross the 417 in case of difficulty in obtaining easements.

Route C

This route is more expensive because of rock excavation and the longer distance but would allow to supply other areas with water such as Le Baron estates.

Crossing of Highway 417

G. Côté has met with the Ottawa office of the MTO to discuss the possible methods of crossing the 417 with pipes. The MTO does not allow to attach pipes to bridges or culverts because of future maintenance concern. Several crossings of the 417 and other divided highways were done using the jacking and boring method. Discussions with specialized contractors have confirmed this method is possible and preliminary cost estimates were obtained. Discussions with the contractors have confirmed the estimated cost included in the Limoges the Phase 2 report.

report in [illegible]

5.0 TECHNICAL ISSUES

5.1 WATER PRESSURE

The connecting watermain between Limoges and Forest Park will most likely be a "low pressure" watermain. This will be confirmed by an hydraulic analysis.

5.2 DESIGN POPULATION

The immediate design population for the watermain to Forest Park is 1,000 persons. The design should provide flexibility to allow an increase in the design population of Forest Park to 1,500 persons.

DETAILS	ACTION TAKEN BY
5.3 EASEMENTS	
It is agreed the width of easements will be 20 metres.	
5.4 ALTERNATIVES FOR CONNECTING WATERMAIN	
McNeely will examine the following alternatives for the watermain between Limoges and Forest Park: - Route A - Route C - Low Pressure line - High pressure line	McNeely
5.5 PREFERRED ROUTE FOR FORCEMAIN	
At this point the preferred route for the forcemain is Route A since it is less expensive than Route C and is the best option to service Cambridge Public School.	
6.0 COST SHARING	
There a two methods to divide the cost between Forest Park and Limoges: - Forest Park pays the additional cost to oversize the Limoges water system: wells, plant, connecting main from wells to plant, some watermains through the village. - The cost is divided proportionally to the design population.	
Council will select the cost sharing method at their meeting of May 23, 1995.	
7.0 INFORMATION TO BE PROVIDED TO McNEELY	
Lecompte Engineering will provide to McNeely Engineering the following information: - pressure at the limit of the Limoges water system, - share of Forest Park based on cost sharing method selected by the Township.	Lecompte

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INGENIEURS CONSEILS

DATE May 19, 1995
FILE No. 5341

DETAILS	ACTION TAKEN BY

8.0 DIVISION OF RESPONSIBILITIES

Lecompte Engineering will be responsible to establish the corridor and negotiate easements (for the watermain and the forcemain) between the south limits of the village of Limoges and the property of Mr. Sum near Route 400.

McNeely Engineering will be responsible to establish the corridor for the watermain between the property of Mr. Sum and Route 500. If Route A is selected for the watermain, then the watermain and the sewage forcemain will be located in the same corridor.

Prepared by :
LECOMPTE ENGINEERING LTD.

Gilbert Côté, P.Eng.
May 31, 1995

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FORM 101A

M2963-006

LECOMPTE ENGINEERING LTD.

CONSULTING ENGINEERS - INGÉNIEURS CONSEILS

251 BANK ST., SUITE 301, OTTAWA, ONTARIO K2P 1X3
TEL (613) 236-6662 FAX 613-236-2945

→ J.Z.

RECEIVED JUN 0 9 1995

MINUTES OF MEETING

DATE: June 1st, 1995 at 9:30 a.m.

LOCATION: Towhnship of Cambridge Municipal Office

PREPARED BY: Gilbert Côté

PROJECT: Water Systems for Limoges and Forest Park

FILE NO: 5341

PURPOSE: Second coordination meeting for the Limoges and Forest Park studies

PRESENT:

Denis Pommainville, Reeve, Township Cambridge
Robert Gratton, Deputy Reeve, Township Cambridge
Donald Brouin, Councellor, Township Cambridge
Suzanne Laflèche, Councellor, Township Cambridge
Roger Brunette, Clerk Administrative, Township Cambridge
Robert Dormer, Project Manager, OCWA
Fernand Dicaire, McNeely Engineering
Gilbert Côté, Lecompte Engineering

COPIES TO:

FORM 101

LECOMPTE ENGINEERING LTD.

CONSULTING ENGINEERS
INGENIEURS CONSEILS

DATE June 1st, 1995

FILE No. 5341

DETAILS	ACTION TAKEN BY
1.0 REVIEW OF PAST MINUTES	
The minutes of the meeting of May 19, 1995 are reviewed and accepted with the following amendment:	
McNeely Engineering has requested a copy of the hydrogeological study for the Limoges water system.	
2.0 HYDRAULIC ANALYSIS	
2.1 Lecompte Engineering has supplied to McNeely Engineering on May 25 the following information: - cost sharing based on formula accepted by Council on May 23, 1995 - water pressure at south end of Limoges for various conditions.	
2.2 McNeely Engineering is proceeding with the hydraulic analysis of the Forest Park water system which are not completed at this time. F. Dicaire indicates that there will be additional cost because the incoming watermain from Limoges would have to be installed on Maple Grove Street to connect to the reservoir. F. Dicaire indicates that if the water is pumped directly from a well pumping station located at the well on route 400, a direct connection to the water distribution system on Maple Grove Street is possible.	
The Township expresses its doubt that a direct connection of the incoming watermain into the distribution system is possible and ask McNeely to verify this matter.	McNeely
3.0 ESTIMATED COST	
3.1 McNeely is not ready to provide the estimated cost for the various options of providing another source of water to Forest Parks and another meeting has to be scheduled for Monday, June 5 @ 4:30 PM to review this matter. F. Dicaire confirms that cost estimates will be ready at that time.	McNeely

FORM 101A

DETAILS	ACTION TAKEN BY

3.2 G. Côté cautions F. Dicaire that the unit cost for the incoming watermain from the Limoges well to the Limoges plant is based on a 300 mm pipe installed along a paved road. The unit cost for the watermain between Limoges and Forest Park should be based on the specific conditions encountered along the two alternative routes (such as possible presence of bedrock for route C) and on the diameter of the pipe. The cost estimates will be based on separate trenches for the sewage forcemain and the watermain even if the two pipes are installed in the same corridor.

3.3 Concerning the crossing of Highway 417 using the jacking and boring method, G. Côté suggests to use the sum of $175,000.

3.4 The estimated cost of oversizing the plant for Forest Park as provided by Lecompte Engineering is based on the Phase 2 report and includes engineering and contingencies. Preliminary design is under way and cost estimates will be updated during the Phase 3 study.

3.5 G. Côté suggest to use the sum of $150/household/year for the operating and maintenance cost of the water supply plant. More detailed estimates for operating and maintenance cost will be prepared during the course of the Phase 3 study for Limoges.

3.6 F. Dicaire indicates that the capital cost of the Forest Park project may include swabbing of the distribution in order to remove sodium deposits.

Prepared by :
LECOMPTE ENGINEERING LTD.

Gilbert Côté

Gilbert Côté, P.Eng.
June 6, 1995
\5341-cor.2

APPENDIX B

COPY OF EXISTING CERTIFICATE OF APPROVAL

Ministry of the Environment

Ontario

NOTICE

TO: Township of Cambridge
P. O. Box 86
St. Albert, Ontario
KOA 3CO
Attn: Mr. A. Ouimet, Clerk

You are hereby notified that final Certificate of Approval No. 7-0224-83-006 has been issued to you subject to the conditions outlined therein.

The reasons for the imposition of these conditions are as follows:

The water supply does not fully meet the Ministry of the Environment objectives for chemical characteristics with respect to chloride and fluoride concentrations, total dissolved solids, and has a concentration equal to the Ministry's objectives for iron with elevated levels of nitrogen. Although the concentrations in the water are not desirable they are not considered a health hazard at their present levels. It is expected that the water quality may deteriorate with continued pumping of the aquifer and therefore a monthly analysis programme is required for monitoring changes in water quality. If significant deterioration of water quality occurs additional treatment may be required.

ON May 4/83

SIGNED

You may by written notice served upon me and the Environmental Appeal Board within 15 days after receipt of this Notice, require a hearing by the Board.

This Notice should be served upon:

The Secretary, Environmental Appeal Board, 1 St. Clair Ave. West, 5th Floor, Toronto, Ontario. M4V 1K7	AND	The Director, Section 23, O.W.R. Act, Ministry of the Environment, 135 St. Clair Ave. West, Toronto, Ontario. M4V 1P5

DATED at Toronto this 3rd day of May , 1983.

Ministry of the Environment
Ontario

Certificate No. ... Attachment: Air Approval

Certificate of Approval
(Water)

Whereas .... TOWNSHIP OF CAMBRIDGE ....

XX

has applied in accordance with Section 23 of the Ontario Water Resources Act for approval of:

construction of water works facilities to serve the Township of Cambridge, Forest Park East Community, (MOE Direct Grant Project No.7-0024, Contract No.2) as follows:

WELL PUMPHOUSE

- modifications to the existing well pump control house located approximately 190 south of the road allowance between Concessions VI and VII of the Township of Cambridge on Part of Lot 28, Concession VII of the Township of Cambridge, includ the installation of a flowmeter; installation of a 75 mm diameter test line; provision of a new 100 mm diameter connection to the existing 150 mm diameter discharge main; electrical and control modifications;

- installation of a new submersible vertical turbine well pump rated to pump 10.75 L/s against a total dynamic head of 33.5 m in existing well No.1;

- modifications to the existing well installations and a provision of new above ground insulated housings over both wells;

RESERVOIR AND PUMPHOUSE

- construction of a 3-celled (including pump well) ground storage reservoir with a total storage volume of approximately 700 cubic metres, to be located north of Street "D" at Maple Grove;

- installation of three (3) electric motor driven vertical turbine high lift pumps (one as stand-by), each rated to pump 8 L/s against a total dynamic head of 42 m (2 pumps operating in parallel to pump the expected design peak hour demand of 16 L/s);

- installation of one (1) Diesel engine driven vertical turbine fire pump rated to pump 47.3 L/s against a total dynamic head of 70 m;

- pumps, engine, controls etc. to be housed in a 7 m x 6 m superstructure over part of the reservoir;

including all the necessary appurtenances and controls, all in accordance with the final plans and specifications prepared by J. L. Richards and Associates

Now therefore this is to certify that after due enquiry the said proposed works have been approved under Section 23 of the Ontario Water Resources Act.

DATED AT TORONTO this 3rd day of May 19 8

Attn:-Mr. A. Ouimet, Clerk, Twp. of Cambridge
cc:-Mr. R.E. Moore, MOE SE Reg. Dir.
-Mr. H.H. Teza, Project Manager
-J.L. Richards & Assoc. Ltd. (attn: A. Reid, P.Eng.)
-Mr. A. Forsyth, CFRB

Ministry of the Environment

Ontario

(Continued)

Certificate of Approval
(Water)

Whereas

of

has applied in accordance with Section 23 of the Ontario Water Resources Act for approval of:-

Limited, Consulting Engineers, at a total estimated cost, including engineering and contingencies and land charges, of TWO HUNDRED AND TWENTY FOUR THOUSAND DOLLARS ($224,000.00), subject to the following special terms and conditions which are considered necessary by the undersigned.

SPECIAL TERMS AND CONDITIONS

1. The water supply shall be sampled and analysed for chlorides, iron, fluoride, Nitrogen, and total dissolved solids at a frequency of at least once per month and the results reported to the Regional Director of the Ministry's Southeast Regional office.

THIS IS A TRUE COPY OF THE ORIGINAL CERTIFICATE ISSUED

ON May 4/83

Now therefore this is to certify that after due enquiry the said proposed works have been approved under Section 23 of the Ontario Water Resources Act.

DATED AT TORONTO this 3rd day of May 19 8

APPENDIX C

PLANNING REPORT FOR FOREST PARK COMMUNITY

PLANNING REPORT

Forest Park Community - Township of Cambridge

Purpose

The purpose of this report is to provide background information on demographics, land use and official plan policies and zoning requirements as they relate to servicing improvements for the Forest Park Community.

Study Area

The study area (see Map 1) consists of the Forest Park subdivision located between County Road 3 and the Castor River, a linear subdivision along Rue du Castor between the Castor River and Chemin 600 Ouest, and land in the immediate vicinity of these areas, i.e. mobile home park (Lot 30, Concession 7), a church and elementary school along County Road 3, and several dwellings. The study area is bisected by the Castor River which serves as a physical barrier between a more concentrated area of development on the north side of the river and two clusters of linear development on the south side of the river.

Description of Land Use

The study area is predominantly residential in character of which the predominant housing type is single detached housing. The following provides a summary of the distribution of residential housing types:

•	Forest Park East subdivision:	135 single detached
		1 semi-detached
	Total	137 housing units
•	Rue du Castor:	16 single detached
•	County Road 3:	10 single detached
•	Chemin 600 Ouest:	8 single detached
		19 mobile homes
	Total	24 housing units
	Grand Total	187 housing units

The total number of housing units within the study area is 187. In addition to a residential development, there is a church and the Cambridge Elementary School.

The lands surrounding the study area are predominantly agricultural as this area is actively farmed.

In terms of the land use pattern, (see Map 2) the most concentrated development is in the Forest Park East subdivision which consists of four streets of equal length, all of which intersect with County Road 3. This subdivision consists of 216 lots of which, as indicated, 136 are developed. South of the Castor River, the development pattern is linear. The Rue du Castor for example, is a single street with residential development either side. Along Chemin 600 Ouest, development is also characterized as linear with the exception of a mobile home park which has three small streets intersecting with Chemin 600 Ouest, where there is a cluster of 18 mobile homes.

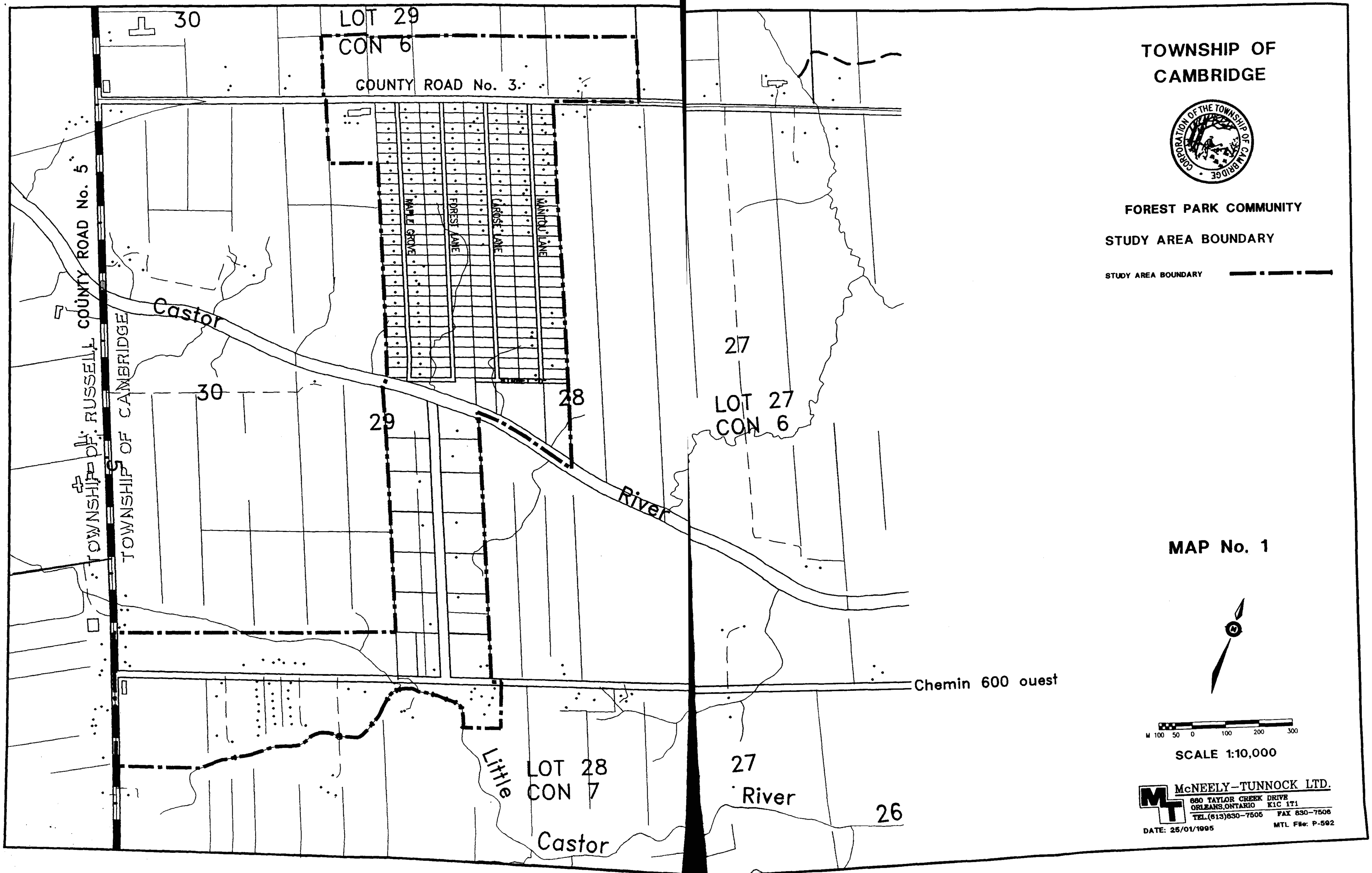
Development however within the Forest Park Community is generally more concentrated than in other rural areas of the Township and has the capacity to become a significant settlement area should undeveloped lots within the subdivisions or vacant existing lots of record become developed.

Development Potential

The development potential exists primarily within the Forest Park East subdivision. Of a total of 216 lots, 135 are developed, leaving a residual of 81 lots. Of these, one is occupied by a pump house associated with the water distribution system. Some of the lots in the subdivision have not been developed likely because of topographic constraints given two of ravines which extend north from the Castor River into the subdivision. The market potential will dictate the viability of developing these lots as will the land use policies of the municipality in encouraging, for example, development in this community as a designated settlement area. It is therefore not unreasonable to consider the development of another 60 or so lots within this particular subdivision.

Aside from the development potential in the Forest Park East subdivision, there is one vacant lot along the Rue du Castor. Given the frontage of lots along this street however, the development potential exists for re-subdivision of lots to increase the number of potential dwelling units from 16 (existing) to perhaps 24. A further potential exists for infill development on existing lots of record along County Road No. 3 and Chemin 600 Ouest, i.e. approximately 4 to 6 lots.

The total potential for future residential development would be in the order of 70 to 75 lots within this particular area.


TOWNSHIP OF CAMBRIDGE
FOREST PARK COMMUNITY
STUDY AREA BOUNDARY
STUDY AREA BOUNDARY
MAP No. 1
M 100 50 0 100 200 300
SCALE 1:10,000
McNEELY-TUNNOCK LTD.
880 TAYLOR CREEK DRIVE
ORLEANS,ONTARIO K1C 1T1
TEL.(613)830-7505 FAX 830-7506
DATE: 25/01/1995
MTL File: P-592
LOT 29
CON 6
COUNTY ROAD No. 3.
COUNTY ROAD No. 5
TOWNSHIP OF RUSSELL
TOWNSHIP OF CAMBRIDGE
MAPLE GROVE
FOREST LANE
LAROSE LANE
MANITOU LANE
Castor River
30
29
28
27
26
LOT 27
CON 6
LOT 28
CON 7
Chemin 600 ouest
Little Castor River

EXECUTIVE SUMMARY

BACKGROUND INFORMATION

This Executive Summary summarizes the information contained in the Phases 1 and 2 Preliminary Report for the Community of Forest Park Water Supply Study. This water supply study was initiated in 1994 for the community of Forest Park by the Township of Cambridge in accordance with the 1993 Municipal Class Environmental Assessment (Class EA) Process for Municipal Water and Wastewater projects. The Class EA is a streamlined process vis-à vis the Environmental Assessment Act and includes an extensive public and governmental review agency consultation process.

Forest Park, a community of approximately 508 people, is located in the Township of Cambridge approximately 25 km east of Ottawa between the Villages of Casselman and Embrun. Many residents commute daily to places of employment located primarily in the Regional Municipality of Ottawa-Carleton. The community is serviced by communal water and private sewage systems.

The water supply and distribution system consists of two drilled wells, a well pumphouse, an underground storage reservoir, complete with a pumphouse structure and a distribution network of 150 mm diameter watermains and provides water to about 163 dwellings and an elementary public school.

The existing system has been operated and maintained by the Township of Cambridge since the early 1980's when the Township took over the water works from the original developer of the community.

Increasing demand on the system and a constant deterioration of raw groundwater quality has made it increasingly difficult for the Township to provide good quality water meeting the Provincial objectives to the residents of the Forest Park community.

In June, 1990, the Township of Cambridge submitted an application for funding to the Ministry of the Environment and Energy. This application was for a study to upgrade the existing water quality by finding a new water source or upgrading the existing treatment.

After a lengthy approval process a decision was made to proceed with a water supply study under a Class Environmental Assessment with the Province of Ontario providing financial assistance to the Township of Cambridge through Ontario Clean Water Agency (OCWA).

Completion of the Phases 1 and 2 Preliminary Report has confirmed that the preferred solution will be a Schedule C activity and that an Environmental Study Report (ESR) will be required.

PROBLEM IDENTIFICATION

The following deficiencies with the current water system were identified in Phase 1 of this study:

- poor water quality which does not meet Ministry of Environment and Energy's Ontario Drinking Water Objectives;
- inability of the community to grow and develop existing approved lots; and,
- deterioration and increased maintenance of water works facilities resulting in increased costs to homeowners.

SUMMARY AND EVALUATION OF ALTERNATIVE SOLUTIONS

Several alternative solutions were investigated to address the identified problems with the Forest Park water supply system.

These alternatives are divided into two categories:

The first category includes alternatives that restrict growth and offer no or only partial solutions to the identified problems. This group includes alternatives such as:

- "do nothing";
- limit community growth;
- upgrade existing system;
- a combination of communal and private systems.

None of the above alternatives offer a long term, reliable solution to the existing water quality problem.

The second category includes alternatives that provide good quality water to the existing dwellings and allow for future growth in the community. This group includes alternatives such as:

- construction of a new water treatment plant (surface supply);
- connection to an "area type" water supply system;
- obtaining water from Limoges; and,
- development of a new well field.

During discussion at Liaison Committee Meetings and with the Forest Park Community Association it was established that the preferred solution should not only resolve poor water quality but also allow for future community growth as per the existing approved Official Development Plan. All alternatives from the second category would meet those criteria, however, due to the complex treatment requirements and distance from surface water sources, the construction of a surface water treatment plant is too costly to implement for the Forest Park Community. The existing population density in Cambridge Township and adjacent municipalities

does not warrant the development of an "Area Type" water supply system in the foreseeable future. Thus, the alternatives of obtaining water from Limoges or development of new wells appear to be the only technically and economically feasible alternatives for a Forest Park water supply.

SELECTION OF RECOMMENDED ALTERNATIVES

As explained above, two alternatives are selected for further evaluation. They are:

- obtaining water from Limoges, and
- developing of a new groundwater supply.

The recommended alternative solution should provide good quality and quantity of water for the projected 20-year design population of 1,000 people, without posing severe financial burden on either the existing community or future development.

Alternative A - Obtaining Water from Limoges

The Village of Limoges is located about 4.0 km north - west of the Forest Park development, just north of Highway 417 along County Road No. 5. The Township of Cambridge is currently proceeding with a Class Environmental Assessment for the provision of a new water supply system to serve the Village of Limoges. The Phase 2 Report of the Class EA recently completed by Lecompte Engineering Ltd. recommends the construction of a communal water supply system for the Village using groundwater as the raw water supply source, together with water treatment and storage. Because of the proximity of Limoges to Forest Park, the provision of water from Limoges appears to be economically and technically feasible. Oversizing of the proposed Limoges water works together with the construction of a feedermain will be required to accommodate the Forest Park Community.

Alternative B - Develop New Wells

The development of a new well field having an acceptable quality and quantity of ground water could be a viable alternative to solve water problems in the Forest Park Community. In July, 1993 Jacques Whitford Environmental Limited was retained to carry out the hydrogeologic investigations necessary to locate an adequate groundwater source. The investigation concluded that there is good quality groundwater near Route 400 about 3 km north of Forest Park and that a minimum of three production wells would be required to meet the projected 20-year water demand.

The hydrogeological report also recommended that a multi-well pump test be conducted to determine interference effects and the long term safe yield of the system. The recommended 72 hour multi-well pump test was conducted in June 1995. The results indicated that a projected maximum safe yield of 4.5 l/s was attainable, which is well below the 12 l/s design flow required to accommodate future development. This testing included water quality sampling which revealed the groundwater was not as good quality as previously believed, however, it was still within treatable limits.

PREFERRED SOLUTION

Based on the fact that the identified groundwater source is not capable of providing the required quantity of water, the recommended alternative is that of "Obtaining Water from Limoges". The preliminary capital cost estimate for this alternative including oversizing of the proposed Limoges water works is estimated at $ 2,500,000.

An application for provincial funding to cover $ 2,125,000 (85%) of capital costs will be made to the Ontario Clean Water Agency. The capital funding rate is 85% which is the maximum permissible rate according to present regulations. A lower grant (i.e. 70%) could possibly be considered. Although yet to be formally endorsed by the Council, it is expected that the balance

($ 375,000) will be levied on existing houses and the Cambridge Elementary School, resulting in an average charge per household of approximately $ 2,100. Alternatively, should the level of subsidy be lower, the net lot charge would increase. As well, there are some 70 existing houses and approved building lots in the proposed service area which are not connected to the water system. The Township Council may choose to include them in the assessment of charges. Should Council decide to include these future lots in the cost apportionment scenario, the resulting average charge per household could then be reduced to $1,500. The same lot charge will also be levied on all new development and recovered money will be allocated to the future capital reserve fund.

The selection of the preferred solution will not be finalized by the Township Council until comments from public and review agencies (following the public meeting scheduled for Wednesday, July 19, 1995) have been received and reviewed.

TOWNSHIP OF CAMBRIDGE

NOTICE OF PUBLIC MEETING

CLASS ENVIRONMENTAL ASSESSMENT
SCHEDULE " C "

WATER SUPPLY STUDY
FOR THE
COMMUNITY OF FOREST PARK

The Corporation of the Township of Cambridge is undertaking a Class Environmental Assessment Study to correct water quality problems with the existing Forest Park communal water supply system.

A public information session is being held to satisfy Phases 1 & 2 of the approved planning procedures contained in the Class Environmental Assessment for Municipal Water and Wastewater Projects.

An Information Session for individual discussions will be held at the **Limoges Community Center, 171 Mabel Street, Limoges** on:

Wednesday , July 19 , 1995 from 2:00 p.m. to 4.00 p.m.

Following the Information Session a Public Meeting will be held at the same location on:

Wednesday , July 19 , 1995 at 7: 30 p.m.

The purpose of the session and meeting is to inform the residents and other interested members of the public of the need for the project, to present the proposed alternative solutions and to provide an opportunity for public input and comments so they can be addressed and incorporated into the planning and design process. Comments will be received until August 4, 1995.

For further information or to submit written comments, please contact:

Mr. Fernand Dicaire
McNeely Engineering Consultants Ltd.
880 Taylor Creek Drive
Orleans, Ontario
K1C 1T0

Tel: (613) 830 - 7500
Fax: (613) 830 - 7506

Mr. Roger Brunette
Township of Cambridge
958 West Route 500, R.R. 3
Casselman, Ontario
K0A 1M0

Tel: (613) 764 - 5444
Fax: (613) 764 - 3310

This notice is issued on July 12, 1995.

Municipalities

The Corporation of the
Township of Cambridge
958 Highway 500 West
R.R. 3
Casselman, Ontario
K0A 1M0

Township of Russell
717 Notre Dame Street
Embrun, Ontario
K0A 1W1

Ontario Government Ministries

Mr. Andre Lemay
Ministry of Agriculture,
Food and Rural Affairs
735 Rue Notre Dame
Embrun, Ontario
K0A 1W1

Patsy McAllister
Ministry of Culture
Tourism and Recreation
903 Brookdale Avenue
Cornwall, Ontario
K6J 4P3

Ministry of Citizenship
77 Bloor Street West, 5th Floor
Toronto, Ontario
M7A 2R9

Ministry of Community & Social Services
Ottawa Area Office
10 Rideau Street
7th Floor
Ottawa, Ontario
K1N 8J1

Alain Secours
Ministry of Economic Development and Trade
Suite 850, Place De Ville Tower B
112 Kent Street
Ottawa, Ontario
K1P 5P2

Mr. Ron Robertson
Ministry of the Environment and Energy
205 Amelia Street
Cornwall, Ontario
K6H 3P3

Mr. Brian Ward, Director
Ministry of the Environment and Energy
133 Dalton Street
Kingston, Ontario
K7L 4X6

Ministry of Government Services
777 Bay Street
Toronto, Ontario
M5G 2E5

Mr. Brian Sutherland
Ministry of Housing
1547 Merivale Road
5th Floor
Nepean, Ontario
K2G 4V3

Mr. Spencer Hope
Ministry of Municipal Affairs
244 Rideau Street
Ottawa, Ontario
K1N 5Y3

Mr. Larry Drennan, P.Eng.
Ministry of Natural Resources
Provincial Government Building
Concession Road
Postal Bag 2002
Kemptville, Ontario
K0G 1J0

Ms. Caroline Newcombe, P.Eng.
Municipal Engineer
Ministry of Transportation
P.O. Box 9530
530 Tremblay Road
Ottawa, Ontario
K1G 0E4

Other Organizations

Dr. Robert Bourdeau
Eastern Ontario Health Unit
1000 Pitt Street
Cornwall, Ontario
K6K 3S5

Kelly Graham
Management Board of Cabinet
Ottawa Courthouse
161 Elgin Street
Ottawa, Ontario
K2P 2K1

Mr. Bob Dormer, P.Eng.
Ontario Clean Water Agency
20 Bay Street, 7th Floor
Toronto, Ontario
M5J 2N8

Ms. Mary Ann Wilson
South Nation River Conservation Authority
P.O. Box 69
15 Union Street
Berwick, Ontario
K0C 1G0

Prescott-Russell County Board of Education
411 Stanley Street
Hawkesbury, Ontario
K6A 3E8

School Boards

Prescott-Russell County Separate School Board
P.O. Box 570
L'Orignal, Ontario
K0B 1K0

Mr. Mark Clermont, P.Eng.
United Counties of Prescott and Russell
777 County Street
P.O. Box 247
Plantagenet, Ontario
K0B 1L0

Public Utilities

Ms. Carole Boileau
Bell Canada
45 - 2nd Street West
Cornwall, Ontario
K6H 5V1

Mr. Dennis Battinston, P.Eng.
Operations Engineer
Consumers Gas
400 Coventry Road
Ottawa, Ontario
K1K 2C7

Ontario

Ministry of
Community and
Social Services

Ministère des
Services sociaux
et communautaires

10 Rideau Street
Ottawa ON KIN 9J1
(613) 234-1188

10, rue Rideau
Ottawa ON K1N 9J1
(613) 234-1188

RECEIVED AUG 0 _ _

July 24, 1995

M. Joseph Zagorski, P.Eng.
Project Manager
McNeely Engineering
Consultants Limited
880 Taylor Creek Drive
Orleans, Ontario
K1C 1T1

RE: Township of Cambridge
Water Supply Study for the Community of Forest Park
Class Environmental Assessment
Your file Reference : M-2963

Dear Mr. Zagorski:

I am writing in response to your correspondence of July 10, 1995, regarding the above captioned project. I have no input to offer at this time as there is limited data available. However I would like to be kept abreast of the result of the environmental assessment, and may wish to offer input in the future.

I trust this response is satisfactory.

Yours sincerely,

Pierre Lalonde
Area Manager
Ottawa Area Office

PL/DO/11

c.c.: Robert Nadon, Community Services Manager
Frank O'Brien, Community Services Manager
Seville Clarke, Direct Services Manager

ontario hydro

RECEIVED AUG 1 0 199

Upper Canada Utility, Bag 360, St. Lawrence Street, Winchester, Ontario K0C 2K0
Utilité Upper Canada, Case postale 360, rue St. Lawrence, Winchester (Ontario) K0C 2K0

Telephone/Téléphone: Service: 1-800-565-2778
Billing Information/Facture: 1-800-565-0805
FACS/Télécopieur: (613) 774-2761

August 4, 1995

McNeely Engineering Consultants Ltd.
880 Taylor Creek Drive
ORLEANS, On
KOC 1T1

ATTN: Mr. M. Joseph Zagorski

RE: Township of Cambridge
Water Supply Study

Dear Mr. Zagorski:

We have reviewed your letter of July 10, 1995 on the above noted subject and have no comments or concerns at this point. When the location or proposed locations are established we will comment on any conflicts with our existing plant.

Should you have any further questions, please contact myself at Extension 309.

Sincerely,

Wayde Roles

Wayde Roles
Operations Planning Supervisor
Upper Canada Utility

JW/cf

3

RECEIVED AUG 0 1 1995

Ontario

Ministry of Transportation

Ministère des Transports

P.O. Box 9530 Terminal
Ottawa, Ontario
K1G 0E4
Tel. (613) 745-6841
Fax (613) 748-5297

July 31, 1995

M. Joseph Zagorski, P. Eng.
Project Manager
McNeely Engineering Consultants Ltd.
880 Taylor Creek Drive
Orleans, Ontario.
K1C 1T1

Dear Sir:

Re: Township of Cambridge
Water Supply Study for the Community of Forest Park
<u>Class Environmental Assessment</u>

The Ministry has reviewed the information submitted, and have no concerns at this time. Please notify this Ministry as to the outcome of the E.A. Study.

If you have any questions, please contact this office.

Sincerely,

R.D. LORRAIN
Senior Municipal Supervisor

rjl

Municipalité du Canton de Cambridge
Corporation of the Township of Cambridge

358 West Route 500 Ouest,
R.R. 3, Casselman, Ontario K0A 1M0

Tél.: (613) 764-5444
Fax: (613) 764-3310

CLASS ENVIRONMENTAL ASSESSMENT

INFORMATION SESSION AND PUBLIC MEETING
ON JULY 19, 1995

WATER SUPPLY STUDY
FOR THE
COMMUNITY OF FOREST PARK
PHASES 1 AND 2

Please provide to the Township of Cambridge prior to August 4, 1995 any comments or concerns you may have on any aspect of the proposed Project. Your comments are important and appreciated.

NAME: (M. Hider) Prescott-Russell County Board of Education

MAILING ADDRESS: 411 Stanley Street
Hawkesbury, Ontario K6A 3E8

COMMENTS:

We are questioning how you came about to determine the amount of households for water consumption and sewage at our Cambridge School.

We would like to further discuss.

Thank you.

Use other side if required

McNEELY
ENGINEERING
CONSULTANTS LTD

United Counties of - Comtés Unis de
Prescott & Russell
Department of Public Works - Département des travaux publics

August 8, 1995

McNeely Engineering Consultants Ltd.
880 Taylor Creek Drive
ORLEANS, Ontario
K1C 1T1

Attention: Mr. Joseph Zagorski, P. Eng., Project Manager

Dear Sir:

RE: Township of Cambridge - Water Supply Study for the community of Forest Park
Class Environmental Assessment

The Department of Public Works of the United Counties of Prescott and Russell acknowledges receipt of your letter date July 10, 1995 regarding the above mentioned project.

Our Department has no objections with the project in principle, however, we do expect to be involved as to the planning of location of the installation of the watermain and other appurtenances within the County Roads right-of-way.

Trusting that you find this satisfactory, we remain,

Yours truly,

Marc R. Clermont, P.Eng.,
Director of Public Works

mrc/sb

P.O. Box/Casier Postal 247 - 777 County St./rue des comtés,
Plantagenet, Ontario, K0B 1L0
Tel: (613) 673-5139 - Fax: (613) 673-4663

August 10, 1995
File Ref: M-2963

(Addressee) **(Note - See attached distribution list)**

Reference: Township of Cambridge
Water Supply for the Community of Forest Park
Class Environmental Assessment

Dear Sir,

We refer to our letter dated July 10, 1995 regarding the Township of Cambridge Class Environmental Assessment Study to correct water quality problems with the existing Forest Park communal water supply system. A public meeting is planned to provide further information to the public on the proposal and to receive input and comment.

The meeting will be held on Tuesday, August 15, 1995 at 7:30 p.m. at Limoges Community Centre, 171 Mabel Street, Limoges.

Enclosed is a copy of an information brief including notice of the meeting.

Please direct your written comments before August 25, 1995 indicating if you wish to be notified of the Environmental Study Report completion.

Yours very truly,

McNeely Engineering Consultants Ltd.

MJZ/

M.J. Zagorski, P.Eng.
Project Manager

LETTERS.95\M2963AUG.95(tn)

INFORMATION BRIEF

In Ontario, all municipal water projects must be planned in accordance with the Environmental Assessment Act. This Act provides for the protection, conservation and wise management of the environment by seeking the public involvement and providing a responsible and accountable process of decision making.

The Class Environmental Assessment (Class EA) is a streamlined process which was developed to standardize the planning process for the projects that are:

- recurring;
- usually similar in nature;
- usually limited in scale;
- have a predictable range of environmental effects; and,
- be responsive to mitigating measures.

The planning and design process for the Class EA consists of five phases which may have to be undertaken before the project is completed.

- Phase 1 - Identify the problem;
- Phase 2 - Identify all alternative solutions to the problem;
- Phase 3 - Identify alternative design concepts;
- Phase 4 - Document all findings in an Environmental Study Report (ESR); and
- Phase 5 - Complete contract drawings, tender documents and proceed to construction, operation and monitoring.

The Class EA also classifies projects according to three Schedules: A, B, and C. The Schedule type dictates which of the five phases are required as follows:

- Schedule A: project approved without further delay;
- Schedule B: follows phases 1, 2, and 5; and
- Schedule C: follows all five phaess.

On July 12, 1995 a copy of the Executive Summary of Class EA Phase 1 and 2 Report was sent to the Forest Park residents for the Forest Park Water Supply Study together with the notice of the open house and the first public meeting. The meeting was held on July 19, 1995 to comply with the requirements of the Class EA.

The Forest Park project is being planned as a Schedule C project under the Class Environmental Assessment for Municipal Water and Wastewater Projects. The project is in Phase 3 of the process. Next, the Draft Environmental Study Report (ESR) will be prepared and circulated to review agencies, mandatory contacts and interested public.

A public meeting is planned for Tuesday August 15, 1995 to provide further information to the public and to receive input and comments (please see a copy of enclosed "Notice of Public Meeting").

Subject to comments received, the draft ESR will be finalized and placed on the public record.

The Phase 1 and 2 report concluded that "Obtaining Water from Limoges" was the preferred solution to correct the water quality problems with the existing Forest Park Supply System and to allow for housing development in the community. After reviewing comments from the public and review agencies, the Township of Cambridge Council passed a resolution officially endorsing the Limoges option and instructing Lecompte Engineering Ltd. to include the Forest Park Community in the proposed service area for the communal water supply for the Village of Limoges and to make all the necessary changes in the proposed works.

The following recommended design concept is based on Phase 3 Class EA draft report for the Village of Limoges proposed water supply prepared by Lecompte Engineering Ltd. and proposed transmission watermain line from Limoges to the Forest Park reservoir.

- Two production wells and a well pumping station located in Part Lot 21, Con. VII, Township of Russell, (Russland Road west of Dunning Road).
- A 250 mm dia connecting raw watermain, approximately 5.2 km long, between the well pumping station and the water treatment plant.
- A water treatment plant located on the east side of Limoges immediately south of the new St-Viateur school.
- Oversizing of watermain on Limoges Road between Des Pins and the south Village limits (530 m).
- Transmission low pressure watermain between south limit of Village of Limoges and storage reservoir and pumphouse in the Forest Park.
- Installation of water meters at each house to promote water efficiency.

The capital cost estimate for this project, including the cost for oversizing of the Limoges Water Works to feed Forest Park is estimated at **$2,500,000.**

An application for provincial funding to cover **$2,125,000** (85%) of capital cost will be made to the Ontario Clean Water Agency. The capital funding rate is 85% which is the maximum permissible rate according to present regulations. The grant, however, may be lower (i.e. 70%). The balance **$375,000** (15%) will be levied on the existing houses, the Cambridge Elementary School and 40 approved building lots, resulting in an average charge per household of approximately **$1,700**, if the level of subsidy is lower, the net lot charge would increase. The same lot charges will also be levied on all new development and recovered money will be allocated to the future Capital Reserve Fund.

The annual operating and maintenance cost, including a repair and maintenance reserve fund, is expected to rise from the current **$205** per household to approximately **$320.** More detailed information about the project can be found in the Draft Environmental Study Report which will be available for review following the August 15th Public Meeting at the Township of Cambridge office.

TOWNSHIP OF CAMBRIDGE
CLASS ENVIRONMENTAL ASSESSMENT
WATER SUPPLY STUDY
FOR THE
COMMUNITY OF FOREST PARK

NOTICE OF PUBLIC MEETING

Recent water supply studies for the Community Forest Park have now been concluded. Based on the results of these studies, the Township of Cambridge is considering obtaining water from the proposed communal water system in the Village of Limoges as a solution to correct water quality problems with the existing Forest Park supply system and to allow for future housing development in the community.

This project is being planned as a Schedule C project under the Class Environmental Assessment for Municipal Water and Wastewater Projects. A public meeting is planned to provide further information to the public on the proposal and to receive input and comment from the interested persons.

Public Meeting : 7:30 pm
Tuesday, August 15, 1995

Limoges Community Center
171 Mabel Street, Limoges

Following the public meeting further comments are invited, for incorporation into the planning and design of this project, and will be received until August 25, 1995.

Subject to comments received as a result of this Notice, the Township plans to instruct the consultant to proceed with the planning for this project and an Environmental Study Report will be prepared and placed on the public record.

For future information or to submit written comments, please contact:

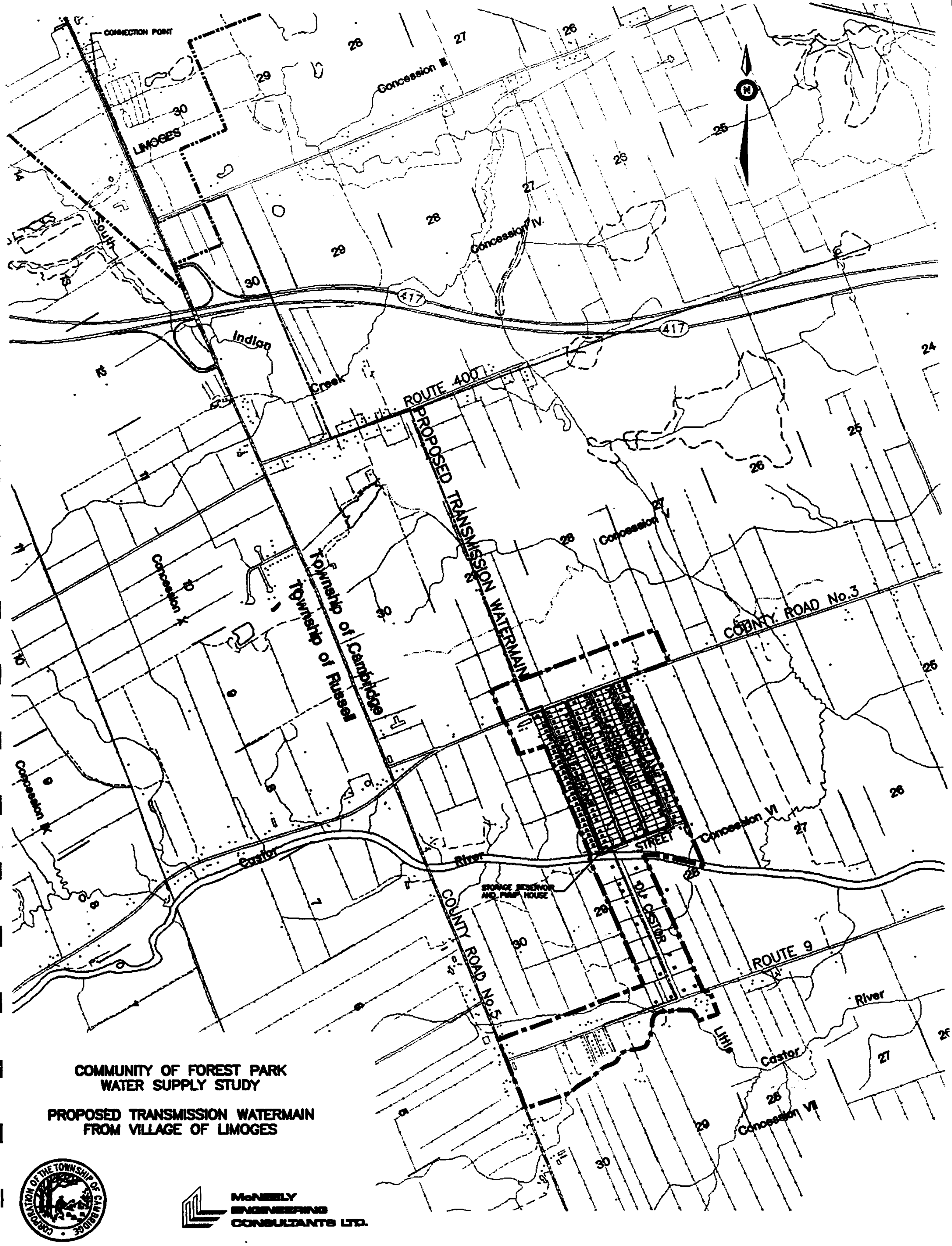
Mr. Fernand Dicaire
McNeely Engineering Consultants Ltd.
880 Taylor Creek Drive
Orleans, Ontario
K1C 1T1

Tel: (613) 830 - 7500
Fax: (613) 830 - 7506

Mr. Roger Brunette
Township of Cambridge
958 West Route 500, R.R.3
Casselman, Ontario
K0A 1M0

Tel: (613) 764 - 5444
Fax: (613) 764 - 3310

This notice is issued on August 9, 1995.



COMMUNITY OF FOREST PARK
WATER SUPPLY STUDY

PROPOSED TRANSMISSION WATERMAIN
FROM VILLAGE OF LIMOGES

CORPORATION OF THE TOWNSHIP OF CAMBRIDGE

McNEELY ENGINEERING CONSULTANTS LTD.

Municipalities

The Corporation of the
Township of Cambridge
958 Highway 500 West
R.R. 3
Casselman, Ontario
K0A 1M0

Township of Russell
717 Notre Dame Street
Embrun, Ontario
K0A 1W1

Mr. Mark Clermont, P.Eng.
United Counties of Prescott and Russell
777 County Street
P.O. Box 247
Plantagenet, Ontario
K0B 1L0

Ontario Government Ministries

Mr. Andre Lemay
Ministry of Agriculture,
Food and Rural Affairs
735 Rue Notre Dame
Embrun, Ontario
K0A 1W1

Mr. Pierre Lalonde
Area Manager
Ministry of Community & Social Services
Ottawa Area Office
10 Rideau Street, 7th Floor
Ottawa, Ontario
K1N 8J1

Mr. Ron Robertson
Ministry of the Environment and Energy
205 Amelia Street
Cornwall, Ontario
K6H 3P3

Mr. Brian Ward, Director
Ministry of the Environment and Energy
133 Dalton Street
Kingston, Ontario
K7L 4X6

Ms. Barbra Conye/Ms. Maria MacDonald
Ministry of Municipal Affairs & Housing
Plans Administration Branch
North & East
777 Bay Street, 14th Floor
Toronto, Ontario
M5S 2E5

Jim Cameron, Planner
Ministry of Natural Resources
113 Amelia Street
P.O. Box 1749
Cornwall, Ontario
K6H 5V7

R.L. Lorrain
Senior Municipal Supervisor
Ministry of Transportation
P.O. Box 9530
530 Tremblay Road
Ottawa, Ontario
K1G 0E4

Other Organizations

Dr. Robert Bourdeau
Eastern Ontario Health Unit
1000 Pitt Street
Cornwall, Ontario
K6K 3S5

Mr. Bob Dormer, P.Eng.
Ontario Clean Water Agency
20 Bay Street, 7th Floor
Toronto, Ontario
M5J 2N8

Ms. Mary Ann Wilson
South Nation River Conservation Authority
P.O. Box 69
15 Union Street
Berwick, Ontario
K0C 1G0

School Boards

Prescott-Russell County Board of Education
411 Stanley Street
Hawkesbury, Ontario
K6A 3E8

Public Utilities

Ms. Carole Boileau
Bell Canada
45 - 2nd Street West
Cornwall, Ontario
K6H 5V1

Mr. Dennis Battinston, P.Eng.
Operations Engineer
Consumers Gas
400 Coventry Road
Ottawa, Ontario
K1K 2C7

Don Thompson, Line Supervisor
Ontario Hydro
Upper Canada Utility
Bag 360, St. Lawrence Street
Winchester, Ontario
K0C 2K0

Rogers Cable T.V.
Engineering Division
475 Richmond Road
Ottawa, Ontario
K2A 3Y8

SOUTH NATION RIVER CONSERVATION AUTHORITY
SOCIÉTÉ D'AMÉNAGEMENT DE LA RIVIÈRE NATION-SUD

P.O. Box/C.P. 69
Berwick, Ontario K0C 1G0
Tel.: (613) 984-2948 Fax: (613) 984-2872

August 15, 1995

Mr. M. Joseph Zagorski, P.Eng., Project Manager
McNeely Engineering Consultants Ltd.
880 Taylor Creek Drive
Orleans, Ontario K1C 1T1

Re: Township of Cambridge
Water Supply Study for the Community of Forest Park
Class Environmental Assessment

Dear Mr. Zagorski,

The South Nation River Conservation Authority has received the Executive Summary of the Preliminary Phase 1 and 2 Report for the above mentioned project. The SNRCA has no comments or concerns at this time. The SNRCA would like to be notified of future developments in the Class Environmental Assessment process for this project.

Please do not hesitate to contact me if you have any questions.

Sincerely,

Leslie Vanclief

Leslie Vanclief,
Water Quality Coordinator.

LV/

McNEELY
ENGINEERING
CONSULTANTS LTD.

August 17, 1995
File Ref: M-2963-010

Ministry of Community and Social Services
10 Rideau Street
Ottawa, Ontario
K1N 9G1

Attention: Pierre Lalonde
Area Manager

Reference: Township of Cambridge
Water Supply for the Community of Forest Park
Class Environmental Assessment

Dear Sir,

Responding to your letter of July 24, 1995 and your request to be kept abreast of the Class EA process, we would like to inform you that a copy of the Preliminary Environmental Study Report for the above project is now available.

Should you wish to receive a copy for your review please contact our office.

Yours very truly,

McNeely Engineering Consultants Ltd.

M.J. Zagorski

JZ/

M.J. Zagorski, P.Eng.
Project Manager

LETTERS.95\M2963AUG.95(tn)

880 Taylor Creek Drive, Orleans, Ontario K1C 1T1
(613) 830-7500 Fax (613) 830-7506

McNEELY
ENGINEERING
CONSULTANTS LTD.

August 17, 1995
File Ref: M-2963-010

Ontario Clean Water Agency
20 Bay Street, 7th Floor
Toronto, ON M5J 2N8

Attention: **Mr. Bob Dormer, P.Eng.**

Reference: **Township of Cambridge**
Water Supply for the Community of Forest Park
Class Environmental Assessment

Dear Sir:

Enclosed, please find a copy of the Preliminary Environmental Study Report (ESR) for your information and input.

We are planning to place the ESR on the public record for a 30 day review period at the beginning of September 1995.

Should you have any questions, please do not hesitate to contact our office. Thank you for your cooperation.

Yours very truly,

McNeely Engineering Consultants Ltd.

M. Joseph Zagorski

MJZ/

M.J. Zagorski, P.Eng.
Project Manager

LETTERS.95\M2963AUG.95(sg)

880 Taylor Creek Drive, Orleans, Ontario K1C 1T1
(613) 830-7500 Fax (613) 830-7506

McNEELY
ENGINEERING
CONSULTANTS LTD.

August 17, 1995
File Ref: M-2963-010

The Corporation of the
Township of Cambridge
958 West Route 500, R.R. #3
Casselman, ON K0A 1M0

Attention: **Mr. Roger Brunette**

Reference: **Township of Cambridge**
Water Supply for the Community of Forest Park
Class Environmental Assessment

Dear Sir:

Enclosed, please find a copy of the Preliminary Environmental Study Report (ESR) for your information.

We are planning to place the ESR on the public record for a 30 day review period at the beginning of September 1995.

Should you have any questions, please do not hesitate to contact our office.

Yours very truly,

McNeely Engineering Consultants Ltd.

M.J. Zagorski

MJZ/

M.J. Zagorski, P.Eng.
Project Manager

LETTERS.95\M2963AUG.95(sg)

880 Taylor Creek Drive, Orleans, Ontario K1C 1T1
(613) 830-7500 Fax (613) 830-7506

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August 17, 1995
File Ref: M-2963-010

Ministry of Natural Resources
Cornwall District - Eastern Region
113 Amelia Street
P.O. Box 1749
Cornwall, ON K6H 5V7

__Attention:__ **Biologist/Planner**

__Reference:__ **Township of Cambridge**
Water Supply for the Community of Forest Park
Class Environmental Assessment

Dear Sir:

Enclosed, please find a copy of the Preliminary Environmental Study Report (ESR) for your information.

We are planning to place the ESR on the public record for a 30 day review period at the beginning of September 1995.

Should you have any questions, please do not hesitate to contact our office.

Yours very truly,

McNeely Engineering Consultants Ltd.

M. J. Zagorski

MJZ/

M.J. Zagorski, P.Eng.
Project Manager

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(613) 830-7500 Fax (613) 830-7506

McNEELY
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CONSULTANTS LTD.

August 17, 1995
File Ref: M-2963-010

Ministry of Transportation
P.O. Box 9530
530 Tremblay Road
Ottawa, ON K1G 0E4

Attention: **R.J. Lorrain**
Senior Municipal Supervisor

Reference: **Township of Cambridge**
Water Supply for the Community of Forest Park
Class Environmental Assessment

Dear Sir:

In response to your letter of July 31, 1995, please find enclosed a copy of the Preliminary Environmental Study Report (ESR) for your information.

We are planning to place the ESR on the public record for a 30 day review period at the beginning of September 1995.

Should you have any questions, please do not hesitate to contact our office.

Yours very truly,

McNeely Engineering Consultants Ltd.

M.J. Zagorski

MJZ/

M.J. Zagorski, P.Eng.
Project Manager

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880 Taylor Creek Drive, Orleans, Ontario K1C 1T1
(613) 830-7500 Fax (613) 830-7506

McNEELY
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CONSULTANTS LTD.

August 17, 1995
File Ref: M-2963-010

Ministry of the Environment and Energy
205 Amelia Street
Cornwall, ON K6H 3P3

Attention: **Environmental Officer**

Reference: **Township of Cambridge**
Water Supply for the Community of Forest Park
Class Environmental Assessment

Dear Sir:

Enclosed, please find a copy of the Preliminary Environmental Study Report (ESR) for your information.

We are planning to place the ESR on the public record for a 30 day review period at the beginning of September 1995.

Should you have any questions, please do not hesitate to contact our office.

Yours very truly,

McNeely Engineering Consultants Ltd.

M. J. Zagorski

MJZ/

M.J. Zagorski, P.Eng.
Project Manager

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880 Taylor Creek Drive, Orleans, Ontario K1C 1T1
(613) 830-7500 Fax (613) 830-7506

McNEELY ENGINEERING CONSULTANTS LTD.

August 17, 1995
File Ref: M-2963-010

Ministry of the Environment and Energy
133 Dalton Street
Kingston, ON K7L 4X6

Attention: **Vicky Mitchell**

Reference: **Township of Cambridge**
Water Supply for the Community of Forest Park
Class Environmental Assessment

Dear Sir:

Enclosed, please find a copy of the Preliminary Environmental Study Report (ESR) for your information.

We are planning to place the ESR on the public record for a 30 day review period at the beginning of September 1995.

Should you have any questions, please do not hesitate to contact our office.

Yours very truly,

McNeely Engineering Consultants Ltd.

M. J. Zagorski

MJZ/

M.J. Zagorski, P.Eng.
Project Manager

cc: MOEE Cornwall

LETTERS.95\M2963AUG.95(sg)

880 Taylor Creek Drive, Orleans, Ontario K1C 1T1
(613) 830-7500 Fax (613) 830-7506

Ministry of
Community and
Social Services

10 Rideau Street
Ottawa ON K1N 9J1
(613) 234-1188

Ministère des
Services sociaux
et communautaires

10, rue Rideau
Ottawa ON K1N 9J1
(613) 234-1188

Ontario

RECEIVED AUG 2 5 1995

August 21, 1995

M. Joseph Zagorski, P.Eng.
Project Manager
McNeely Engineering
Consultants Limited
880 Taylor Creek Drive
Orleans, Ontario
K1C 1T1

RE: Township of Cambridge
Water Supply Study for the Community of Forest Park
Class Environmental Assessment
Your file Reference : M-2963

Dear Mr. Zagorski:

I am writing in response to your correspondence of August 10, 1995, regarding the above captioned project. Would you please advise my office of the outcome of the Environmental Assessment Study upon its completion.

I trust this response is satisfactory.

Yours sincerely,

Pierre Lalonde
Area Manager
Ottawa Area Office

PL/DO/sb

c.c.: Robert Nadon, Community Services Manager
Frank O'Brien, Community Services Manager
Seville Clarke, Direct Services Manager

0520 (05/95)

Ministry of
Community and
Social Services

10 Rideau Street
Ottawa ON K1N 9J1
(613) 234-1188

Ministère des
Services sociaux
et communautaires

10, rue Rideau
Ottawa ON K1N 9J1
(613) 234-1188

Ontario

August 24, 1995

RECEIVED AUG 30 1995

M. Joseph Zagorski, P.Eng.
Project Manager
McNeely Engineering
Consultants Limited
880 Taylor Creek Drive
Orleans, Ontario
K1C 1T1

RE: Township of Cambridge
Water Supply Study for the Community of Forest Park
Class Environmental Assessment
Your file Reference : M-2963-010

Dear Mr. Zagorski:

I am writing in response to your correspondence of August 17, 1995, regarding the completion of the "Preliminary Environmental Assessment Study Report" for the above captioned project. A copy of the document would be helpful to me, in formulating any future response on this project. Would you please therefore, forward a copy to my attention at your earliest convenience.

I trust this response is satisfactory.

Yours sincerely,

Pierre Lalonde
Area Manager
Ottawa Area Office

PL/DO/sb

c.c.: Robert Nadon, Community Services Manager
Frank O'Brien, Community Services Manager
Seville Clarke, Direct Services Manager

0520 (05/95)

McNEELY
ENGINEERING
CONSULTANTS LTD.

August 30, 1995
File Ref: M-2963-010

Ministry of Community and Social Services
10 Rideau Street
Ottawa, Ontario
K1N 9G1

Attention: Pierre Lalonde
Area Manager

Reference: Township of Cambridge
Water Supply for the Community of Forest Park
Class Environmental Assessment

Dear Mr. Lalonde,

As requested in your letter of August 24, 1995, please find enclosed a copy of the Environmental Study Report for the above project.

Please do not hesitate to call if you have any questions.

Yours very truly,

McNeely Engineering Consultants Ltd.

M J. Zagorski

MJZ/

M.J. Zagorski, P.Eng.
Project Manager

LETTERS.95\M2963AUG.95(tn)

880 Taylor Creek Drive, Orleans, Ontario K1C 1T1
(613) 830-7500 Fax (613) 830-7506

McNEELY
ENGINEERING
CONSULTANTS LTD.

August 31, 1995
File Ref: M-2963-011

South Nation River Conservation Authority
P.O. Box 69
15 Union Street
Berwick, Ontario
K0C 1G0

Attention: Leslie Vanclief
Water Quality Coordinator

Reference: Township of Cambridge
Water Supply for the Community of Forest Park
Class Environmental Assessment

Dear Ms. Vanclief,

Responding to your letter of August 15, 1995 and your request to be notified of future developments in the Class EA process, please find a copy of the Environmental Study Report for your information

Please call if you have any questions.

Yours very truly,

McNeely Engineering Consultants Ltd.

M. J. Zagorski

MJZ/

M.J. Zagorski, P.Eng.
Project Manager

LETTERS.95\M2963AUG.95(tn)

880 Taylor Creek Drive, Orleans, Ontario K1C 1T1
(613) 830-7500 Fax (613) 830-7506

129 Maple Grove Street
Embrun, Ontario
K0A 1W0

Corporation of the Township of Cambridge
958 West Route 500
R.R. 3
Casselman, Ontario
K0A 1M0

August 3, 1995

Dear Sirs:

Enclosed are my comments and questions regarding the proposed Limoges Water and Sewer Project and the Water Supply for Forest Park.

I want to thank the Township for the detailed information provided to us before the Public Meeting and also extent my congratulations to them on a very thorough presentation given at the meeting.

Regarding the enclosed sheets, I would appreciate a personal response to the questions before the next Public Meeting.

Catherine J. Khan

Catherine J. Khan

Enclosures (2)

Municipalité du Canton de Cambridge
Corporation of the Township of Cambridge

958 West Route 500 Ouest,
R.R. 3, Casselman, Ontario KOA 1MO

Tél.: (613) 764-5444
Fax: (613) 764-3310

CLASS ENVIRONMENTAL ASSESSMENT

INFORMATION SESSION AND PUBLIC MEETING
ON JULY 19, 1995

WATER SUPPLY STUDY
FOR THE
COMMUNITY OF FOREST PARK,
PHASES 1 AND 2

Please provide to the Township of Cambridge prior to August 4, 1995 any comments or concerns you may have on any aspect of the proposed Project. Your comments are important and appreciated.

NAME: Catherine J. Khan

MAILING ADDRESS: 129 Maple Grove
Embrun, Ontario KOA 1W0

COMMENTS:

1) Are we guaranteed the same Quantity of water?

2) Are we guaranteed the same water pressure?

3) Will the price of the Forest Park water supply come down if the two projects (Forest Park water + Limoges Water + Sewer) are approved and constructed together (One ditch only needs to be dug)

Use other side if required

4) If Limoges Water & Sewer Project is approved first and Forest Park Water Project is done later, will cost also lower due to the fact easements will have already been purchased under the Limoges Project?

Municipalité du Canton de Cambridge
Corporation of the Township of Cambridge

958 West Route 500 Ouest,
R.R.3, Casselman, Ontario KOA 1MO

Tél.: (613) 764-5444
Fax: (613) 764-3310

CLASS ENVIRONMENTAL ASSESSMENT

INFORMATION SESSION AND PUBLIC MEETING
ON JULY 19, 1995

WATER SUPPLY STUDY
FOR THE
COMMUNITY OF FOREST PARK
PHASES 1 AND 2

Please provide to the Township of Cambridge prior to August 4, 1995 any comments or concerns you may have on any aspect of the proposed Project. Your comments are important and appreciated.

NAME: Catherine J Khan

MAILING ADDRESS: 129 Maple Grove
Embrun, Ontario

COMMENTS:

1) Considering the amount of money involved with the Forest Park Water Supply & the Limoges Water & Sewer Project, I feel the Government should look at doing both projects at the same time so money can be saved on the portions of the project which are parallel (ie. the ditch from Limoges to Forest Park for both the sewer pipe & the water pipe.

Use other side if required

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(613) 836-7500 Fax (613) 836-7506

2) Perhaps the government should look at the whole picture (Russell, Embrun, Limoges + Casselman) who are all having water problems and perhaps a solution which could accommodate all villages could result in less of a cost to residents + government.

3) Who is to say the wells in Limoges will not meet the same fate as the Forest Park wells?

4) If the project is to go through, I feel it is extremely important that the Council include all lots in the proposed service area to be part of the cost apportionment scenario (ie: 163 + school + 70 building lots)

5) Forest Park has been complaining about the quality of water for years now. How come only when Limoges requires water + sewers has a viable solution been found. Because of this delay by the township it is possible the subsidy by the government would be as low as 70%. I feel the township should be responsible for the difference between 85% and 70% - 15%!

Reçu le - 3 AOUT 1995

Municipalité du Canton de Cambridge
Corporation of the Township of Cambridge

958 West Route 500 Ouest,
R.R. 3, Casselman, Ontario K0A 1M0

Tél.: (613) 764-5444
Fax: (613) 764-3310

CLASS ENVIRONMENTAL ASSESSMENT

INFORMATION SESSION AND PUBLIC MEETING
ON JULY 19, 1995

WATER SUPPLY STUDY
FOR THE
COMMUNITY OF FOREST PARK
PHASES 1 AND 2

Please provide to the Township of Cambridge prior to August 4, 1995 any comments or concerns you may have on any aspect of the proposed Project. Your comments are important and appreciated.

NAME : ELDON FINDLAY

MAILING ADDRESS : 121 MAPLE GROVE
EMBRUN ONTARIO

COMMENTS :

REFER TO THE ATTACHED

Use other side if required

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[illegible] Taylor Creek Drive, Orleans, Ontario K1C 1T1
(613) 830-7500 Fax (613) 830-7506

Water Supply For Forest Park
Comments and Concerns

During the course of the July 19, 1995 Public Meeting at Limoges Community Center, attendees were informed that comments and/or concerns should received by the Township of Cambridge prior to August 4, 1995.

My comments/concerns follow:

(1) At the present time, I have no grounds to dispute the preferred solution of obtaining Water from Limoges; it seems the only credable solution. My concerns are the costs estimate and the baselining of those costs to actual costs incurred.

(a) Costs estimate - Without knowing the details, these estimates appear high. Roughly ten years ago (after an OMB decision) residents ended up paying $1,310 on a 100 foot frontage lot for a water project that included a well pumping station, main feeder lines to a holding tank, a holding tank, and a distribution system. The current estimate is $2,100 based on a total project cost of $2,500,000. At the meeting, Mr. Lecompte (Engineers for the Limoges Water and Sewage Project) stated that the $2,500,000 included approximately $500,000 for " oversizing " in the Limoges Project to accommodate the Forest Park Project. The $2,000,000 or $1,750 per household for only a main feeder line appears high even given the ten year span from the previous Forest Park project. I'm also concerned with the estimate for oversizing and it's potential for Limoges further expansion at no cost.

(b) Baselining - We were told that the above oversizing was based on incremental costing. Is the estimate a detail baseline (budget) of costs? Will it be sufficent to monitor and allocate costs to their respective projects regardless of any cost overruns/savings etc? If any savings occur because of the dual projects, in particular with the main line digging (water-Forest Park and Sewage - Limgoes) right of way costs etc., will Forest Park receive a fair portion of those savings?

(2) Boundaries of Forest Park

The provided map of the project includes land on lot 30, both on the north and south side of Route 600. I'm not aware of this land presently being hooked up to the Forest Park system. Is this something new? If so, then these lots should be considered an enlargement to the distribution system and not part of the main line system and segregated as such in the cost estimates.

Eldon Findlay
August 3/95

Municipalité du Canton de Cambridge
Corporation of the Township of Cambridge

958 West Route 500 Ouest,
R.R. 3, Casselman, Ontario K0A 1M0

Tel: (613) 764-5444
Fax: (613) 764-3310

CLASS ENVIRONMENTAL ASSESSMENT

INFORMATION SESSION AND PUBLIC MEETING
ON JULY 19, 1995

WATER SUPPLY STUDY
FOR THE
COMMUNITY OF FOREST PARK
PHASES 1 AND 2

Please provide to the Township of Cambridge prior to August 4, 1995 any comments or concerns you may have on any aspect of the proposed Project. Your comments are important and appreciated.

NAME : PETER THOMP-LEVITT

MAILING ADDRESS : 11 MANITOU ST
FOREST PARK

COMMENTS :

I feel strongly that building lots currently approved, which could be hooked up to the new water system, should be billed at the same time as the rest of Forest Park

Use other side if required

McNEELY
ENGINEERING
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[illegible] Orleans, Ontario K1C 1T1
(613) 830-[illegible] Fax (613) 830-7506

Reçu le - 3 AOUT 1995

Corporation of the Township of Cambridge
958 West Route 500 Ouest,
R.R. 3, Casselman, Ontario K0A 1M0
Tél.: (613) 764-5444
Fax (613) 764-3310

CLASS ENVIRONMENTAL ASSESSMENT

INFORMATION SESSION AND PUBLIC MEETING
ON JULY 19, 1995

WATER SUPPLY STUDY
FOR THE
COMMUNITY OF FOREST PARK
PHASES 1 AND 2

Please provide to the Township of Cambridge prior to August 4, 1995 any comments or concerns you may have on any aspect of the proposed Project. Your comments are important and appreciated.

NAME: Peter Janeck

MAILING ADDRESS: 141 Maple Grove, Forest Park, Embrun P.O., Ont. K0A 1W0

COMMENTS:

The 70 approved building lots should be included in the assessment for at least two reasons :

1) with an assured source of safe, drinkable water, the lots will be easier to sell and at better prices, thereby benefiting the owners.
2) the cost for resident taxpayers would be reduced, many of whom may still be paying off the present system.

$ 2,100 would be a financial hardship for many residents, even if spread out.

QUESTION : has consideration been given to an additional assessment if any duplexes will be built on the approved lots ?

McNeely's (Fernand Dicaire) presentation was very professional, far superior to one on the sewage system for Limoges.

Thank you for your consideration.

Use other side if required

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CONSULTANTS LTD.

August 11, 1995
File Ref: M-2963-011

Eldon Findlay
121 Maple Grove
Embrun, Ontario
K0A 1W0

Reference: Township of Cambridge
Forest Park Water Supply Study
Class Environmental Assessment

Dear Sir,

On behalf of the Township of Cambridge, we like to thank you for attending Phase 1 and 2 public meeting and providing your comments. After consultation with Township Council we are pleased to respond to your concerns:

A) Comparing construction cost of existing Forest Park water works and estimate for the proposed works, we would like to note the following factors that contribute to the perceived costs difference:

- Bigger size of proposed transmission line (200 mm dia. versus 150 mm for existing distribution pipes).
- Linear length of proposed line is about 5600 m, about 900 m more than existing distribution lines.
- Buying of easement.
- Upgrading of existing pumphouse.
- Flushing of existing watermain
- Crossing of Hwy #417.
- Treatment of groundwater supply.
- Inflation factor about 1.76 or 176% between 1982 and 1995.

Detail cost estimate will be presented during the Phase 3 public meeting.

B) Before construction of Limoges works, a detailed agreement providing formula for costs sharing between Limoges and Forest Park, separate contract will be called for raw watermain construction of common works like well treatment plant.

After construction, once final cost of the projects are known, the costs will be shared as per agreement.

Any cost resulting from two projects going together will be reflected in construction costs benefitting both projects equally.

.../2

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C) Provision of the water distribution lines to the houses on both sides of Route 600 is not part of this project and is not included in the cost estimates.

We trust that this letter responds fully to your concerns at the present time. Please attend the Phase 3 public meeting planned for August 15, 1995 (see enclosed notice) to obtain further information. Thank you again for your comments.

Yours very truly,

McNeely Engineering Consultants Ltd.

M. J. Zagorski

MJZ/

M.J. Zagorski, P.Eng.
Project Manager

cc: Roger Brunette, Twp of Cambridge

LETTERS.95\M2963AUG.95(sg)

McNEELY
ENGINEERING
CONSULTANTS LTD.

August 11, 1995
File Ref: M-2963-011

Mr. Peter Thorp-Lewitt
11 Manitou Street
Embrun, Ontario
K0A 1W0

Reference: Township of Cambridge
Forest Park Water Supply Study
Class Environmental Assessment

Dear Sir,

On behalf of the Township of Cambridge, we would like to thank you for attending Phase 1 and 2 meeting and we are responding to your comments.

Township Council has endorsed resolution to include 40 approved building lots in the cost apportionment scenario. The remaining 30 lots were not approved for development in the recently completed local improvement report being to expensive for development in the foreseeable future.

We trust that this letter responds fully to your concerns at the present time. Please attend the Phase 3 public meeting planned for August 15, 1995 (see enclosed notice) to obtain further information. Thank you again for your comments.

Yours very truly,

McNeely Engineering Consultants Ltd.

M. J. Zagorski

MJZ/

M.J. Zagorski, P.Eng.
Project Manager

cc: Roger Brunette, Twp of Cambridge

LETTERS.95\M2963AUG.95(tn)

880 Taylor Creek Drive, Orleans, Ontario K1C 1T1
(613) 830-7500 Fax (613) 830-7506

TOWNSHIP OF CAMBRIDGE
CLASS ENVIRONMENTAL ASSESSMENT
WATER SUPPLY STUDY
FOR THE
COMMUNITY OF FOREST PARK

NOTICE OF PUBLIC MEETING

Recent water supply studies for the Community Forest Park have now been concluded. Based on the results of these studies, the Township of Cambridge is considering obtaining water from the proposed communal water system in the Village of Limoges as a solution to correct water quality problems with the existing Forest Park supply system and to allow for future housing development in the community.

This project is being planned as a Schedule C project under the Class Environmental Assessment for Municipal Water and Wastewater Projects. A public meeting is planned to provide further information to the public on the proposal and to receive input and comment from the interested persons.

Public Meeting : 7:30 pm
Tuesday, August 15, 1995

Limoges Community Center
171 Mabel Street, Limoges

Following the public meeting further comments are invited, for incorporation into the planning and design of this project , and will be received until August 25, 1995.

Subject to comments received as a result of this Notice, the Township plans to instruct the consultant to proceed with the planning for this project and an Environmental Study Report will be prepared and placed on the public record.

For future information or to submit written comments, please contact:

Mr. Fernand Dicaire
McNeely Engineering Consultants Ltd.
880 Taylor Creek Drive
Orleans, Ontario
K1C 1T1

Tel: (613) 830 - 7500
Fax: (613) 830 - 7506

Mr. Roger Brunette
Township of Cambridge
958 West Route 500, R.R.3
Casselman, Ontario
K0A 1M0

Tel: (613) 764 - 5444
Fax: (613) 764 - 3310

This notice is issued on August 9, 1995.

McNEELY
ENGINEERING
CONSULTANTS LTD.

August 11, 1995
File Ref: M-2963-011

Catherine J. Khan
129 Maple Grove Street
Embrun, Ontario
K0A 1M0

Reference: Township of Cambridge
Forest Park Water Supply Study
Class Environmental Assessment

Dear Madame,

On behalf of the Township of Cambridge, we like to thank you for attending Phase 1 and 2 public meeting and providing your comments. After consultation with Township Council we are pleased to respond to your concerns;

- Both Limoges and Forest Park projects will be done in the same time subject to approval of provincial funding.

- An "area type" water supply system covering the Townships of Clarence, Russell and Cambridge was already studied by the MOEE via a J.L. Richard report, however existing population density in the Townships and locations of affected communities makes this alternative too expensive to implement in the foreseeable future.

- According to Lecompte Engineering Ltd. a groundwater source from the Sarsfield Esker is a recommended source of supply for the Village of Limoges. Sufficient quantity of water was found in the Esker to provide water for the 20 year design period. In general, the water quality meets the Ontario Drinking Water Objectives, however, a number of aesthetic parameters are exceeded. To reduce those parameters below ODWO, a chemical injection system followed by filtration is proposed. Design criteria for the parameters requiring treatment are higher than the levels measured in the raw water to provide a safety margin should groundwater quality deteriorate over time.

- Council has endorsed a resolution to include 40 approved building lots in the cost apportionment scenario. The remaining 30 lots were not approved for development in the recently completed local improvement report being too expensive for development in the foreseeable future.

.../2

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(613) 830-7500 Fax (613) 830-7506

- Application for provincial funding to correct existing water quality problem in the community of Forest Park was made as early as the beginning of 1990. However, funding to commence the study was only approved in September 1993, resulting in a 3 year delay. Provincial subsidy of 85% will be applied for, however, if lower subsidy will be granted the Township cannot make a commitment to cover the difference.

- The proposed Limoges water works will be oversized to accommodate Forest Park. Therefore, the Forest Park will be guaranteed the required quantity of water to satisfy a 20 year design maximum day consumption.

- The water from Limoges will be pumped directly to the existing Forest park storage reservoir the same way as is delivered now. The pressure in the distribution system is currently maintained by Forest Park pumphouse and the same arrangement will be kept therefore water pressure at Forest Park will not change.

- The estimated prices for the Forest Park already reflect the fact that Limoges and Forest Park project will go for construction at the same time.

- If Limoges project will proceed first the easement for Forest Park will have to be pre-purchased, therefore the Forest Park share of easement costs will have to be refunded to Limoges. It should be noted however that the cost of the easement is insignificant in comparison to the global cost of the project.

We trust that this letter responds fully to your concerns at the present time. Please attend the Phase 3 public meeting planned for August 15, 1995 (see enclosed notice) to obtain further information. Thank you again for your comments.

Yours very truly,

McNeely Engineering Consultants Ltd.

M.J. Zagorski

MJZ/

M.J. Zagorski, P.Eng.
Project Manager

cc: Roger Brunette, Twp of Cambridge

LETTERS.95\M2963AUG.95(tn)

McNEELY
ENGINEERING
CONSULTANTS LTD.

August 11, 1995
File Ref: M-2963-011

Prescott-Russell County Board of Education
411 Stanley Street
Hawkesbury, Ontario
K6A 3E8

Attention: Mr. Hider

Reference: Township of Cambridge
Forest Park Water Supply Study

Dear Sir,

Responding to your question regarding formula to establish household equivalent for Cambridge Elementary Public School to determine allocation of capital cost charges, we are providing you with following formula:

- Equivalent school population is calculated as follows:

  361 x 70 L/cap.day / 365 L/cap.day = 70

  Where:
  361 - Present school population including students and staff.
  70 L/cap.day - Minimum water usage per student per day as indicated in the Ministry of the Environment and Energy (MOEE) Guidelines (see attachement).
  365 L/cap.day - Residential water usage rate per person per day as per MOEE Guidelines.
  70 - Equivalent residential population.

- Equivalent number of households:

  70 persons/3.5 persons/household = 20 households
  70 persons - Equivalent school population.
  3.5 persons/household - Average occupancy rate per household.
  20 - Equivalent number of households.

.../2

880 Taylor Creek Drive, Orleans, Ontario K1C 1T1
(613) 830-7500 Fax (613) 830-7506

McNEELY
ENGINEERING
CONSULTANTS LTD.

We trust that you will concur with the above method of calculation for a school portion of capital works share (equivalent of 20 households). However, should you have any questions or require more information, please do not hesitate to contact our office or the Township of Cambridge.

Yours very truly,

McNeely Engineering Consultants Ltd.

M. J. Zagorski

M.J. Zagorski, P.Eng.
Project Manager

MJZ/

cc: Roger Brunette, Twp of Cambridge

LETTERS.95\M2963AUG.95(sg)

2.1.1.2 Commercial and Institutional Water Demands

Par 1 The water demands for commercial and institutional establishments vary greatly with the type of water-using facilities present in the development, the population using the facilities, the presence of metering, etc.

Par 2 Institutional flows should be computed in each individual case based on historical records, where available. Where no records are available, the unit values below should be used. For commercial and tourist-commercial areas, an allowance of 28 m^3/ha.d average flow should be used in the absence of reliable flow data.

Par 3 For individual commercial and institutional uses, the following unit water demands are commonly used.

	Water Usage (Avg. Daily)
Shopping Centres	- 2500-5000 L/1000 m^2.day (based on total floor area)
Hospitals	- 900-1800 L/bed.day
Schools	- 70-140 L/student.day
Travel Trailer Parks	- 340 L/space. day (minimum without individual hook-ups)
	- 800 L/space. day (minimum with individual hook-ups)

McNEELY
ENGINEERING
CONSULTANTS LTD.

August 11, 1995
File Ref: M-2963-011

Mr. Peter Janeck
141 Maple Grove Street
Embrun, Ontario
K0A 1W0

Reference: Township of Cambridge
Forest Park Water Supply Study
Class Environmental Assessment

Dear Sir,

On behalf of the Township of Cambridge, we would like to thank you for attending Phase 1 and 2 meeting and we are responding to your comments.

Township Council has endorsed resolution to include 40 approved building lots in the cost apportionment scenario. The remaining 30 lots were not approved for development in the recently completed local improvement report being to expensive for development in the foreseeable future.

If duplexes are going to be built on approved lots they will be assessed at a doubled rate.

We trust that this letter responds fully to your concerns at the present time. Please attend the Phase 3 public meeting planned for August 15, 1995 (see enclosed notice) to obtain further information. Thank you again for your comments.

Yours very truly,

McNeely Engineering Consultants Ltd.

M.J. Zagorski

MJZ/

M.J. Zagorski, P.Eng.
Project Manager

cc: Roger Brunette, Twp of Cambridge

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(613) 830-7500 Fax (613) 830-7506

Municipalité du Canton de Cambridge
Corporation of the Township of Cambridge

958 West Route 500 Ouest,
R.R. 3, Casselman, Ontario KOA 1MO

Tél. (613) 764-5444
Fax (613) 764-3310

CLASS ENVIRONMENTAL ASSESSMENT

PUBLIC MEETING ON AUGUST 15, 1995

WATER SUPPLY STUDY
FOR THE
COMMUNITY OF FOREST PARK
PHASE 3

Please provide to the Township of Cambridge prior to August 25, 1995 any further comments or concerns you may have on any aspect of the proposed Project. Your comments are important and appreciated.

NAME: Mr Mervin Heide

MAILING ADDRESS: 109 Maple Grove, Forest Park, Ontario
KOA 1WO

COMMENTS:

In reference to the public meeting held in Limoges on August 15, 1995 regarding the water supply study for the Community of Forest Park, I reiterate in writing, as suggested by Cambridge Township Reeve, the township councillors and Mr Dicaire of McNeely Engineering Consultants Ltd, the request I made at the meeting, which is as follows:

Since the Eastern Ontario Health Unit in Cornwall insisted that the septic tank/bed be moved from lot 109 to lot *Use other side if required ....*

Name: Mr Mervin Heide
104 - Maple Grove
Forest Park, ~~Ont~~ Ontario
K0A 1W0

113, several years ago, it has rendered my second lot (lot 113) unsuitable for future development. I hereby request that I ~~be~~ be exempt from the proposed additional lot fee which is being charged to owners of undeveloped lots in Forest Park.

M.D. Heide

Municipalité du Canton de Cambridge
Corporation of the Township of Cambridge

958 West Route 500 Ouest, RR 2, Casselman, Ontario K0A 1M0
Tel (613) 764-5444
Fax (613) 764-3310

CLASS ENVIRONMENTAL ASSESSMENT

PUBLIC MEETING ON AUGUST 15, 1995

**WATER SUPPLY STUDY
FOR THE
COMMUNITY OF FOREST PARK
PHASE 3**

Please provide to the Township of Cambridge prior to August 25, 1995 any further comments or concerns you may have on any aspect of the proposed Project. Your comments are important and appreciated.

NAME: MR MERVIN HEIDE

MAILING ADDRESS: 109 MAPLE GROVE, FOREST PARK,
EMBRUN ONT. K0A 1W0

COMMENTS:

In reference to the public meeting held in Limoges on Aug 15,1995 regarding the Water Supply Study for the Community of Forest Park, I wish to pass on the comments and suggestions that were made in my presence just after the meeting was adjourned, which I feel were worthwhile and should be thoroughly investigated and followed up before any further steps are taken to go ahead with existing proposals. They basically were as follows:

(1) Since Casselman has an ample water supply which was apparently originally designed to also serve the Town of Embrun at that time (Embrun has since obtained it's own water supply) it has the capacity to supply Forest Park and Limoges with water at a cost that would be substantially lower than the existing proposal, as the wells and treatment plant already exist in Casselman and all that is needed is a pump and a pipeline to Forest Park and Limoges.

(2) Since a new water supply will fix the problems of the limited number of wells which are being contaminated by septic tanks/beds on individual properties in Limoges, there will be no need to upgrade all of the sewer systems in Limoges at this time. This would only be an added cost to all homeowners, many of whom

Use other side if required ....

from: Mr Heide
109 Maple Grove, Forest Park, K0A 1W0

are Senior Citizens on fixed incomes. Some of these people fear that they will be forced out of their own homes because they cannot afford to pay the astronomical additional costs per household in addition to a new water supply, which will be imposed upon them all at once, whether they need it or not.

However, if the authorities continue to insist on upgrading sewers, regardless of the fact that many septic tanks/beds are creating no problems, it would be less expensive for them to give homeowners who are experiencing contamination problems a grant or loan to fix their existing dysfunctional septic systems on an individual basis, as needed. This would be more acceptable than the proposed new sewer system for the entire town of Limoges for the following reasons:

(a) it would eliminate the need for a lagoon to be situated near Forest Park (nearly six miles from Limoges) which in itself imposes questionable environmental concerns. In addition, there is already a foul odor emitted from existing lagoons in the general vicinity, which drastically spoils the air quality for days at a time, especially in the Spring and on days when the wind and/or the humidity creates the right conditions for this to happen.

(b) it would substantially reduce the overall costs, especially when governments are trying to cut back and these economic times are so tough for most everyone (who can afford to have an average additional cost of $10,000 or more added to their household expenses?)

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August 30, 1995
File Ref: M-2963-011

Mr. Mervin Heide
109 Maple Grove
Forest Park
Embrun, ON K0A 1W0

Reference: **Township of Cambridge**
Forest Park Water Supply Study
Class Environmental Assessment

Dear Mr. Heide:

We are writing on behalf of the Township of Cambridge to thank you for attending the Phase 3 meeting for this project and to respond to your comments arising from the meeting.

1. Request for Exemption on Lot 113

Your request to be exempted for assessment of costs on Lot 113 will be considered during the preparation of the detailed assessment schedule and associated by-laws. We will keep you informed of our progress on this work.

2. Casselman Water Supply

The Casselman water treatment plant is designed to serve a population of 3,500 persons. The existing population of Casselman is approaching 3,000 persons. At times of the year, the plant has some difficulties in even serving the current population and studies are underway to examine this situation. Without a major expansion to this plant, there is insufficient capacity to serve the needs of Forest Park and Limoges. In addition, a feedermain of approximately 15 km would be required between Limoges and Casselman for this solution. We do not consider this to be a viable solution for Forest Park.

3. Limoges Sewage System

We cannot comment on the Limoges sewage system since we have no involvement with the study.

.../2

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We trust this response is satisfactory to you. If, however, you have additional questions or should you wish to discuss the issues further, please contact us.

Yours very truly,

McNeely Engineering Consultants Ltd.

MJZ/ for/ M.J. Zagorski, P.Eng.
Project Manager

c.c.: Township of Cambridge
Attn: Mr. R. Brunette

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Municipalité du Canton de Cambridge
Corporation of the Township of Cambridge

958 West Route 500 Ouest,
R.R. 3, Casselman, Ontario K0A 1M0

Tél.: (613) 764-5444
Fax: (613) 764-3310

CLASS ENVIRONMENTAL ASSESSMENT

PUBLIC MEETING ON AUGUST 15, 1995

WATER SUPPLY STUDY
FOR THE
COMMUNITY OF FOREST PARK
PHASE 3

Please provide to the Township of Cambridge prior to August 25, 1995 any further comments or concerns you may have on any aspect of the proposed Project. Your comments are important and appreciated.

NAME: Peter Janeck

MAILING ADDRESS: 141 Maple Grove, Forest Park, Embrun P.O., Ont. K0A 1W0

COMMENTS: & Questions :

1) What are the details of the water analysis from the new source, e.g. content of iron, sodium, phosphate, chloride, alumina, heavy metals, etc. (I'm not just looking for assurance that the water meets Ministry guidelines)

2) Will the water be fluoride treated ?

3) Will the water prsssure in Forest Park be the same as now, and if so, for how many years, based on possible depletion of aquifer & on projected new users in the areas ?

4) How will the actual cost of the water meters themselves be handled ? Paid out of general revenue or chraged individually, and if the latter, how much & when ?

5) Has any thought been given to extend the water system to the Montée Lebrun area, especially in view of the fact they are on wells now & the proposed lagoon may sooner or later cause contamination problems. Have the wells been tested recently there for any contamination from the septic beds &?.

Again, the Engineers came very well prepared for the last meeting also & made another very good presentation.

Thank you for your time.

Use other side if required ....

McNEELY ENGINEERING CONSULTANTS LTD.

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McNEELY
ENGINEERING
CONSULTANTS LTD.

August 30, 1995
File Ref: M-2963-011

Mr. Peter Janeck
141 Maple Grove Street
Embrun, Ontario
K0A 1W0

Reference: Township of Cambridge
Forest Park Water Supply Study
Class Environmental Assessment

Dear Mr. Janeck,

We are writing on behalf of the Township of Cambridge to respond to your comments submitted after the Phase 3 meeting for the above project.

- Regarding the details of the water analysis from Limoges supply source please find attached a copy of Table 5.1 from the Lecompte Engineering Ltd. Phase 3 Class EA Report summarizing water quality and treatment options.

- According to the above mentioned report the fluoride will be added to the supplied water for dental health considerations.

- Due to the fact that the water from Limoges will be pumped directly to the existing storage reservoir and that the existing high lift pumps arrangement to provide pressure is being kept, the water pressure in the Forest Park community will stay the same.

  A groundwater source employing the Sarsfield Esker was a recommended source of supply for the Village of Limoges. A hydrogeological investigation of this Esker was carried out by Golder Associates to determine the quality and quantity of the water. Sufficient quantity of water was found in the Esker to provide required amount of water for the 20 year design period. A copy of the report can be found in the recently completed Lecompte Engineering Ltd. Environmental Study Report (ESR) for Village of Limoges Communal Water and Sewer Systems.

- Water meters are part of the proposed works and installation costs (estimated at $250 per household) are subject to OCWA subsidy. The remaining portion will be included in assessment of charges to individual home owners.

.../2

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- We have not considered extension of the water system to the Montée Lebrun area. It was not part of our study. Concerns regarding the proposed sewage lagoon shall be directed to the Township of Cambridge or Lecompte Engineering Ltd.

We appreciate very much your comment regarding our Phase 3 meeting presentation and trust that the above response satisfactorily addresses your concerns. However, should you have any additional questions or wish to discuss the issue further please contact our office.

Yours very truly,

McNeely Engineering Consultants Ltd.

M. J. Zagorski

M.J. Zagorski, P.Eng.
Project Manager

MJZ/

cc: Township of Cambridge
Attn: Mr. R. Brunette

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Table 5.1
Summary of Treatment Options

Parameter	Raw Water Concentration	Design Concentration	Ontario Drinking Water Objectives	Proposed Treatment*
Iron	0.61 mg/L	2.5 mg/L	0.30 mg/L	G.S.F.
Manganese	0.13 mg/L	0.35 mg/L	0.05 mg/L	G.S.F.
Organic Nitrogen	0.24 mg/L	0.24 mg/L	0.15 mg/L	Alum feed + G.S.F.
Dissolved Organic Carbon	4.8 mg/L	4.8 mg/L	5.0 mg/L	Alum feed + G.S.F.
THM Formation Potential	0.176 mg/L	0.176 mg/L	0.100 mg/L *	Alum feed + G.S.F.
Methane	2.7 L/m^3	3.0 L/m^3	3.0 L/m^3	Tray aerator
H_2S	0.04 mg/L	0.05 mg/L	0.05 mg/L	Tray aerator + oxidation
Colour	38 TCU	-	5 TCU	See above ***
Turbidity	5 NTU	5 NTU	1 NTU	See above ***
pH	7.85	-	6.5-8.5	-
Alkalinity	186 mg/L	-	30-500 mg/L	-

* G.S.F. = Greensand Filtration

** Revised standard to come

*** Colour and turbidity are caused by iron, manganese and organic matter.

APPENDIX G

JACQUES WHITFORD HYDROGEOLOGICAL REPORT

MCNEELY ENGINEERING
CONSULTANTS LIMITED
HYDROGEOLOGICAL ASSESSMENT
COMMUNAL WATER SUPPLY
COMMUNITY OF FOREST PARK

PROJECT NO. 30340

Consulting Engi...
Environmental S...

Dartmouth, NS
Sydney, NS
Port Hawkesbury, NS
Saint John, NB
Fredericton, NB
Moncton, NB
Bathurst, NB
Charlottetown, PE
St. John's, NF
Corner Brook, NF
Hull, PQ
Ottawa, ON
Toronto, ON
Calgary, AB
Portland, ME

December 16, 1994 File No. 30340

Mr. Fernand Dicaire, CET
McNeely Engineering Consultants Limited
880 Taylor Creek Drive
Orléans, ON K1C 1T1

Dear Mr. Dicaire:

Re: Hydrogeological Assessment
Communal Water Supply
Community of Forest Park

We are pleased to submit our final report on the hydrogeological investigations carried out to identify a groundwater source for the communal water supply for Forest Park. We would like to thank both McNeely Engineering Consultants Ltd. and the Township of Cambridge for the opportunity of providing this service.

We trust that you will find this report both concise and complete. However, if you have any questions, please do not hesitate to contact the undersigned.

Yours truly,

JACQUES WHITFORD ENVIRONMENT LIMITED

Stephen J. Livingstone, M.Sc.
Project Manager

PROJECT NO. 30340

REPORT TO

MCNEELY ENGINEERING CONSULTANTS LIMITED

ON

HYDROGEOLOGICAL ASSESSMENT
COMMUNAL WATER SUPPLY
COMMUNITY OF FOREST PARK

Jacques Whitford Environment Limited
2781 Lancaster Road
Suite 200
Ottawa, ON K1B 1A7
Tel: (613) 738-0708
Fax: (613) 738-0721

December 16, 1994

EXECUTIVE SUMMARY

This report presents the results of hydrogeological investigations that were carried out to identify and assess a groundwater source for a communal water supply for the community of Forest Park in the Township of Cambridge.

The candidate area for the water supply investigations was chosen on the basis of local knowledge of water resources and a review of available geologic and hydrogeologic information. The candidate area is generally within 3 km of the community of Forest Park. Within the candidate area a number of target areas were delineated for test drilling. The target areas which lie north and south of Route 400 and east of Road 5 were chosen sequentially on the basis of the results of the prior field work. The field program comprised, a walk over reconnaissance of the area, a VLF (very low frequency) geophysical survey, a residential well survey along Route 400, drilling nine test wells, a 24 hour pump test on each of TW-5 and TW-7, and a 72 hour pump test on TW-9 and water sampling at the end of each pump test.

The review of available information, the site reconnaissance and the geophysical survey revealed the presence of three faults in bedrock. Test wells TW-1 to TW-4 were drilled east of County Road 5 and south of Route 400 between a mapped and an unmapped fault. Little or no water was encountered in these wells. Only TW-2 (the most northerly test well of the four) produced water, but the estimated yield was sufficient only for a private residential well. These results led to a survey of all residential wells along Route 400 and Road 5 to identify a second target area for exploration in the vicinity of the bedrock faults. The well survey suggested that good quality water of sufficient quantity might be found in bedrock approximately 700 m east of Road 5 along Route 400.

Two test wells, TW-5 and TW-6 were drilled south of Route 400. TW-5 exhibited a higher potential yield than TW-6 during the test drilling and was tested. The results of the test on TW-5 were encouraging but the calculated long term yield of this well was too low to consider this part of the aquifer for a communal well. Further study and analysis of conditions in the area pointed to the exploration work further north of TW-5 and TW-6 on the south side of Route 400. Three other test wells were drilled in proximity to one another in this area on property owned by Mr. Y.K. Sum. All three wells encountered water in shallow bedrock, in fractures zones likely associated with northeast - southwest striking faults in bedrock. TW-7 was pumped for 15 hours and TW-9 which was constructed to be potentially a 254 mm diameter production well was pumped for 72 hours. TW-9 was pumped for a significant period of time (in comparison to TW-7 pumping test) to simulate longer term pumping conditions and aquifer responses. These two pumping tests, which were carried out at different times, suggest that the shallow bedrock aquifer has a transmissivity on the order of 40 m^2/day and a potential 20 year safe yield on the order of 260 m^3/day (40 igpm). The 20 year safe yield calculation assumes no recharge of the aquifer. This is a conservative assumption based on an analysis of the drawdown curves for the pumping wells and observation wells. The more likely scenario is there will be recharge. Hence, higher yields on the order of 390 m^3/day (60 igpm) are likely possible for one well based on an available drawdown of approximately 9.0 m. The pumping tests on TW-9 at a rate of 260 m^3/day (40 igpm) showed drawdown effects in the order of 4 to 5 m within a distance of 200 m of the pumping well. The drawdown occurred preferentially along the northeast - southwest fault/fracture zone.

The results of water quality analysis of samples taken near the end of the pumping tests on TW-7 and TW-9 suggest no major treatment requirements. The analyses show that the quality of water encountered in the shallow bedrock aquifer meets Ontario Drinking Water Objectives except for colour. The maximum desirable limit of colour is 5 TCU. Field measurements using a photospectrometer indicated 18 TCU. The reason for the high colour value is not clear. The observed colour values may be an issue with the MOEE and therefore further study into the reasons for the high colour value is recommended.

In conclusion, the hydrogeological investigations reported herein have demonstrated that there is a good quality water resource near Route 400 that is capable of producing on the order of 390 m^3/day (60 igpm) from one well. To develop a communal water supply in the shallow bedrock aquifer in the area north of Route 400 a minimum of three wells will be required to meet a demand of 850 m^3/day (130 igpm). These wells should be spaced approximately 200 m apart to reduce interference effects and maximize the available drawdown.

The additional production wells should be located ideally northeast and/or west of TW-9 in proximity of the mapped faults. The locations of the production wells should be optimized in order to minimize interference effects between production wells and the nearby residential wells. A multi-well pumping test is recommended to determine potential interference effects and the optimal pumping rate for the production wells. Interim and long-term water level monitoring of residential wells in the area is recommended.

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APPENDICES

APPENDIX 1

DRAWINGS

1.0 INTRODUCTION

1.1 Purpose

In July of 1993, Jacques Whitford Environment Limited (JWEL) was retained by McNeely Engineering Consultants Limited (MECL) on behalf of the Township of Cambridge to carry out the hydrogeologic investigations necessary to locate an alternative groundwater supply for the community of Forest Park, in the Township of Cambridge. The location of Forest Park is shown on Drawing 30340-101 provided in Appendix 1.

Hydrogeological investigations have been initiated by the Township because the existing water supply at Forest Park has excessive concentrations of dissolved solids (mainly salt) which are increasing with time. The hydrogeological investigations are one element of the studies which MECL are undertaking in relation to the Class Environmental Assessment (Class EA) for a Municipal Water Supply for Forest Park. It is understood that the Class EA is proceeding in accordance with the June 1993 publication of the Municipal Engineers Association. This report will be incorporated into the Phase 2 of the process which involves identifying alternative solutions to the problem. A communal water supply from a groundwater resource is one potential solution. JWEL were retained to assess this potential solution.

1.2 Background

In this portion of Southeastern Ontario, groundwater resources capable of supplying communities are generally obtained from either large fractures or faults in bedrock or highly transmissive overburden units such as sand and gravel glacial outwash. A review of the available hydrogeological and geological information revealed that thick sand and gravel deposits capable of providing a good quality communal water supply are not present within a reasonable distance of the community of Forest Park. Therefore, the hydrogeological investigation was directed towards finding, areas where bedrock is likely to be fractured and/or contain faults and hence inferred to be water bearing. Once these areas were identified, target areas for test holes were identified and well drilling was initiated. Where the well drilling program suggested a good source for a communal well, pumping tests in wells completed in the aquifer were carried out and water samples were taken for chemical analysis. The approach followed in this hydrogeological investigation is described in detail in Section 2.0 of this report.

At the outset of the investigation a candidate area was suggested by the Township and MECL for exploration. The area suggested was in the northern portion of Lot 30, Concession 5 (near Route 400). JWEL reviewed the available geological and hydrogeological information and concurred with the opinion that Lot 30, Concession 5 in the Township of Cambridge would be a good area in which to start exploration for a communal groundwater supply.

1.3 Water Supply Identification and Assessment Guidelines

The following guidelines were used by JWEL to identify and assess aquifers as a source for a communal water supply for the community of Forest Park.

- The aquifer should be located as close as possible to Forest Park. Ideally the well field should be less than 3 km from the community in order to minimize the cost of the water supply lines.

- The aquifer (well field) should yield the maximum 20 year day demand of 130 igpm that was determined by MECL based on a design population of 850, maximum day factor of 2.75 and a per capita consumption of 365 litres per day.

- The quality of the aquifer should ideally meet Ontario Drinking Water Objectives (ODWO) or should meet ODWO with conventional low cost treatment technologies, if possible.

1.4 Report Organization

The report is organized as follows:

Section 1 (this section) provides a description of the purpose of the hydrogeological assessment and background to it. The guidelines used by JWEL for identification and assessment of groundwater resources as a potential source for a communal water supply are also highlighted.

Section 2 presents an overview description of the approach that JWEL followed to identify and assess aquifers as potential sources.

Section 3 describes in broad terms, the physiography, geology and hydrogeology of the area. The description provided is based on secondary sources of information which JWEL reviewed.

Sections 4 to 8 outline Phases 1 to 4 of the exploration program, respectively. Within these sections there is a description of methodology, results, conclusions and recommendations that arose from the exploration work.

Sections 9 and 10 provide the overall conclusions and recommendation regarding the hydrogeological assessment carried out to identify a communal water supply within the candidate area explored.

Appendices follow the text. Appendices 1 and 2 contain the Drawings and Tables, respectively which support the text of the report. Appendix 3 contains the completed forms for the residential well survey along Route 400. Appendix 4 contains the water well records for test wells TW-1 to TW-9.

Appendices 5, 6 and 7 contain data, graphs, and calculations related to pumping tests carried out in Phases 2, 3 and 4. Appendix 8 contains the laboratory Reports of Analyses for the chemical testing of groundwater.

2.0 APPROACH

The approach followed by JWEL to identify and assess groundwater resources as potential sources of a communal water supply involved a number of steps as discussed below. The results of each step were used to define the work in the next step.

- **Review Available Geological and Hydrogeological Information:**

  The initial task was to review available geological and hydrogeological information and confirm what geological materials and geographic area should be the focus of the exploration work. The information reviewed included:

  - MOE water well records to 1986
  - Published maps prepared by Ontario Geological Survey and the Geological Survey of Canada.
  - Environment Canada publications by E.J. Charron.

  JWEL also consulted with local water well drillers and residents to acquire their first hand knowledge of the groundwater resources in the area.

  The study area for this initial review was within Cambridge Township and east of Road 5, south of the Highway 417, and north of the Castor River (see Drawing 30340-101). As discussed above, the candidate area selected for exploration work was on the northern portion of Lot 30, Concession V, in the Township of Cambridge, near Route 400 (see Drawing 30340-101). This candidate area is generally within 3 km of the community of Forest Park.

  A description of the geologic setting and physiography is contained in Section 3.0. Drawings 30340-102 and 103, illustrate the surficial and bedrock geology in the area, respectively.

Upon completion of the background information review, exploration drilling commenced in the candidate area delineated on Drawing 30340-101. The exploration work was completed in four phases which covered different target areas within the candidate area. The target areas which were the subject of the four phases of exploration are outlined on Drawing 30340-104. The exploration phases involved drilling test wells, pumping tests, water sampling and chemical analysis. Upon completion of Phase 1 of the exploration and prior to further test well drilling, a residential groundwater survey was conducted to help refocus the exploration work and select other potential target areas for drilling. The four phases of exploration drilling and testing and the residential well survey are described briefly below and then expanded upon in Sections 4.0 to 8.0 of the report.

- **Exploration Phase 1 - Drilling of Test Wells:**

  This phase consisted of a geophysical survey to locate faults in the area and drilling four exploration wells (TW-1 to TW-4). Based on the results of that work, a residential groundwater survey was proposed to evaluate potential target areas.

  The results of this Phase 1 of exploration were originally presented to MECL in a letter report dated October 25, 1992. The results and recommendations were also presented to council at a meeting held on October 25, 1992. Council subsequently approved the residential well survey on October 25, 1993.

- **Residential Groundwater Survey:**

  This phase of the work consisted of interviewing over 50 well owners in the area, completing preliminary groundwater chemical tests and short term pump tests on a select number of bedrock wells. The results indicated an area with potential for moderate to high yield wells. A potential target area and two exploration wells were proposed.

  The results of the residential survey and the above recommendations were presented to Council on a meeting held on November 8, 1993, and a letter report was prepared on November 9, 1993. The next phase of exploration was approved in principle by the client on or about November 15, 1993. However, the authorization to proceed with Phase 2 was not received until January 11, 1994.

- **Exploration Phase 2 - Drilling and Pump Test Analysis:**

This phase consisted of deepening TW-4, drilling two exploration wells (TW-5 and TW-6) and pump testing TW-5. Groundwater chemical testing was also completed on TW-5. Based on these results, a new target drilling area on the north side of Route 400 was proposed.

The results of this phase of the work and the above recommendations were presented in a letter report dated February 25, 1994. Authorization to proceed with the next phase of the work was granted on or about May 11, 1994, when property negotiations were concluded.

- **Exploration Phase 3 - Drilling and Pump Test Analysis:**

Two exploration wells (TW-7 and TW-8) were drilled and a pumping test was completed on TW-7. The results of the pumping test and chemical testing were analyzed and a target area for a production well was defined.

The results of Phase 3 of the exploration work were originally presented in a letter report to MECL, dated June 15, 1994. The results and recommendations were also presented at a meeting with Council and the Ontario Clean Water Agency, on June 16, 1994. Approval to proceed with the recommendations was given on June 22, 1994. Because of problems associated with property negotiations and gaining access to the target area for the next well, the comprehensive testing program was delayed until September 13, 1994.

- **Phase 4 - Comprehensive Production Well Drilling and Testing:**

This phase consisted of drilling a production well (TW-9) and carrying out a 72 hour pump test. In addition, groundwater chemical testing was completed. The results of the pumping test and chemical testing are presented in this report.

3.0 GEOLOGIC AND HYDROGEOLOGIC SETTING

3.1 Surficial Geology

The study area as shown on Drawing 30340-101, is located on the Russell and Prescott Sand Plains (Chapman and Putnam,1984) which is an area of generally low relief. This sand deposit is dispersed over the local clay plain and varies in thickness from approximately 3 to 6 m deep. The area is part of the South Nation River Drainage Basin. To the north of the study area surface drainage follows the topography towards the South Indian Creek and local drainage ditches. To the south, the area is drained by the Castor River. The topography of the study area consists of low relief with a gentle bedrock ridge located south of South Indian Creek and Route 400.

The surficial geology, as shown on Drawing 30340-102, consists of deltaic and estuarine deposits of medium to fine grained sand. To the south of the sand deposit, clay and silt material are present which represents marine deposits. This clay and silt material are found beneath the surficial sands in the study area.

3.2 Bedrock Geology

The bedrock formations found in the study area are shown on Drawing 30340-103. To the south of Route 400, the bedrock consists of the Lindsay Formation (Upper-Middle Ordovician) which is a fine to crystalline limestone with thin interbeds of shale. A bedrock outcrop is present in this portion of the study area. To the west and marginally to the north of Route 400, the bedrock consists of the Verulam Formation (Middle Ordovician) which is a interbedded bioclasitic limestone to fine crystalline limestone with shale interbeds. To the north of the study area, the bedrock consists of the Queenston Formation (Upper Ordovician) which is a interbedded siltstone and shale. As shown on Drawing 30340-103, numerous faults have been mapped in the area.

3.3 Hydrogeology

The hydrogeologic conditions in eastern Ontario have been described in broad terms by E.J. Charron in two reports. One report by Charron, published in 1974, is on a regional study of groundwater flow in Russell County. The second report by Charron, published in 1978, is on a hydrochemical study of groundwater flow in the instream area between the Ottawa and the St. Lawrence River. Some general information can be drawn from these studies as highlighted below.

The groundwater flow study of Russell County reveals that in the Forest Park area and surrounding environs there are a considerable number of drilled wells on record. The drilled wells are into limestone, likely of the Oxford Formation. Dug wells are also on record in the Forest Park area as noted on Figure 8 in the 1974 Charron report. The interpreted direction of groundwater flow in the bedrock aquifer as presented by Charron is approximately from southwest to northeast across the study area for this communal well investigation.

Hydrogeochemical maps accompanying the 1974 Charron report suggest that water in bedrock will have the following characteristics:

- Relatively high salt content
- Specific conductance approaching 1500 $\mu S/cm$
- Total hardness ($CaC0_3$) less than 100 ppm
- TDS in the range of 500 to 1000 ppm
- Potentially high H_2S
- SO_4 less than 10.0 ppm.

The quality of water is thus expected to be generally fair with a potential for high salt and H_2S concentrations.

The 1978 report by Charron is on a much broader scale than the 1974 report. The interpreted groundwater flow direction is generally south to north. Mapping also suggests the piezometric level in the bedrock is likely to be in the range of elevation 45 to 70 m above sea level and the depth to the piezometric surface is between 0 and 3 m. Both the 1974 and 1978 Charron reports suggest that the study area is in a transition zone (between groundwater recharge zone and discharge zone) in groundwater flow.

MOEE water well records current to 1986 were acquired for the wells drilled within 3 to 4 km of Forest Park. There were approximately 30 wells on record in the Forest Park area and north along County Road 5. In reality there are many more wells in the study area than this based on the number of residences. One may infer from this that many of the local residents use a shallow well completed in the upper sand deposit which overlies the marine clay in the north half of the study area. The MOEE well records were reviewed for well yield and depth to water. The well yield was found to be between 13 and 975 m^3/day (2 and 150 igpm) and depth to water was in the range of 5 to 31 m in the wells on record north of Forest Park within the study area.

This hydrogeologic information coupled with the geologic conditions leads to the following summary of hydrogeologic conditions.

1. There are potentially two aquifers in the study area: a shallow unconfined overburden aquifer and a confined bedrock aquifer.

2. The nature of the bedrock aquifer is not readily defined by the available data base. It is likely within horizontal fractures in bedrock near the bedrock/overburden interface or there may be a preferential source of groundwater along or adjacent to the mapped faults in the area.

3. There is a clay aquitard separating the bedrock aquifer and shallow overburden aquifer.

4. Recharge to the bedrock aquifer from infiltrating precipitation is expected to be relatively low due to the presence of the clay aquitard. Recharge may be higher in areas of direct infiltration such as bedrock outcrop areas.

5. The shallow aquifer is thin and, is susceptible to contamination from surface and subsurface activities by residents. Therefore, it would likely not supply adequate quantities of good quality water for a communal supply.

6. A deep aquifer in bedrock should be sought for a potential communal supply.

4.0 EXPLORATION PHASE 1 - DRILLING OF TEST WELLS

4.1 Geophysical Survey

JWEL carried out a geophysical survey in September 1993 to locate geological faults which are indicated in the study area on geological maps. The survey involved running 15 geophysical survey lines using a VLF (very low frequency) receiver in the northern part of Lot 30 Concession 5 and the southern part of Lot 30, Concession 4. The results of the geophysical survey are shown on Drawing 30340-105.

Two faults are mapped in the northern portion of Lot 30, Concession 5 and the southern portion of Lot 30, Concession 4 (Drawing 30340-105). Both faults were extensively investigated using VLF but strong anomalies were not detected for the northern fault. Near the mapped location of the southern fault, a weak but persistent anomaly was detected. This formed a linear zone which, when extended, passed very close to areas to the north and south where wells are understood to have moderate to good yields in bedrock. The anomaly is approximately 50 m in width. Fault zones in the Ottawa area generally range between 15 and 50 m in width but can be wider or narrower depending upon the magnitude of the fault. These results were used to chose target areas for test drilling.

4.2 Test Well Drilling Program (TW-1 to TW-4)

A total of four holes were drilled between September 28 and October 20 1993 in this phase of exploration. Water well records for these test wells are contained in Appendix 4. The first two wells drilled (TW-1 and TW-2) yielded disappointing results with respect to water supply as discussed below. Because of these results, Dr. Fred Michel, a hydrogeological professor at Carleton University and an expert in the hydrogeology of faults in the Ottawa Valley was consulted to assist in the search for an aquifer. The latter two holes were drilled because the first two were unsuccessful in locating sufficient water to warrant a pumping test.

Target areas for drilling were selected one at a time with the results of the last hole taken into consideration during the selection procedure. TW-1, TW-3 and TW-4 were drilled using an air rotary rig and a 150 mm (6") diameter bit. These three wells are located on the property of Mr. Germain Lapalme. Two probe holes on this property were also drilled to locate a fault.

TW-2 was also a 150 mm diameter well but was drilled with a cable tool drilling rig because of access constraints. Access problems were encountered at the site of TW-2, which is owned by Mr. Vincent Forget, and a bulldozer was required to help the drilling rig into and out of the site. The particulars of each well and the circumstances leading to the drilling of each are described below.

Test Well 1

Prior to the drilling of the first well, the existing information was reviewed to check for the presence of either mapped geological faults in bedrock, or surficial deposits which may be good exploration targets. It was determined that there are no mapped overburden units within a reasonable distance which would have a high probability of providing adequate quantities of groundwater for a communal well system. There are, however, numerous geological faults mapped as existing in the vicinity of Forest Park and it is possible that the current water supply for the community taps a fault.

As stated above, an area thought to be a good candidate area for exploration before the hydrogeological investigation began, was the northern part of Lot 30, Concession 5. No mapped faults existed on this land but a bedrock ridge suggested that an unmapped one may exist. Within this area the right to drill on land owned by Mr. Lapalme was acquired and exploration began on September 28, 1993.

TW-1 was drilled on the north side of the bedrock ridge (Drawing 30340-104) approximately the same distance from the ridge as a moderately highly producing communal well located 500 m to the southwest on Road No. 5. TW-1 was located here with the hope that it would encounter the same (unmapped) structure that the communal well to the southwest had encountered. Bedrock was encountered at a depth of 2.4 m and the well was drilled to a depth of 36.6 m. No water was encountered despite the proximity (30 m) from an inundated bedrock quarry.

Test Well 2

A site was selected near the western edge of the anomaly, as close as possible to the three geophysical lines where it was detected. The area was difficult to access and required a backhoe to clear a path and a bulldozer to help the drill rig into the site. A cable tool rig was used because it was much easier to get into the site than a water well rig would have been.

On October 13, 1993 the well was drilled. Bedrock was encountered at 13.4 m and water was encountered at a fairly shallow depth below this. The well was drilled to 25.0 m and produced a yield of 6 igpm. This yield would be sufficient for a domestic water supply but would be too little for a communal source. Therefore a pumping test was not carried out on TW-2.

Test Well 3

Since the original scope of work included only two wells and one pumping test, permission was sought to dispense with the pumping test and instead drill a third well. The location of the third well was chosen after a site visit by Dr. Michel of Carleton University on October 19, 1993. The purpose of this site visit was to assess the program to date, particulary with respect to the attempt to locate geological faults and to make any suggestions on how to improve our success.

After inspecting the geology with Dr. Michel, it was decided that the evidence suggests that a geological fault likely exists on the southern side of the bedrock ridge. Drilling was carried out on October 20, 1993 at the location which was thought to be most likely to be successful in intercepting the fault. Weathered shale was encountered at 1.5 m and limestone was encountered at a depth of 10.4 m. The discontinuity in strata between this point and the quarry located 30 m to the north proves the existence of a fault in this area. Despite this, no water was encountered to a depth of 30 m.

Test Well 4

Upon completion of TW-3, three probe holes located approximately 10 m apart were drilled between TW-3 and the quarry. The first two were 3 m deep and encountered shale. The last was continued as a well to a depth of 24 m. Despite its location between the quarry (15 m north) and fault (less than 10 m south), no water was encountered. This well was drilled on October 20, 1993.

4.3 Recommendations

As result of the difficulties encountered trying to find water in the vicinity of the quarry, a residential groundwater survey was proposed to help define potential water supply target areas.

The results of this Phase 1 of exploration were originally presented to MECL in a letter report dated October 25, 1993. The results and recommendations were also presented to council at a meeting held on October 25, 1993. Council subsequently approved the residential well survey on October 25, 1993.

5.0 RESIDENTIAL WELL SURVEY

5.1 Methodology

The purpose of this program was to locate areas of high potential prior to any further drilling.

The program involved:

- A house to house survey of well owners along Route 400 and Road 5 between Highway 417 and the hill, located 0.8 km to the south of Route 400. The purpose of this was to obtain information on wells, and specifically on depth of well, depth to water, and estimated yields. An attempt was made to correlate the wells with published MOEE well records but there are few records listed for this area.

- Testing of well water from residential wells for salinity content based on electrical conductivity measurements and hydrogen sulphide which are the primary water quality parameters of concern at the site. The electrical conductivity was measured using a Hannah pocket conductivity meter. Hydrogen sulphide was determined in the field using a Hach hydrogen sulphide test kit.

- Selecting areas of suspected higher yields and, with home owner approval, testing the wells for yield with the existing pumps and distribution systems.

- Identifying target areas for further drilling.

The well survey involved investigation of 55 wells at just over 50 residences (Drawing 30340-105). All residences within the above noted area were visited except one (Well 52) but information on the well at this site was obtained from a neighbour. For each well, the owner was interviewed and a well inventory sheet was filled out (see Appendix 3 for examples of completed survey forms.) If the well head was accessible, the depth of the well was plumbed. Water from an untreated portion of the distribution system was tested for hydrogen sulphide and electrical conductivity in the field.

5.2 Survey Results

Based on the house to house survey approximately three quarters of the homes surveyed obtain their water from the shallow sand aquifer through dug wells, well points or through some other collection system. This aquifer cannot sustain high enough quantities of water to supply communal systems and therefore further investigation focused on the 14 bedrock wells surveyed. The completed survey sheets for these wells are contained in Appendix 3. Table 1, in Appendix 2 summarizes the important information from each of the bedrock wells surveyed. Well yields vary from low to moderately high with a group of moderate to high yielding wells (Nos. 3, 4, 6, and 27B) centred at approximately 600 m east of Road 5 along Route 400.

5.3 Pumping Tests on Residential Wells

Five wells were identified for pumping tests but only three of the wells were accessible. The three wells (Nos. 50, 6 and 27B) were pumped on November 5, 1993. Well No. 50 had a poor yield which was determined to be between 13 and 20 m^3/day (2 and 3 igpm) based on recovery rates. Wells 6 and 27B had high yields and showed transmissivities of approximately 20 and 40 m^2/day respectively. Assuming an available drawdown of 10 m, these result in estimated 20 year safe yields of 100 to 200 m^3/day (15 and 30 igpm), respectively. These long term yields can only be determined with confidence on the basis of long term pumping.

5.4 Chemical Testing of Well Water

Water quality based on hydrogen sulphide and electrical conductivity (reflects salt content or salinity of groundwater) show opposite trends as shown in Drawing No. 30340-105. Hydrogen sulphide increases from east (where concentrations are below detection) to west along Route 400 (where concentrations exceed 2 mg/l). Electrical conductivity increases from west where concentrations are in the order of 100 mg/l to east along Route 400, where concentrations exceed 500 mg/l. In the central area, both electrical conductivity and hydrogen sulphide are within acceptable limits for water supply exploration. The arbitrary limits used in this case were 0.5 mg/l for hydrogen sulphide and 200 mg/l for electrical conductivity.

5.5 Recommendations

Considering both water quality and quantity, an area suitable for further exploration was defined as shown on Drawing 30340-104. It was recommended that two water wells (TW-5 and TW-6) be drilled in this area.

Following drilling, and assuming sufficient quantity is obtained, a 24-hour pumping test on one well was recommended. This would involve selecting the well with the higher yield, pumping it for 24 hours, measuring drawdown and recovery, and water quality testing. This program would provide an indication of whether or not sufficient quantity and quality of water is available.

The results of the residential survey and the above recommendations were presented to Council on a meeting held on November 8, 1993 and a letter report was prepared on November 9, 1993. The next phase of exploration was approved in principle by the client on or about November 15, 1993. However, the authorization to proceed with Phase 2 was not received until January 11, 1994.

6.0 EXPLORATION PHASE 2 - DRILLING AND PUMP TEST ANALYSIS

6.1 Test Well Drilling Program (TW-5 and TW-6)

On January 13, 1994, two wells (TW-5 and TW-6) were drilled on the property of Mr. Germain Lapalme (see Drawing 30340-104 for well locations). The results of the drilling are shown on the water well records (Appendix 4). As shown, the stratigraphy consisted of approximately 2 m of sand underlain by 9 m of clay before bedrock was encountered.

Both were successful in obtaining water. The first well, TW-5 was drilled to 21.3 m below grade and encountered a visually estimated 100 to 165 m^3/day (15 - 25 igpm) in a horizontal seam, based on testing with the water well rig. More water may have been encountered below this prior to the termination of drilling at 21.3 m depth. The second well, TW-6, encountered an estimated 39 m^3/day (6 igpm) at approximately the same depth into bedrock. The final depth of TW-6 was 27.4 m below grade.

These preliminary indications of well yield were encouraging therefore a pump test on TW-5 was proposed and approved.

6.2 Pumping Test on TW-5

Prior to 24 hour test pumping, a short step test was carried out on TW-5 which consisted of three half-hour steps at increasing pumping rates (55, 85, 100 m^3/day). The purpose of this was to obtain an optimum yield at which to pump the well during the 24 hour pumping test. Following this, an additional six hours of development (stop and start pumping) was carried out to reduce the turbidity to a visually clear state. In accordance with the MOEE Water Taking Permit (Appendix 5), all wells within 300 m of the pumping well were monitored during the pumping test. The water taking permit was obtained on January 20, 1994.

Beginning on January 25, 1994, TW-5 was test pumped for a period of 24 hours at a pumping rate of 49.1 m^3/day (7.5 igpm). A multi channel Hermit data logger was used to monitor drawdown and recovery in the TW-5, TW-6 and OW-27B, which was an observation well owned by Mr. J. Shank. In addition, temperature and electrical conductivity (which is directly proportional to salinity) were monitored throughout pumping.

The results of the pumping are shown on Figure 5-1 to 5-7 in Appendix 5. The pump test data are presented on Tables 5.1 to 5.4 in Appendix 5. The drawdown and recovery data were analyzed using the Jacob Straight Line Method for calculations of aquifer transmissivity and storativity. Two transmissivities values were calculated from the pumping well data: i) an apparent transmissivity for the well itself, ii) an aquifer transmissivity, usually represented by the early drawdown (before boundaries) and recovery data calculated from observation well data. The calculated well yields represent the maximum discharge rate that the well may be pumped over a 20 year period without exceeding the available drawdown in the well (assuming no recharge). Available drawdown is the depth to the top of the fracture zones less the depth to the static water level.

The pumping well TW-5 exhibited a drawdown of 4.0 m and encountered an apparent recharge boundary after 10 hours of pumping with negligible drawdown after encountering the boundary condition. This boundary condition is interpreted to be a fracture zone acting as a recharge boundary. The well recovered 44% after one hour. Based on the pump test data, TW-5 has an apparent well transmissivity (T) in the order of 5.8 m^2/day. Assuming 15 m of available drawdown, this well would have a 20 year safe yield in the order of 38 m^3/day (5.8 igpm). These values of apparent well transmissivity and 20 year safe yield were calculated based on the early drawdown and early and late recovery data. Late drawdown data is influenced by fracture dewatering (boundary conditions) and thus does not represent the characteristics of the aquifer.

The drawdown curves from the observation well TW-6 provide similar results to those of TW-5. Observation well TW-6 (r = 120 m from TW-5) exhibited a maximum of 2.2 m of drawdown, recovered 26% after one hour and indicates an aquifer transmissivity on the order of 8 m^2/day (excluding late drawdown data). The storativity is low on the order of 8.5 X 10^{-6}, which is typical value for confined aquifers. This well also encountered an apparent recharge boundary after 10 hours of pumping and correlates with the pumping well TW-5.

The observation well on the Shank property (OW-27B) (r= 137 m from TW-5) exhibited minimal drawdown response (0.36 m), a relatively high aquifer transmissivity of 40 m^2/day and a low storativity on the order of 4 X 10^{-5}. The shape of the drawdown curve at OW-27B indicated no major boundary effects in this portion of the bedrock aquifer.

Although initial pumping rates were encouraging, the drawdown vs time curves (Appendix 5) indicate that less water is available from bedrock in this area over the long term than the well can provide over the short term. Pumping TW-5 at the rate used in the pumping test (49.1 m^3/day) could result in dewatering the fracture network, (i.e. the resource was being used at a faster rate than it could be replenished). The aquifer in this area has a low to moderate aquifer transmissivity and a low storage coefficient. However, the lack of boundary effects at OW-27B and the apparent high transmissivity suggested that a more promising portion of the aquifer existed to the north of TW-5 and on the north side of Route 400.

6.3 Groundwater Chemical Test Results

The chemical data (temperature and electrical conductivity) recovered during the pumping test are presented on Figures 5-6 and 5-7 in Appendix 5. As shown, there was a sharp drop in electrical conductivity (and hence salinity) with time. Temperature also dropped with time suggesting the water is from a shallower source or a recharge area some distance from the pumping well. The sharp drop in electrical conductivity and temperature is significant for it implies that the fracture zone is being recharged and the groundwater supply is not limited to fracture storage.

At the end of pumping TW-5, samples were collected and submitted to Accutest Laboratories in Ottawa for chemical analysis of the standard Ministry of Environment and Energy (MOEE) "Subdivision Set" parameters. The analytical results, as shown on Table 2 in Appendix 2, show a very low concentration of chloride (2 mg/l) and a low concentration of hydrogen sulphide (0.02 mg/l). All results were below the Ontario Drinking Water Objectives. As presented on Drawing 30340-108, the groundwater chemistry is dominated by the anion bicarbonate and the cations sodium and calcium.

6.4 Conclusions and Recommendations

The purpose of this phase of exploration was to investigate the second locality in the vicinity of Route 400 which was thought to have the potential to supply groundwater of sufficient quantity and quality for the Community of Forest Park.

The results of the pumping test on TW-5 indicate that in the vicinity of the two drilled wells (TW-5 and TW-6), there is insufficient water in the bedrock aquifer in this area to supply the long term needs of the community. However, based on the chemical data, the fracture zone is being recharged. Thus the groundwater supply appears to be not limited to fracture storage. Based on observation well data, there is a possibility that the aquifer is more productive to the north, i.e. across Route 400.

Based on the results of the testing and on other considerations, the following recommendations arose from Phase 2 of the exploration program:

- Prior to drilling further to the north, it was recommended that TW-4 be extended from 25 m to 110 m in depth. Typically in faults such as these in the Ottawa area, if water is not encountered in the upper 10 m of bedrock then it is not expected to be encountered again until a depth of between 60 and 90 m has been reached. It was therefore recommended that the existing TW-4, which was originally drilled to a depth of approximately 25, be extended to 110 m in total depth.

- Water quality data from the pumping test were encouraging and drawdown data suggest greater groundwater resources in a northerly direction from the pumping well (TW-5). It was recommended that two wells be drilled on the north side of Route 400.

- If water was encountered in one or more of the drilled wells, a pumping test would be carried out on the well exhibiting the higher yield. A 24 hour test would be conducted and samples taken for chemical analysis.

The results of this phase of the work and the above recommendations were presented in a letter report dated February 25, 1994. Authorization to proceed with the next phase of the work was granted on or about May 11, 1994, when property negotiations were concluded.

7.0 EXPLORATION PHASE 3 - DRILLING AND PUMP TEST ANALYSIS

7.1 Test Well Drilling Program (TW-7 and TW-8)

On April 12, 1994, TW-4 was drilled deeper with an air rotary drilling rig from a depth of 24 m (80') to a depth of 107 m. Well drilling was carried out by Gilles Bourgeois Well Drilling Ltd. Sufficient quantities of water were not encountered. Thus this location was not considered to be an area for further exploration drilling.

Beginning on May, 13, 1994, two wells (TW-7 and TW-8) were drilled on the property of Mr. Yau Kuen Sum (see Drawing 30340-104 for locations of wells). The wells were drilled using a cable tool drilling rig. The wells were 150 mm (6") diameter exploration wells and were constructed in accordance with Regulation 903 under the Ontario Water Resources Act.

Wells TW-7 and TW-8 yielded water. In both wells (TW-7 and TW-8), a horizontal seam with water was encountered at a depth of 14 m which was approximately 1.5 m into bedrock. Drilling was discontinued in both wells at 15.2 m. The results of drilling are shown on the water well records (Appendix 4). At both well locations approximately 12.5 m of overburden was encountered including approximately 2 m of sand (not identified on the water well records) overlying 10.5 m of clay.

7.2 Pumping Test on TW-7

On the basis of the yield estimated during well drilling it was apparent that the optimum pumping rate would require a MOEE Water Taking Permit. Accordingly one was applied for and obtained on May 24, 1994 (Appendix 6).

Prior to 24 hour test pumping, a short step test was carried out on TW-7 on May 31, 1994 which consisted of four half-hour steps at increasing pumping rates (55, 118, 173, 323 m^3/day). The purpose of this was to determine the optimum yield at which to pump the well during the 24 hour pumping test.

In accordance with the MOEE Water Taking Permit, groundwater drawdown during the constant discharge pumping test was monitored in all wells within 300 m which amounted to 8 wells in overburden and 7 wells in bedrock. Prior to pumping, static levels were recorded and information obtained from the owner on depth of well, depth of pump intake and type of pump. Only one suction pump was in use in the bedrock wells (owned by Mr. Shank: OW-27B) and the pump intake was at approximately 9.5 m from surface.

On June 1, 1994, TW-7 was pumped for a period of 15.5 hours at a pumping rate of 270 m^3/day (41 igpm). The test was scheduled to be run for 24 hours but had to be discontinued because the water level in a neighbour's well (Mr. Shank OW-27B) dropped below his pump intake. An automatic depth recorder was used to monitor drawdown and recovery in the TW-7 and TW-8. In addition, temperature and electrical conductivity (which is directly proportional to salinity) was monitored in TW-7 throughout pumping.

The results of the pumping at TW-7 are shown on Figures 6-1 to 6-5 in Appendix 6. The pump test data and calculations are shown on Tables 6-1 to 6-12 in Appendix 6. The drawdown and recovery data were analyzed using the Jacob Straight Line Method for calculations of aquifer transmissivity and storage coefficients. Two transmissivities values were calculated from the pumping well data: i) an apparent transmissivity for the well itself, and ii) an aquifer transmissivity, usually represented by the early drawdown (before boundaries) and recovery data calculated from observation well data. The safe well yield represent the maximum discharge rate that the well may be pumped over a 20 year period without exceeding the available drawdown in the well (assuming no recharge). In addition, a 90 day extreme drought pumping yield (represents 90 days of no aquifer recharge) was calculated. Available drawdown is depth to the top to the fracture zones less the depth to static water level.

Pumping well TW-7 exhibited 4.8 m of drawdown in 15.5 hours, followed by 85% recovery in 1.5 hours. The pumping well has an apparent well transmissivity of approximately 41 m^2/day (excluding late drawdown data) . The well is 15.2 m deep and has 9.5 m of available drawdown above of the fractured zone. The 20 year safe yield is estimated to be 206 m^3/day (31.5 igpm). The 90 day seasonal maximum yield is on the order of 330 m^3/day (50 igpm).

The eight bedrock observation wells (TW-8, OW-26, OW-27, OW-6, OW-27B, OW-54, TW-5 and TW-6) located between 40 and 250 m from the pumping well responded 1.7 m (TW-5) to 4.2 m (TW-8) drawdown as shown on Drawing 30340-106. Based on the drawdown data, the aquifer has an average aquifer transmissivity of approximately 41 m^2/day and the average storativity of the aquifer is 2×10^{-5}. The distance-drawdown plot (Figure 6-3) and the plan view drawdown contours (Drawing 30340-106) illustrate a spatial distribution in aquifer transmissivities. Three wells (TW-7, TW-8 and OW-6 (Encarnacao's property) exhibit a greater degree of drawdown than the other wells monitored. These wells are likely located adjacent to a high transmissivity fault zone. This statement is also supported by the fact that these three wells reported a significant recharge boundary after 12 hours of pumping TW-7. In particular, observation well TW-8 was the first well to respond to the high transmissivity zone after approximately 10 hours of pumping. This observation is significant for it implies that the high transmissivity zone is west to northwest of TW-7.

Wells TW-5, OW-54 (Sum's property) and OW-27B (Shank's property) located to the north and south of the pumping well exhibited moderate transmissivities ranging from 36 to 42 m^2/day and a low storativity ranging from 4 X 10^{-6} to 4 X 10^{-5}. Observation wells OW-26 (McLaughlin's property), OW-27 (Lavigne's property) and TW-5 located southeast of the test site showed less response than wells of similar distance away from the pumping well. TW-6 and the shallow dug wells in sand did not respond to the pumping of TW-7.

This drawdown distribution suggests that the southeast wells are located south of a water bearing fault zone and that the wells TW-7, TW-8 and OW-6 (Encarnacao's property) are located adjacent to the fault zone. This fault zone was considered to be an excellent target area for production well(s).

7.3 Groundwater Chemical Test Results

The chemical data (temperature and electrical conductivity) recovered during the pumping test are presented on Figures 6-4 and 6-5 in Appendix 6. As shown, temperature remained relatively unchanged throughout the monitoring period. Electrical conductivity increased slightly from 290 μS/cm to around 330 μS/cm over the monitoring period.

At the end of pumping, samples were collected and submitted to Accutest Laboratories in Ottawa for chemical analysis of the standard MOEE "Subdivision Set" parameters. The analytical chemical data are shown on Table 2 in Appendix 2. Iron was very low (0.04 mg/l) and manganese was not detected. Chlorides were also very low (6 mg/l). Hydrogen sulphide is moderately high (0.42 mg/l). As shown on Drawing 30340-108, the groundwater chemistry is dominated by the anion bicarbonate and the cations sodium and calcium.

7.4 Conclusions and Recommendations

The results of the pump test and analyses indicate that a potentially viable groundwater source to supply the long-term needs of the community (assuming 130 igpm). was located in the vicinity of TW-7 and TW-8. Based on the observation well data, the aquifer is likely more productive to the north and east of TW-7.

Based on the results of the testing and analyses, the following recommendations were provided to target a potential production well location:

- Conduct a detailed level survey of the bedrock wells, determine groundwater flow direction and (if possible) pathways and obtain detailed topographic information for the purpose of optimizing the production well locations. Detailed analysis of existing pumping test data will also be required. It is also recommended that TW-4 be abandoned at this time.

- Upon approval by property owner drill another well (farther north on the property) and, if it is successful in penetrating the aquifer install a large diameter well that could be used later as a production well in the water supply system.

- Test the well with a full 72 hour pumping test and water quality analysis.

- Pending results of drilling proceed with the installation of additional wells as required.

The results of Phase 3 of the exploration work were originally presented in a letter report to MECL dated June 15, 1994. The results and recommendations were also presented at a meeting with council and the Ontario Clean Water Agency, on June 16, 1994. Approval to proceed with the recommendations was given on June 22, 1994. Because of problems associated with property negotiations and gaining access to the target area for the next well, the comprehensive testing program was delayed until September 13, 1994.

8.0 PHASE 4 - COMPREHENSIVE WELL DRILLING AND TESTING

8.1 Test Well Drilling (TW-9)

Beginning on September 13, 1994, a 254 mm (10") diameter well (TW-9) was drilled on the property of Mr. Yau Kuen Sum (Drawing 30340-104). The wells was drilled using an air rotary drilling rig owned and operated by Gilles Bourgeois Well Drilling Ltd. The well was constructed in accordance with Regulation 903 under the Ontario Water Resources Act.

The well was successful in obtaining water at a depth of approximately 17 m which was approximately 3 m into bedrock. The results of drilling are shown on the water well records (Appendix 4). Approximately 14.6 m of overburden was encountered including 1.8 m of sand overlying 12.8 m of clay and hardpan.

8.2 Pumping Test on TW-9

Prior to carrying out a pumping test on Well TW-9 an MOEE Water Taking Permit was applied for by JWEL. The permit was received on August 25, 1994. The permit was valid for the period August 25 to October 30, 1994 (Appendix 7).

Prior to the 72 hour pumping test, a short step test was carried out on TW-9 on September 17, 1994. This test consisted of three half-hour steps at increasing pumping rates (195, 293, 390 m^3/day). The purpose of this was to determine the optimum yield at which to pump the well during the 72 hour pumping test.

In accordance with the MOEE Water Taking Permit, groundwater drawdown during the constant discharge pumping test was monitored in all wells within 300 m which amounted to 8 wells in overburden and 8 wells in bedrock. Prior to pumping, static levels were recorded and are presented on Table 5 (Appendix 2).

Starting on September 19, 1994, TW-9 was pumped for a period of 72 hours at a constant pumping rate of 264.5 m^3/day (41 igpm). The test concluded on September 22, 1994. The results of the pumping at TW-9 are shown on Figures 7-1 to 7-3 in Appendix 7. The pump test data and calculations are shown on Tables 7-1 to 7-14 in Appendix 7. The drawdown and recovery data were analyzed using the Jacob Straight Line Method for calculations of aquifer transmissivity and storage coefficients. Two transmissivities values were calculated from the pumping well data: i) an apparent transmissivity for the well itself, and ii) an aquifer transmissivity, usually represented by the early drawdown (before boundaries) and recovery data calculated from observation well data. The safe well yield represent the maximum discharge rate that the well may be pumped over a 20 year period without exceeding the available drawdown in the well (assuming no recharge). In addition, a 90 day extreme drought pumping yield (represents 90 days of no aquifer recharge) was calculated. Available drawdown is depth to the top of the fracture zones less the depth to static water level.

Pumping well TW-9 exhibited 5.2 m of drawdown in 72 hours, followed by 88% recovery after 2 hours. The pumping well has an apparent well transmissivity of approximately 36 m^2/day (excluding late drawdown data) . The well is 25 m deep and has 15.8 m of available drawdown to the top of the fractured zone. The 20 year safe yield is estimated to be 316 m^3/day (48 igpm) based on the following equation:

$$Q_{20} = 0.68 \times T \times \Delta s \times 0.8$$

where

Q_{20} = 20 year safe yield (m^3/day)
0.68 = constant
T = aquifer transmissivity (m^2/day)
Δs = available drawdown (m)
0.8 = safety factor

The 90 day seasonal maximum yield is on the order of 500 m^3/day (75 igpm) based on the following equation:

$$Q_{90} = 1.068 \times T \times \Delta s \times 0.8$$

where

Q_{90}	= 90 day seasonal maximum yield
1.068	= constant
T	= aquifer transmissivity (m^2/day)
Δs	= available drawdown (m)
0.8	= safety factor

The nine bedrock observation wells located 75 to 315 m from the pumping well responded 2.19 m (TW-5) to 4.46 m (TW-8) drawdown as shown on Drawing 30340-107 and the distance-drawdown plot shown on Figure 7-3 in Appendix 7. Four wells (TW-7, TW-8, OW-27B (Shank's property) and OW-6 (Encarnacao's property) exhibited greater drawdown than the other wells. These four wells are oriented in an approximate northeast-southwest line. These wells are located adjacent to a high transmissivity fault zone as identified during the pumping test on TW-7 (see Drawing 30340-104). Drawdown to the north (towards OW-54 (Sum's property) is less than drawdown further south due to the fault zone acting as a recharge boundary. Thus, the drawdown front is pushed towards the south and along the mapped fault as shown on Drawing 30340-107. Observation well TW-6 and the shallow dug wells showed no response.

The observation well responses are similar to the TW-7 pump test. A recharge boundary was encountered in all wells except TW-5 after 30 hours of pumping. Recovery was rapid in all observation wells (over 90% in approximately 2 hours). The early drawdown (before the boundary) and the late recovery data indicate relatively consistent aquifer hydraulic properties with aquifer transmissivity of approximately 43 m^2/day and an average storativity of the aquifer of 2 X 10^{-5}.

8.3 Discussion on Hydrogeology and Estimated Well Yields

Data recorded from existing and test bedrock wells and dug wells in the area suggest that three geological units form three local hydrostratigraphic units as follows:

- upper sand and gravel watertable aquifer;
- underlying low permeable aquitard composed of silts and clays;
- limestone bedrock confined (leaky) aquifer.

Water level measurements and derived hydraulic head calculations are shown in Table 5 (Appendix 2)

Upper Sand and Gravel Watertable Aquifer

In the study area, the upper sand and gravel aquifer provides an adequate water supply for the local residences. This aquifer forms a perched aquifer above the lower permeability silts and clays and is likely greatly influenced by seasonal precipitation and runoff events. Thus, this aquifer may transmit relatively large quantities of groundwater to shallow surface water receivers.

Low Permeable Aquitard

The low permeability silt and clay likely acts as an aquitard separating the shallow flow system in the sand and gravel from the deeper bedrock aquifer. This statement is verified by the pump test data (TW-5, TW-7 and TW-9 pump tests) which shows no response of the shallow dug wells positioned in the sand and gravel aquifer when the bedrock aquifer is pumped. However, the aquitard likely allows some recharge to the bedrock aquifer.

Bedrock Aquifer

The bedrock aquifer in the study area is a limestone formation with numerous faults and associated fracture zones. Based on the hydraulic head data, the aquifer is influenced by the fracture network and the faults. Thus an attempt to contour the hydraulic head measurements did not produce a clear groundwater flow pattern. However, based on Charron (1974), groundwater flow in bedrock at the study area is towards the northeast. A review of the vertical gradients between the upper sand and gravel aquifer and the bedrock aquifer identify a gradient of approximately 0.3 downwards to the bedrock.

The shallow bedrock aquifer tested in the vicinity of TW-7, TW-8 and TW-9 is a viable groundwater resource with good quality and quantity. A major water-bearing fracture is present in the vicinity of these wells and observation wells OW-6 and OW-54. This structure appears to trend in a southwest-northeast direction along a mapped fault zone. Apparent recharge boundaries were encountered in many of the wells during the pumping tests TW-7 and TW-9.

Based on a mean aquifer transmissivity of 40 m^2/day, this aquifer appears capable of sustaining a 90 day continuous yield on the order of 60 to 75 igpm. The 90 day continuous yield assumes drought conditions (i.e. no recharge of the aquifer) for 90 days. The 20 year safe yield of the aquifer is on the order of 40 to 50 igpm with no recharge of the aquifer over 20 years. The more likely scenario is that some recharge to the bedrock aquifer is occurring through the silts and clays and from direct infiltration of precipitation near bedrock surface outcrops. Recharge via direct infiltration is likely occurring southwest of the study area within local bedrock outcrops extending towards the Castor River. (See Drawing 30340-103). Evidence of bedrock aquifer recharge is based on temperature and electrical conductivity data collected during pump test TW-5; an aquifer analysis of pump test curves to theoretical leaky aquifer curves, and the strong downward gradients from the upper sand and gravel aquifer.

The water resource potential could be limited to the safe yield of the fracture source aquifer if total withdrawal or extraction exceeded the 90 day continuous yield. The main limitations is the shallow depth to the fractured zone and the potential interference drawdowns between production wells installed in the same fracture zone. However, production wells completed in areas where the fracture zone is at a deeper depth may have greater yield potential and will not be limited to the safe yield of the shallow fracture zone.

Domestic bedrock wells within about 200 m of production wells can be expected to be affected by the pumping wells. Using the Theis approximation, (Driscoll, 1986) the predicted drawdown at a well 200 m from any pumping well would be on the order of 4 to 5 m after 90 days assuming some seasonal recharge into the aquifer.

Following, the 72 hours pumping test, TW-1, TW-3 and TW-4 were abandoned by Gilles Bourgeois Well Drilling Ltd. on October 14, 1994 in accordance with Regulation 903 under the Ontario Water Resources Act. TW-1 and TW-3 were abandoned as per the recommendations outlined in the JWEL report dated February 25, 1994. TW-4 was abandoned as per the recommendations outlined in the JWEL report dated June 15, 1994.

8.4 Groundwater Chemical Test Results

A water sample was collected on September 19, 1994, at the end of the first hour of pumping in the 72 hour test for testing for a range of general chemistry, inorganic and bacteriological parameters. The results were received on September 23, 1994. The analyses revealed generally good water quality except high concentrations of bacteriological parameters - faecal and total coliform were detected. JWEL immediately advised MECL of this unexpected finding and recommended further investigation because deliberate tampering of the well was suspected. On September 23, 1994 JWEL took swab samples from the inside of the well casings (above the water level on TW-9, TW-8 and TW-7. Water samples were also taken from TW-8 and TW-7.

The results of bacteriological testing of the September 23, 1994 samples show faecal contamination on the well casing in TW-9 and TW-7 but not TW-8 (Table 4: Appendix 2). Faecal bacteria levels in the water sample for TW-7 were high but were not detected in the water from TW-8. Testing of TW-7 in June, 1994 showed no faecal bacteria. JWEL concluded from this that wells TW-7 and TW-9 were deliberately contaminated just prior to the 72 hour pump test. The MOEE were advised of these findings and have opened a file on the subject. Further, because of these findings JWEL recommended that TW-7, TW-8 and TW-9 be redeveloped, purged and chlorinated and TW-9 be pumped for 24 hours and resampled. In order to carry out this work, the MOEE Water Taking Permit was extended by the MOEE to December 31, 1994 (Appendix 7).

TW-7 to TW-9 were redeveloped, purged and chlorinated on September 27, 1994. TW-9 was subsequently pumped for 24 hours starting November 2, 1994. A water sample was taken at the end of the 24 hour period and submitted to Accutest for analysis of the MOEE "Subdivision Set" of parameters, including faecal and total coliforms. Because of previous laboratory findings with respect to water colour, a test was conducted in the field for colour. Accutest conducted the test using a photospectrometer at the end of the 24 hour pumping.

The results of chemical testing after a water sample collected at the end of the 72 hour test on TW-9 on September 22, 1994, and the water sample collected at the end of the 24 hour pumping on November 3, 1994 are presented in Table 2 in Appendix 2. The results of the September 23, 1994 testing for bacteriological parameters are presented in Table 4 in Appendix 2.

The chemical results indicate that all chemical parameters meet Ontario drinking water objectives with the exception of colour (19 TCU) the water may have to be treated to lower this level. As shown on Drawing 30340-108, the groundwater chemistry is dominated by the anion bicarbonate and the cations sodium and calcium.

9.0 CONCLUSIONS

1) Testing to date (three pumping tests on TW-5, TW-7 and TW-9) has identified a leaky confined shallow bedrock aquifer in the vicinity of TW-7 to TW-9 north of Route 400. Aquifer transmissivities increase in a northerly direction from 5 m^2/day at TW-5 and TW-6 to 38 and 48 m^2/day in the vicinity of wells TW-7, TW-8 and TW-9. The aquifer transmissivities appear to exhibit a northeast-southwest trend, likely associated with mapped faults in the area. Based on pump testing TW-7 and TW-9, several wells (TW-7, TW-8, TW-9, Shank (OW-27B) and Encarnacoa (OW-6) exhibit similar hydraulic response and are believed to be within or in hydraulic connection to the high transmissivity fault zone. Pump test analysis indicates that the high transmissivity fault zone acts as a recharge boundary. Storativity is low and is on the order to 5×10^{-5}, which suggests confined aquifer conditions.

2) The shallow bedrock aquifer is a viable groundwater resource with good quality and quantity. Based on a mean aquifer transmissivity of 40 m^2/day, this aquifer appears capable of sustaining a 90 day continuous yield on the order of 60 to 75 igpm. The 90 day continuous yield assumes drought conditions (i.e. no recharge of the aquifer) for 90 days. The 20 year safe yield of the aquifer is on the order of 40 to 50 igpm with no recharge of the aquifer over 20 years. The more likely scenario is that some recharge is occurring via leakage from the overlying silts and clays and direct infiltration. This statement is based on temperature and electrical conductivity data collected during pump test TW-5 and an aquifer analysis of pump test curves to theoretical leaky aquifer curves.

3) The water resource potential could be limited to the safe yield of the fracture source aquifer if total pumping exceeds the 90 day continuous yield. The main limitations is the shallow depth to the fractured zone and the potential interference drawdowns between production wells installed in the same fracture zone.

4) Drawdown will occur preferentially along fault zones based on the observations made during the pumping of TW-7 and TW-9. It is expected that domestic wells within 200 m of production wells will be affected by production wells. For example, the predicted drawdown at a domestic well 200 m from TW-9 would be on the order of 4 to 5 m assuming 90 day drought conditions and the domestic well is located in or directly adjacent to the fracture zone.

5) Groundwater chemical test results from wells TW-5, TW-7 and TW-9 report excellent groundwater quality with all chemical parameters being below the Ontario Drinking Water Objectives with the exception of colour. The water may have to be treated to lower this level.

10.0 RECOMMENDATIONS

1) Optimization of the well locations and further multiple well pumping tests should be part of the field commissioning process. Potential well locations which should be explored are to the north, west and east of well TW-9. The objective will be to intersect the main fracture zone at depth where greater available drawdown and well yield are possible.

2) Two more production wells should be installed and a multi well pump test conducted to determine interference effects and the long term yield of the system.

3) An interim monitoring plan should be developed to observe fluctuations in piezometric levels in some key bedrock and shallow overburden wells. The purpose of this monitoring would be to determine the degree to which the aquifer is recharged in spring and fall. Monitoring should be carried out monthly and hydrographs should be produced for the next 12 months.

4) To provide the desired 130 igpm to service the community of Forest Park, 3 to 4 production wells each producing 40 igpm may be required. Wells should be separated by at least 200 m to minimize water level interference effects. Fewer wells may be considered if storage is provided. The cost of storage should be determined.

5) A long term monitoring plan should be established to monitor residential wells during the long term pumping to ensure the domestic wells are not impacted from production well pumping. In this regard TW-2, TW-5, TW-6, TW-7 and TW-8 should be kept to permit monitoring during future pump tests. If there are problems with drawdown in the long-term additional production wells may have to be drilled. A well head protection plan should be established to ensure water quality over the long term.

Respectfully Submitted,

JACQUES WHITFORD ENVIRONMENT LIMITED

S. J. L. -95

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G. Parker

Geoffrey F. Parker, M.E.Sc., P.Eng.

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GLOSSARY OF TERMS

Aquifer, confined An aquifer that is overlain by a confining bed. The confining bed has a significantly lower hydraulic conductivity than the aquifer.

Aquifer, perched A region in the unsaturated zone where the soil may be locally saturated because it overlies a low-permeability unit.

Aquifer, unconfined An aquifer in which there are no confining beds between the zone of saturation and the surface. There will be a water table in an unconfined aquifer. Water-table aquifer is a synonym.

Aquitard A low-permeability unit that can store ground water and also transmit it slowly from one aquifer to another.

Bedrock A general term for the rock, usually solid, that underlies soil and other unconsolidated material.

Electrical conductivity A measure of the ease with which a conducting current can be caused to flow through a material under the influence of an applied electric field. It is the reciprocal of resistivity and is measured in micro Siemens/cm.

Fault A fracture or a zone of fractures along which there has been displacement of the sides relative to one another parallel to the fracture.

Observation well A nonpumping well used to observe the elevation of the water table or the potentiometric surface.

Overburden The loose soil, silt, sand, gravel, or other unconsolidated material overlying bedrock, either transported or formed in place.

Porosity The ratio of the volume of void spaces in a rock or sediment to the total volume of the rock or sediment.

Pumping test A test made by pumping a well for a period of time and observing the change in hydraulic head in the aquifer. A pumping test may be used to determine the capacity of the well and the hydraulic characteristics of the aquifer. Also called aquifer test.

Recharge area An area in which there are downward components of hydraulic head in the aquifer. Infiltration moves downward into the deeper parts of an aquifer in a recharge area.

Recharge boundary An aquifer system boundary that adds water to the aquifer. Streams, lakes and faults are typically recharge boundaries.

Recovery The rate at which the water level in a well rises after the pump has been shut off. It is the inverse of drawdown.

Safe yield The amount of naturally occurring ground-water that can be economically and legally withdrawn from an aquifer on a sustained basis without impairing the native ground-water quality or creating an undesirable effect such as environmental damage. It cannot exceed the increase in recharge or leakage from adjacent strata plus the reduction in discharge, which is due to the decline in head caused by pumping.

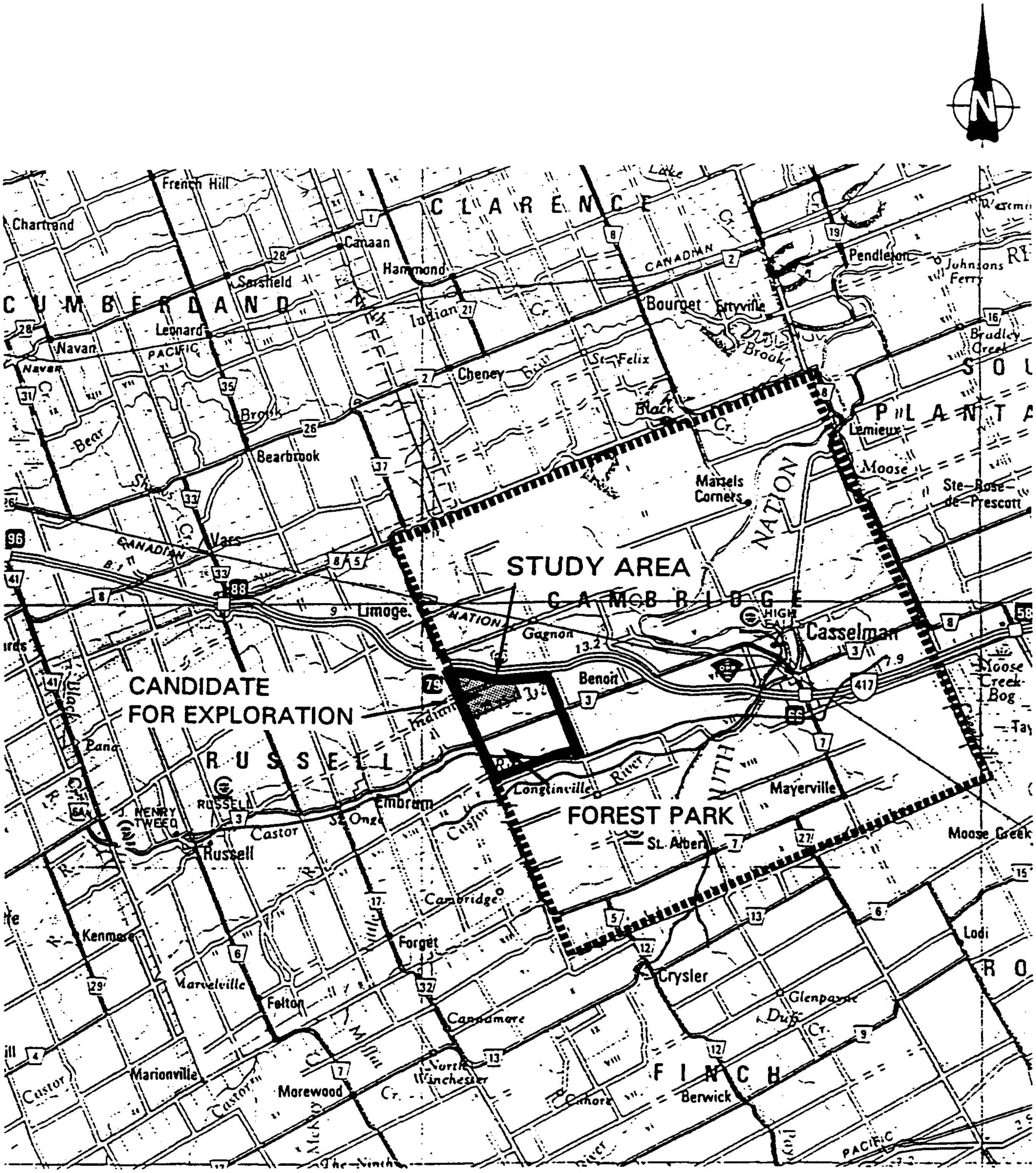
Storativity The volume of water an aquifer releases from or takes into storage per unit surface area of the aquifer per unit change in head. It is equal to the product of specific storage and aquifer thickness. In an unconfined aquifer, the storativity is equivalent to the specific yield. Also called storage coefficient.

Transmissivity The rate at which water of a prevailing density and viscosity is transmitted through a unit width of an aquifer or confining bed under a unit hydraulic gradient. It is a function of properties of the liquid, the porous media, and the thickness of the porous media.

Water table The surface in an unconfined aquifer or confining bed at which the pore water pressure is atmospheric. It can be measured by installing shallow wells extending a few feet into the zone of saturation and then measuring the water level in those wells.

APPENDIX 1

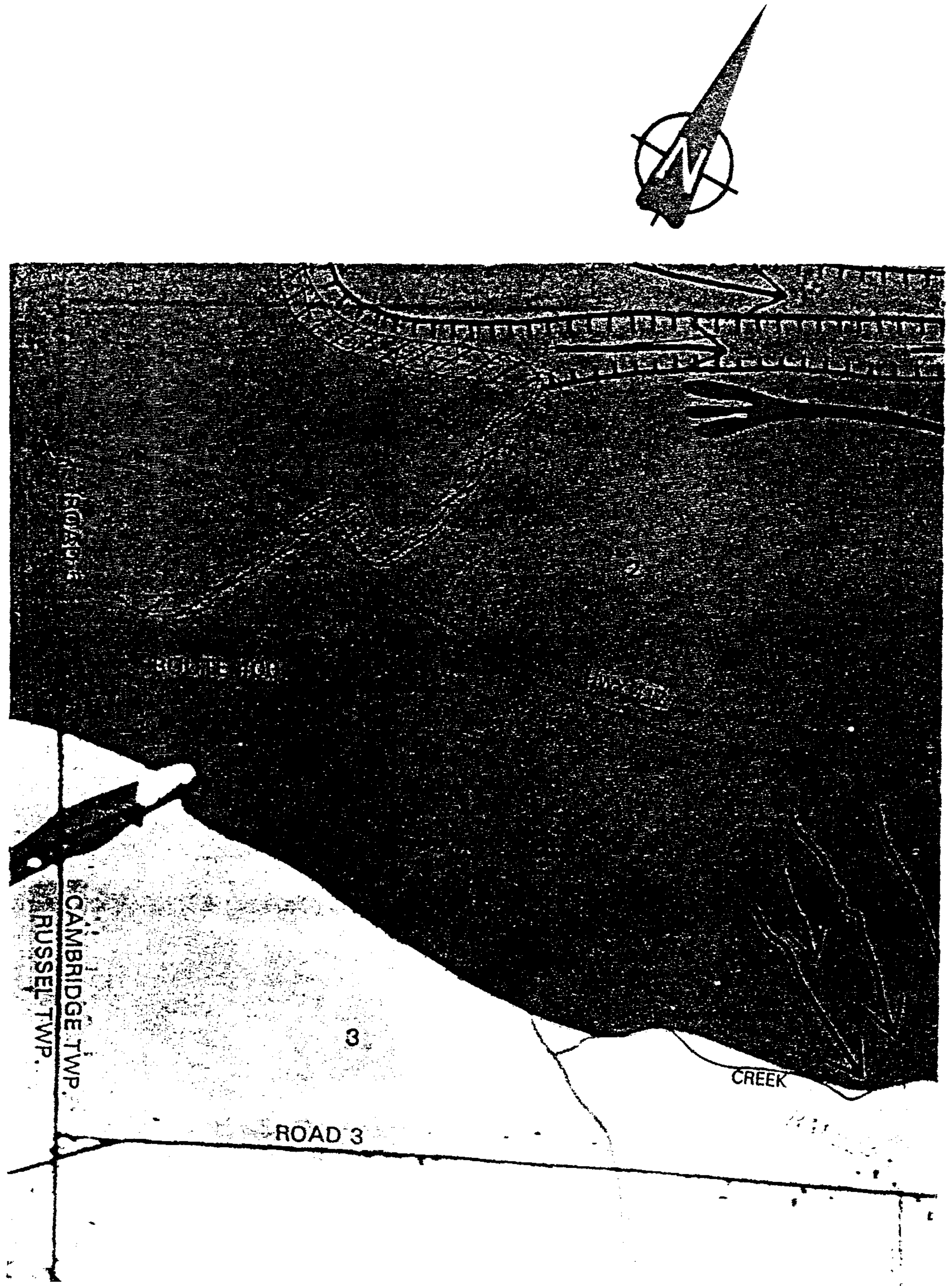
DRAWINGS



KEY PLAN

SCALE 1 : 200 000 (approx)

DRAWING No. 30340-101



LEGEND

CENOZOIC
QUATERNARY

POST-CHAMPLAIN SEA DEPOSITS

7 — *ORGANIC DEPOSITS mainly muck and peat in bogs, fens, swamps and poorly drained areas*

ALLUVIAL DEPOSITS stratified sand, silty sand, silt, minor gravel, disseminated organic matter and marl

6a — *Silty sand, silt, sand and clay; deposits of present floodplains and of alluvial fans in areas of low relief*

6b — *Medium grained stratified sand with some silt; in the form of fluvial terraces and channels cut in marine clay, and bars and spits within abandoned channels*

CHAMPLAIN SEA SEDIMENTS

NEARSHORE SEDIMENTS: gravel, sand and coarser material generally well sorted

Gravel, sand and boulders: beaches commonly fossiliferous, nature of sediment controlled by underlying material (gravel, sand and boulders where developed from till and glaciofluvial deposits; slabs and shingles where developed from sedimentary bedrock)

5b — *Fine to medium-grained sand, calcareous and commonly fossiliferous; nearshore sand generally occurs as a sheet or as bars or spits associated with glaciofluvial materials*

DELTAIC AND ESTUARINE DEPOSITS: medium-to fine-grained sand, in some places fossiliferous, lies outside abandoned channels; most common deposit is a combined strip delta-sand plain that developed as water levels fell

3 — *OFFSHORE MARINE DEPOSITS [illegible] locally overlain by thin sands. Upper parts are generally mottled or laminated reddish brown and bluish grey and may contain lenses and pockets of sand, but at depth the clay is uniform and blue-grey*

3a — *Clay and silt underlying erosional terraces; upper part of marine deposits removed to variable depths by fluvial erosion so in places clay is uniform blue-grey; unit includes lenses, bars and channel fills of sand and pockets of nonmarine silt that were formed during terrace (or channel) cutting*

GLACIAL DEPOSITS

ICE-CONTACT STRATIFIED DRIFT: gravel and sand, poorly to well sorted and bedded, mainly coarse- to medium-grained with numerous cobbles, boulders and lenses of till, includes esker fans and outwash deltas deposited below sea level, kames, kame terraces, eskers, and outwash plains. In areas that lie below marine limit (approx. 198 m (650 ft) a.s.l.) it is generally overlain by marine beach deposits

TILL: sandy and silty compact diamicton, grey at depth but brown where oxidized, calcareous where derived from sedimentary rocks and not leached; consists dominantly of lodgment till. In areas that lie below marine limit (approx. 198 m (650 ft) a.s.l.) it is overlain by a discontinuous lag consisting of gravel, sand and boulders

1a — *Till plain, local relief <5 m (<15 ft)*

1b — *Till drumlinized*

1c — *Till hummocky to rolling, local relief 5 to 25 m (15 to 80 ft)*

PALEOZOIC

BEDROCK

Limestone, dolomite, sandstone and shale, relatively flat-lying, mainly occurring as bare tabular outcrops; includes areas thinly veneered by unconsolidated Quaternary sediments [illegible]

Geological boundary

Former strandline positions of Champlain Sea indicated by flights of abandoned marine beaches

Escarpment in unconsolidated material

Escarpment in bedrock (large, small)

Abandoned channel (arrow indicates direction of flow)

Landslide area showing location of headscarp and general trend of slump ridges. Ridges generally consist of clay with overlying or admixed sand

Gullies, ravines; shown where undercutting of steep slopes could cause slumping and/or sliding

Dunes in areas of sand deposits generally reworked by the wind, most areas now stabilized

Fossil locality, marine species present, freshwater species present

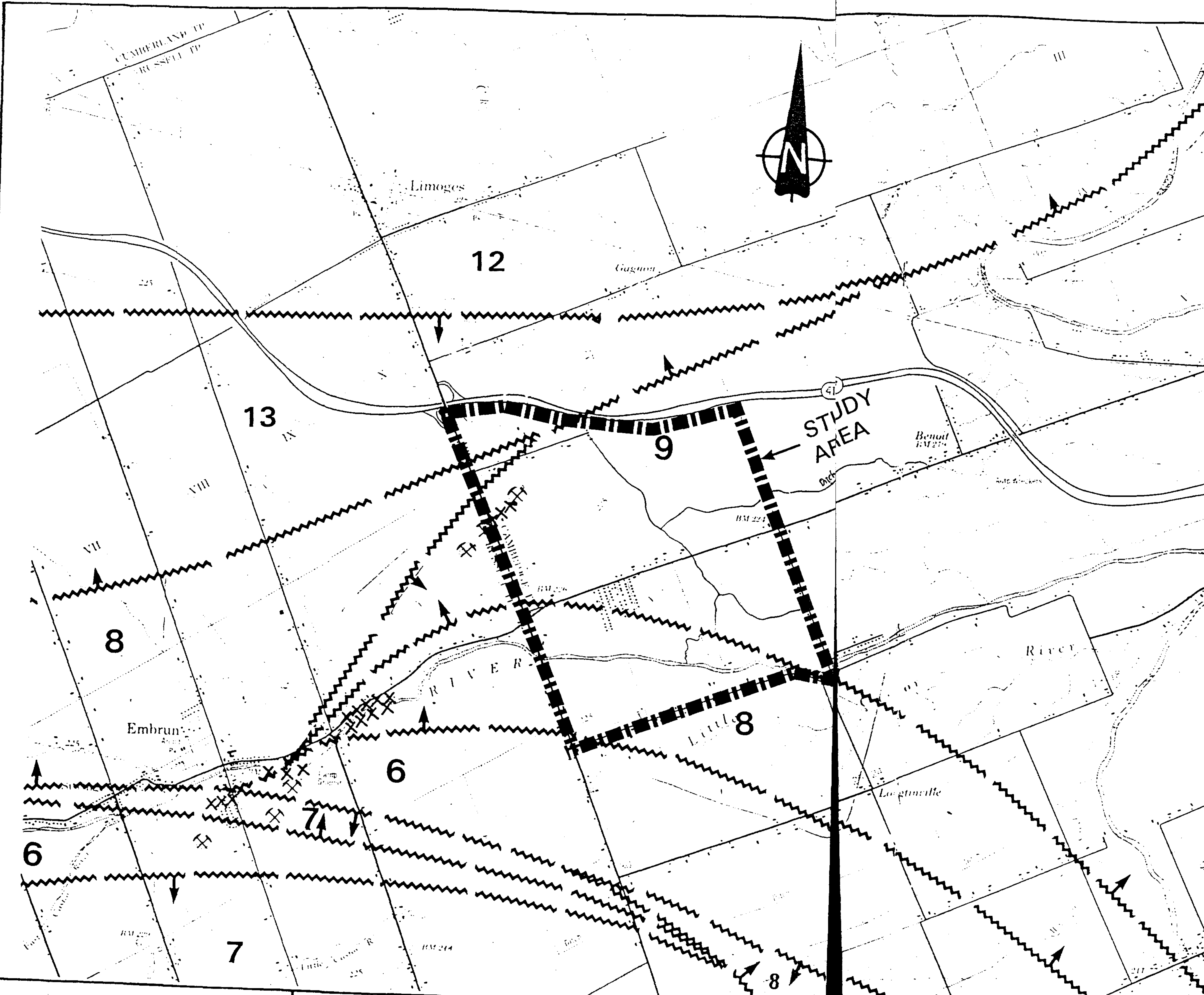
Pit in unconsolidated materials, mainly in gravel and sand but some in clay and till

Bedrock quarry

Locality of specimen, dated by radiocarbon method

10 200 ± 90	SHELLS COQUILLES
GSC-1968	53 m [illegible]

Jacques, Whitford Limited	REFERENCE : GEOLOGICAL SURVEY OF CANADA MAP 1507A SURFICIAL GEOLOGY RUSSEL, ONTARIO	SCALE : 1 : 25,000	TOWNSHIP OF CAMBRIDGE	PHYSIOGRAPHY AND SURFICIAL GEOLOGY MAP
		DATE : 94/12/01	FOREST PARK COMMUNAL WATER SUPPLY INVESTIGATION	DRAWING NO 30340-102
		DWN. BY : BBW	TOWNSHIP OF CAMBRIDGE, ONTARIO	
		APP'D BY :		



SYMBOLS

- Bedrock outcrop
- Quarry
- Geological boundary, position approximate
- Fault, position approximate (arrow indicates downthrown side)
- Drillhole, with reference number*

LEGEND

PHANEROZOIC

PALEOZOIC

UPPER ORDOVICIAN

13	Queenston Formation: red to light greenish grey siltstone and shale, with interbeds of silty bioclastic limestone in lower part
12	Carlsbad Formation: interbedded dark grey shale, fossiliferous calcareous siltstone, and silty bioclastic limestone

MIDDLE-UPPER ORDOVICIAN

9	Lindsay Formation: sublithographic to fine crystalline limestone, nodular in part, with interbeds of calcarenite and shale

MIDDLE ORDOVICIAN

8	Verulam Formation: interbedded bioclastic limestone, sublithographic to fine crystalline limestone, and shale
7	Bobcaygeon Formation: interbedded calcarenite and sublithographic to fine crystalline limestone
6	Gull River Formation: interbedded silty dolostone, lithographic to fine crystalline limestone, oolitic limestone, shale, and fine-grained calcareous quartz sandstone

Jacques, Whitford Limited

REFERENCE: ONTARIO GEOLOGICAL SOCIETY MAP P.2717 GEOLOGICAL SERIES - PRELIMINARY MAP PALEOZOIC GEOLOGY RUSSEL-THURSO AREA SOUTHERN ONTARIO

SCALE: 1 : 50 000

DATE: 94/12/16

DWN. BY:

APP'D BY:

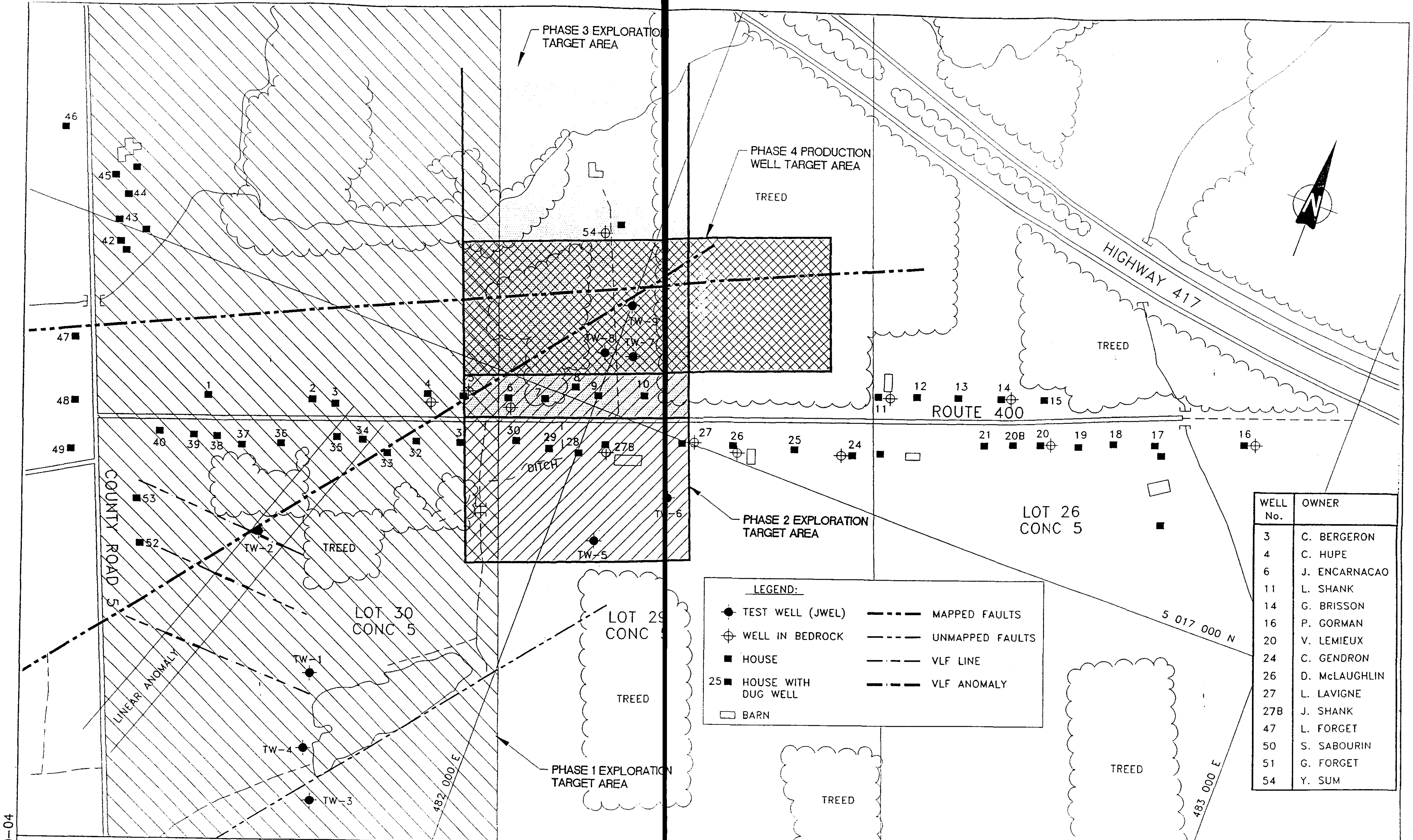
TOWNSHIP OF CAMBRIDGE

FOREST PARK COMMUNAL WATER SUPPLY INVESTIGATION

TOWNSHIP OF CAMBRIDGE, ONTARIO

BEDROCK GEOLOGY

DRAWING NO. 30340-103



WELL No.	OWNER
3	C. BERGERON
4	C. HUPE
6	J. ENCARNACAO
11	L. SHANK
14	G. BRISSON
16	P. GORMAN
20	V. LEMIEUX
24	C. GENDRON
26	D. McLAUGHLIN
27	L. LAVIGNE
27B	J. SHANK
47	L. FORGET
50	S. SABOURIN
51	G. FORGET
54	Y. SUM

FILE 30340-04

Jacques Whitford

REFERENCE :

SCALE : 1 : 5000
DATE : 94/12/01
DWN. BY : GBB
APP'D BY : 8C7

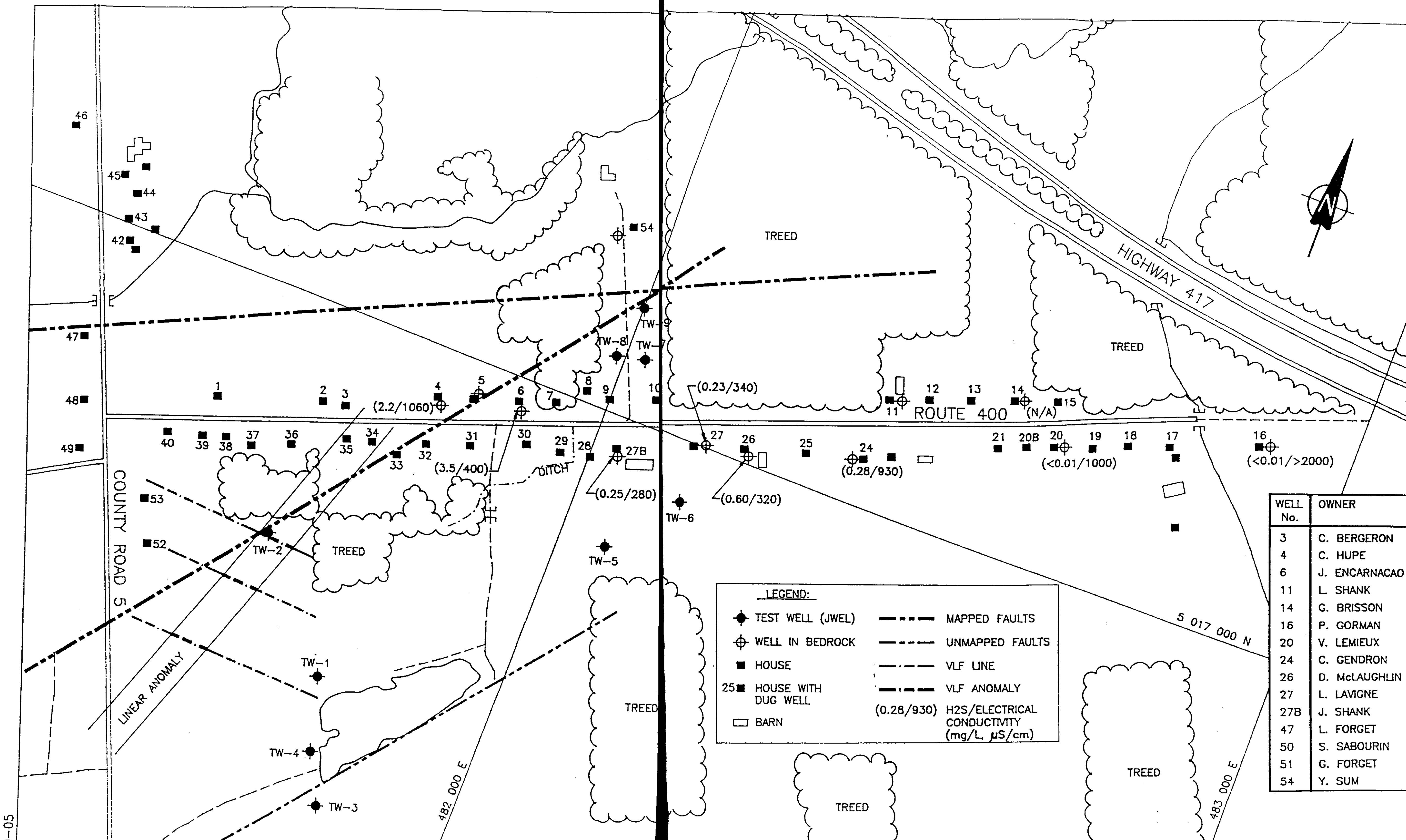
TOWNSHIP OF CAMBRIDGE

FOREST PARK COMMUNAL WATER SUPPLY INVESTIGATION

TOWNSHIP OF CAMBRIDGE, ONTARIO

EXPLORATION TARGET AREAS

DRAWING No.: 30340-104



WELL No.	OWNER
3	C. BERGERON
4	C. HUPE
6	J. ENCARNACAO
11	L. SHANK
14	G. BRISSON
16	P. GORMAN
20	V. LEMIEUX
24	C. GENDRON
26	D. McLAUGHLIN
27	L. LAVIGNE
27B	J. SHANK
47	L. FORGET
50	S. SABOURIN
51	G. FORGET
54	Y. SUM

Jacques Whitford

SCALE : 1 : 5000
DATE : 94/12/16
DWN. BY : GBB
APP'D BY : SM

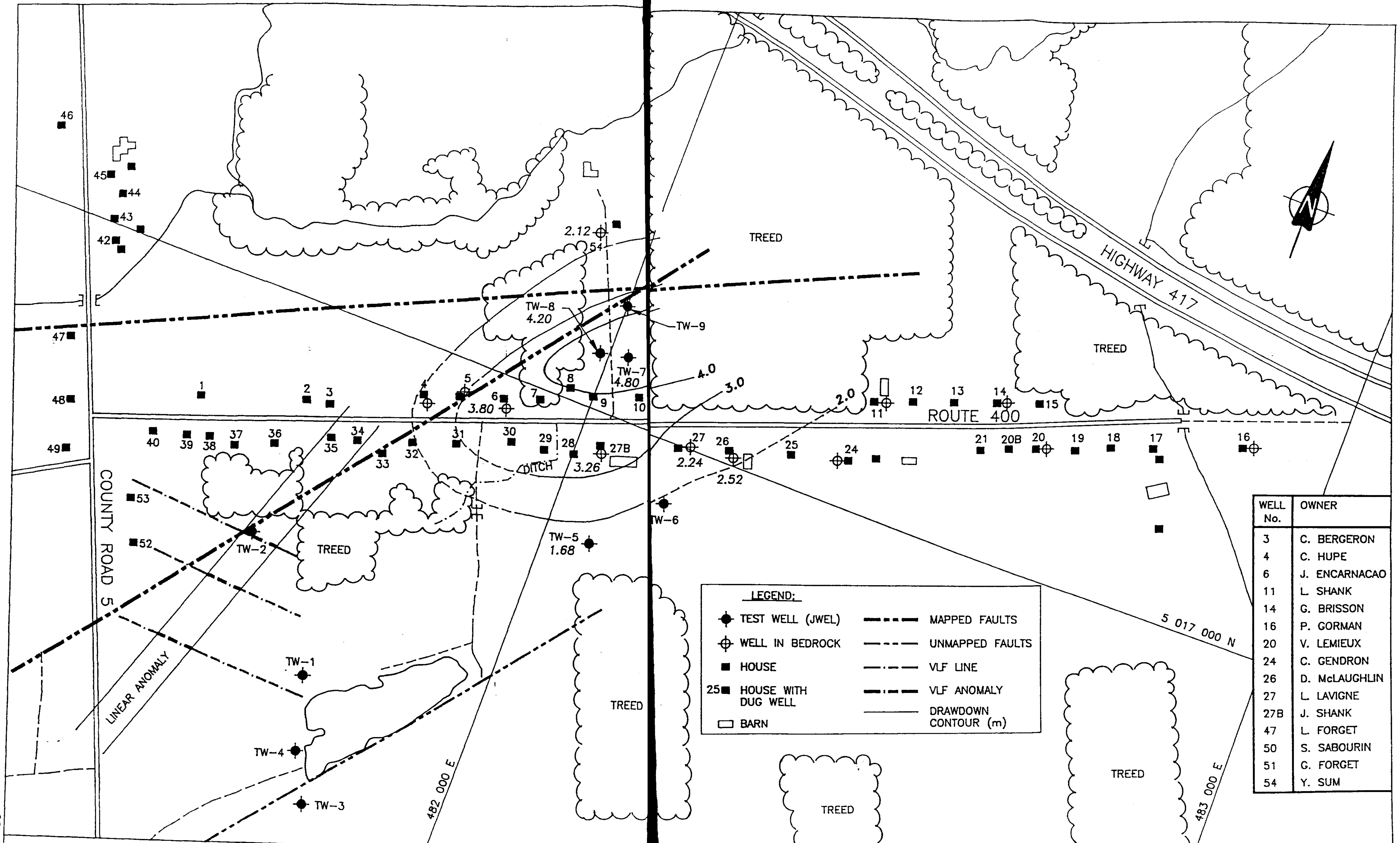
TOWNSHIP OF CAMBRIDGE

FOREST PARK COMMUNAL WATER SUPPLY INVESTIGATION

TOWNSHIP OF CAMBRIDGE, ONTARIO

GEOPHYSICAL AND RESIDENTIAL WELL SURVEYS RESULTS

DRAWING No.: 30340-105



WELL No.	OWNER
3	C. BERGERON
4	C. HUPE
6	J. ENCARNACAO
11	L. SHANK
14	G. BRISSON
16	P. GORMAN
20	V. LEMIEUX
24	C. GENDRON
26	D. McLAUGHLIN
27	L. LAVIGNE
27B	J. SHANK
47	L. FORGET
50	S. SABOURIN
51	G. FORGET
54	Y. SUM

FILE 30340-06

Jacques Whitford

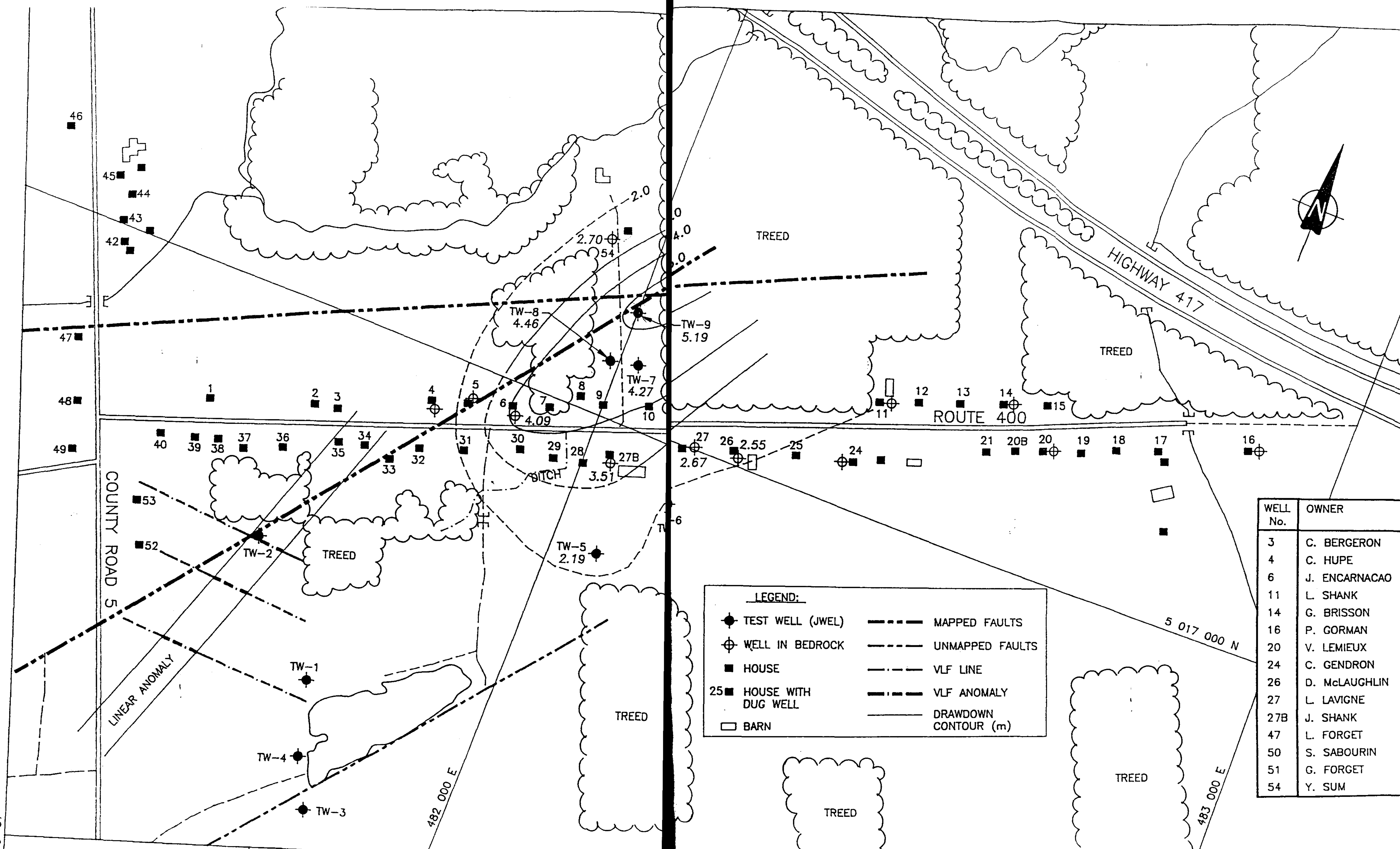
REFERENCE :

SCALE : 1 : 5000
DATE : 94/12/01
DWN. BY : GBB
APP'D BY : SM

TOWNSHIP OF CAMBRIDGE
FOREST PARK COMMUNAL WATER SUPPLY INVESTIGATION
TOWNSHIP OF CAMBRIDGE, ONTARIO

PUMP TEST TW-7
DRAWDOWN AT 15 HOURS

DRAWING No.: 30340-106



WELL No.	OWNER
3	C. BERGERON
4	C. HUPE
6	J. ENCARNACAO
11	L. SHANK
14	G. BRISSON
16	P. GORMAN
20	V. LEMIEUX
24	C. GENDRON
26	D. McLAUGHLIN
27	L. LAVIGNE
27B	J. SHANK
47	L. FORGET
50	S. SABOURIN
51	G. FORGET
54	Y. SUM

FILE 30340-07

Jacques Whitford

REFERENCE :

SCALE : 1 : 5000
DATE : 94/12/01
DWN. BY : GBB
APP'D BY :

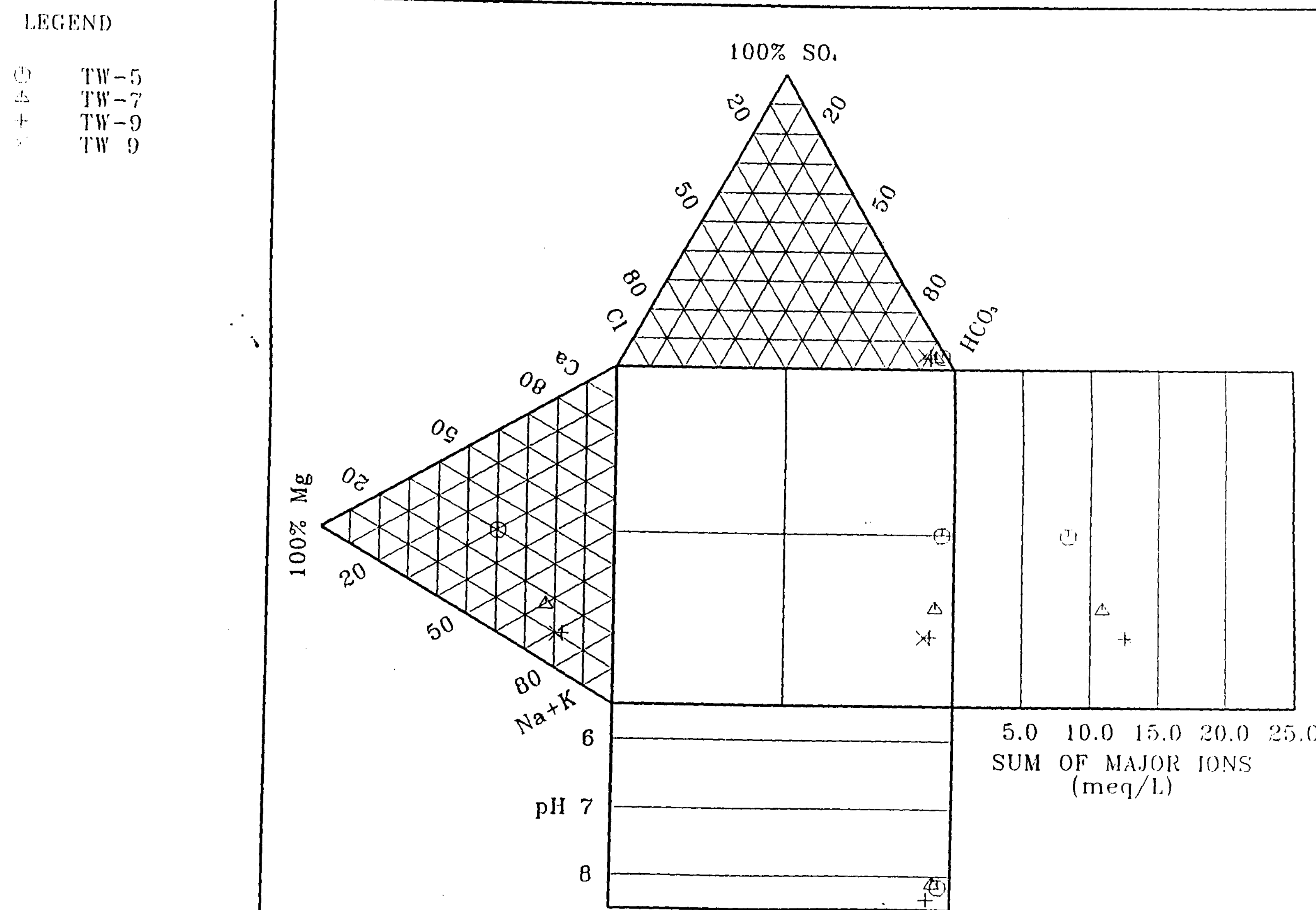
TOWNSHIP OF CAMBRIDGE
FOREST PARK COMMUNAL WATER SUPPLY INVESTIGATION
TOWNSHIP OF CAMBRIDGE, ONTARIO

PUMP TEST TW-9 DRAWDOWN AT APPROX. 72 HOURS

DRAWING No.: 30340-107

Drawing 30340-108

Major Ion Chemistry
Forest Park Groundwater Chemistry



July 10, 1995

File No. 30340

Mr. Fernand Dicaire, CET
McNeely Engineering Consultants Limited
880 Taylor Creek Drive
Orleans, Ontario K1C 1T1

Dear Mr. Dicaire:

Re: Hydrogeological Investigation (Phase 5)
Communal Water Supply
Community of Forest Park

1.0 INTRODUCTION

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This draft letter report provides the results of Phase 5 of the Hydrogeological Investigation conducted to identify an alternative groundwater supply for the community of Forest Park in the Township of Cambridge. Phases 1 to 4 were previously completed by Jacques Whitford Environment Limited (JWEL). JWEL provided the results in a report to McNeely Engineering Consultants Limited (MECL), dated December 16, 1994. This letter report should be read in conjunction with JWEL's previous report.

The purpose of the Phase 5 work was to determine interference effects and the long term yield of an aquifer identified in JWEL, 1994, with the potential to service Forest Park. The scope of work included: a step test on Observation Well (OW) 54, i.e. Sum Well; a 24-hr pumping test on OW-54; and a 72-hr multiwell pumping test on OW-54 and Test Well (TW) 9. Gilles Bourgeois Well Drilling Ltd. assisted with the pumping tests. Figures 30340-109 and 30340-110 (attached) provide the locations of all test wells and observation wells.

JWEL conducted Phase 5 in accordance with our proposal to MECL, dated January 11, 1995.

2.0 METHODOLOGY

2.1 24-hour Pumping Test on OW-54

Prior to carrying out a 24-hour pumping test on OW-54, i.e. Sum Well, a Ministry of the Environment and Energy (MOEE) Water Taking Permit was requested and obtained by JWEL on June 9, 1995. A copy of the permit is contained in Appendix 1. Gilles Bourgeois Well Drilling Ltd. assisted JWEL with both the 24-hr and 72-hr pumping tests by supplying and installing the required pumps, and monitoring water levels in conjunction with JWEL.

Testing of OW-54 commenced with a step test, conducted on June 14, 1995. The purpose of the step test was to determine the optimum discharge for the 24 hour pumping test. The test consisted of four, 30 minute steps, conducted at increasing pumping rates and no recovery in between steps. The pump was set at 22 m Below Top of Casing (BTC); the static water level was 5 mBTC. The pumping rates were 0.046, 0.091, 0.136, and 0.173 m^3/min, with total drawdowns of 2.0, [illegible].6, 5.2, and 11.6 m, respectively. Based on these results, JWEL decided to conduct the 24-hr test on OW-54 at a pumping rate of 0.159 m^3/min.

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Starting at approximately 9 AM on June 15, 1995, OW-54 was pumped for a period of 24 hours, at a constant pumping rate of 0.159 m^3/min. JWEL monitored groundwater levels during 24 hours of pumping and 8 hours of recovery in the pumping well, in eight observation wells installed in overburden (i.e. OW's 8, 10 *or 9 and 10???, 25, 28, 29, 30, 31, and 32), and in 10 observation wells installed in bedrock (i.e. TW's 2, 5, 6, 7, 8, 9 and OW's 11, 24, 27B, 27). Prior to pumping, JWEL measured static levels in the pumping well and all observations wells.

At the end of the 24-hr pumping test, JWEL collected a groundwater sample from the pumping well. The sample was submitted to Accutest Laboratories Limited (Accutest), Nepean, Ontario, for analysis of the MOEE "Subdivision Set" of parameters.

2.2 72-hour Pumping Test on OW-54 and TW-9

Based on results to date, JWEL decided to conduct the72-hr multiwell test at a pumping rate of 0.123 m^3/min at OW-54 and 0.185 m^3/min at TW-9. However, due to interference with OW-27B, the pumping rate at TW-9 was lowered to 0.124 m^3/min by the end of the test. JWEL monitored groundwater levels during 72 hours of pumping and 8 hours of recovery in the pumping wells, and in the observation wells noted in Section 2.1.

At the end of the 72-hr pumping test, JWEL collected a groundwater sample from TW-9 which was submitted to Accutest for analysis of the MOEE "Subdivision Set" of parameters. In addition, JWEL collected groundwater samples from TW-9 and OW-54 which were submitted to Waterloo... for tritium analyses.

3.0 RESULTS

3.1 24-hour Pumping Test on OW-54

The drawdown and recovery data collected during the 24-hr pumping test on OW-54 were analyzed using the Cooper- Jacob solution to obtain values for aquifer transmissivity and storage coefficient. This is a solution for confined aquifers and, therefore, concluded to be valid for the subject site. Results are summarized in Table 1. Appendix X provides the field measurements made of the well discharge and water levels in the pumping and observation wells, as well as the time-drawdown curves.

In general, the transmissivity and storage coefficient values calculated for the aquifer are low. Based on the pumping well data, the aquifer transmissivity is 0.021 m^2/min. Based on observation well data, the aquifer transmissivity ranges from 0.029 to 0.066 m^2/min and the storage coefficient ranges from 10^{-4} to 10^{-6}. Therefore, in general, the drawdown and recovery data from both the pumping well and the observation wells indicate relatively consistent aquifer hydraulic properties. Based on the time-drawdown curves, no recharge or impermeable boundaries to the aquifer were encontered within 24-hrs of pumping.

The safe well yield represents the maximum discharge rate that a well may be pumped at long term, without degrading the aquifer. The safe well yield is strongly dependent on the aquifer transmissivity used in the calculation, and the available drawdown at the pumping well. For the purposes of this discussion, available drawdown is the depth to the top of the fracture zone (i.e. aquifer), minus the depth to the static water level. Clearly, if the pump were placed above the fracture zone, the available drawdown would decrease accordingly.

JWEL estimated the 20 year safe well yield to be 0.214 m^3/min (47 iGPM) for OW-54, using the following equation:

$$Q_{20} = 0.68 \times T \times \Delta s \times 0.8$$

where

Q_{20}	= 20 year safe well yield (m^3/day)
0.68	= constant
T	= aquifer transmissivity (m^2/day)
Δs	= available drawdown (m)
0.8	= safety factor

This equation assumes no recharge to the aquifer for 20 years and, therefore, is considered conservative.

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Drawdown in the bedrock observation wells, located 107 to 629 m from the pumping well, ranged from 0.29 to 1.76 m, in T[illegible] and [illegible]-8, respectively. Drawdown data is summarized in Table 1 and shown on Drawing 30340-109 (attached). The majority of the drawdown occurs within less than 100 m of the pumping well. Even if the early (i.e. 0 - 5 min) drawdown data in the pumping well is negated to account for well storage, more than 66% of the drawdown occurs within 100m of the pumping well. Therefore, the cone of depression could be described as relatively steep, which is typical of low transmissivity aquifers.

Drawdown does not appear to be significantly greater in any one direction. However, no data is available between TW-8 and TW-2, along the suspected higher transmissivity fault zone, because the owner of OW-6 would not allow monitoring of his well.

TW-6 and the shallow dug wells showed no response to the 24-hr pumping test. Some fluctuations in water levels were detected in the dug wells, but they seemed to correlate with times of anticipated water use, i.e. early morning and evening.

3.2 72-hour Pumping Test on OW-54 and TW-9

The drawdown and recovery data collected during the 72-hr multiwell pumping test on OW-54 and TW-9 were analyzed using the Theis solution to obtain values for aquifer transmissivity and storage coefficient. This is a solution for confined aquifers which supports variable pumping rates and multiple pumping wells and, therefore, concluded to be appropriate for the multiwell pumping test. Results are summarized in Table 1. Appendix X provides the field measurements made of the well discharge and water levels in the pumping and observation wells, as well as the time-drawdown curves.

In general, the transmissivity and storage coefficient values calculated for the aquifer are low. Based on data from OW-54, the aquifer transmissivity is 0.051 m^2/min; based on data from TW-9, the aquifer transmissivity is 0.046 m^2/min; and based on observation well data, the aquifer transmissivity ranges from 0.030 to 0.049 m^2/min and the storage coefficient ranges from 10^{-4} to 10^{-6}. Therefore, in general, the drawdown and recovery data from both the pumping wells and the observation wells indicate relatively consistent aquifer hydraulic properties. The transmissivities calculated for OW-54 and TW-9 are slightly higher than those calculated elsewhere (see Table 1). However, it is important to note that they are of the same order of magnitude, which is about the accuracy obtainable for transmissivity measurements.

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Based on the time-drawdown curves, [illegible] recharge boundary to the aquifer was encountered approximately halfway th[illegible] the test.

JWEL estimated the 20 year safe well yield to be 0.533 m^3/min (117 iGPM) for OW-54, and 0.395 m^3/min (97.0 iGPM) for TW-9, using the equation provided in Section 3.1. As noted above, the transmissivities obtained from the multiwell test for OW-54 and TW-9 were slightly higher than from the single well tests, therefore, the slightly higher safe yields.

If we calculate safe well yields using an average transmissivity from the observation well data instead (i.e. 0.033 m^2/min), we estimate 0.345 m^3/min (75.8 iGPM) for OW-54 and 0.284 m^3/min (62.5 iGPM) for TW-9. The higher safe well yield estimated for OW-54 compared to TW-9, using the same transmissivity value, is due to its higher available drawdown.

The above highlights the influence that variations in transmissivity and available drawdown have on predicting safe well yields. In general, JWEL would recommend using transmissivity values obtained from single well pumping tests, because the solution of these tests is simpler.

As noted in Section 3.1, the equation used to estimate well yields assumes no recharge to the aquifer for 20 years. However, as discussed earlier in this section, the time-drawdown curves for the multiwell pumping test suggests that some recharge to the aquifer may be occurring. Therefore, the estimated 20-year safe well yields are conservative.

Drawdown in the bedrock observation wells, located 107 to 629 m from OW-54, ranged from 1.25 to 4.45 m, in OW-11 and TW-7, respectively. Drawdown data is summarized in Table 1 and shown on Drawing 30340-110 (attached).

Total drawdown in TW's-7, 8 and 9 was very similar, suggesting that these wells are interconnected and tapping the same fracture system. In general, drawdown appears to be greater towards the south and southwest. The latter may be a reflection of a higher transmissivity zone along the proposed fault zone trending southwest. However, as noted in Section 3.1, no data is available between TW-8 and TW-2, along the proposed fault zone, because the owner of OW-6 would not allow monitoring of his well. Greater drawdown to the south may also indicate a higher transmissivity fracture system trending north-south. This may account for the relatively high yield of OW-54, which lines up with this trend.

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In general, drawdown due to the multiw[illegible]tes[illegible] is in line with that of the single well pumping tests. Specifically, drawd[illegible]y be greater towards the southwest, along the proposed fault zone; the cone of depression is relatively steep, particulary around OW-54; and the majority of drawdown occurs within 100 - 300 m of the pumping wells. These findings are consistent with a confined aquifer of low transmissivity.

TW-6 and the shallow dug wells showed no response to the multiwell pumping test (CHECK). Some fluctuations in water levels were detected in the dug wells, but they seemed to correlate with times of anticipated water use, i.e. early morning and evening.

3.3 Groundwater Chemistry

Table 2 (attached) provides the results of chemical testing from Phases 2 to 5. Appendix X contains the Rreports of Analyses provided by Accutest, for the Phase 5 chemical testing.

The chemical results from OW-54 indicate several parameters that exceed the Ontario Drinking Water Objectives (ODWO), as follows: sodium, turbidity, colour, total organic carbon (TOC), total dissolved solids (TDS), hydrogen sulphide, and organic nitrogen. In general, the water is soft; indicative of reducing conditions in the aquifer, as indicated by the presence of ammonia and hydrogen sulphide; and relatively high in organic content, as indicated by elevated levels of tannin and lignin, organic nitrogen, and TOC.

Some of the water quality problems with this well may be attributable to poor well construction, i.e. no grouting around the casing. However, the well was constructed in the early 1980's and, therefore, is not that old. A water well record has not been available for review.

Assuming that the water quality at OW-54 is indicative of groundwater in the bedrock aquifer , water treatment would be required for sodium, turbidity, colour, TOC, TDS, hydrogen sulphide, and organic nitrogen.

The chemical results from TW-9 indicate better quality groundwater than that encountered in OW-54. However, two parameters exceeded ODWO, as follows: colour and hydrogen sulphide. As in OW-54, the water chemistry indicates reducing conditions in the aquifer. Water treatment would be required for colour and hydrogen sulphide.

Based on the above results, it is possible that with long term pumping of TW-9, water quality may decline as groundwater in the vicinity of OW-54 migrates towards TW-9. In addition, locations for additional production wells to the north, east and west of TW-9, as recommended by JWEL (1994), may intersect poor quality water, as indicated by results from OW-54, which is north of TW-9.

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4.0 SUMMARY AND CONCLUSIONS

The shallow bedrock aquifer tested in the vicinity of TW-9 and OW-54 may be a viable groundwater resource for the Community of Forest Park. However, there are three main issues relevant to this conclusion. They are discussed in the following sections.

4.1 Water Quantity of the Target Aquifer

Based on a mean aquifer transmissivity of 0.033 m^2/min, the aquifer in the vicinity of TW-9 appears capable of sustaining a 20 year safe yield on the order of 50 to 60 iGPM. This assumes no recharge to the aquifer over 20 years. However, some recharge to the bedrock aquifer is likely occurring, based on pumping test data discussed above, and data discussed in JWEL, 1994. Therefore, the estimated safe yield may be conservative.

In order to obtain the required yield of upwards of 130 iGPM, at least two more production wells with safe yields of greater than 40 iGPM would be required. The production wells should be separated by a minimum of 200 m. Based on results to date, this may require drilling many more than two additional wells, in order to intersect water bearing fracture zones with adequate yields.

The safe yield obtainable in the vicinity explored to date is severely constrained by the depth of the aquifer, i.e. fracture zone, which limits the available drawdown. As discussed in Sections 3.1 and 3.2, the safe yield is dependent on the aquifer transmissivity and available drawdown. There is no indication that the depth to the aquifer is any deeper in potential exploration areas to the north, east, or west of TW-9.

4.2 Domestic Well Interference

Based on results provided above, and in JWEL, 1994, significant interference with domestic bedrock wells can be expected within approximately 200 m of production wells. Domestic bedrock wells within this area may have to be abandoned and the houses connected to the communal system. With respect to TW-9, this may require abandoning on the order of three to six wells.

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If additional production wells are i[illegible]e north or east of TW-9, there should be no additional domestic wells impacted. [illegible]ever, production wells to the west of TW-9 may impact additional domestic wells.

Results suggest that domestic overburden wells will not be impacted by a communal well system. However, a monitoring program should be established during any long term pumping tests to further confirm this.

4.3 Water Quality of the Target Aquifer

The chemical results from OW-54 indicated several parameters that exceed the Ontario Drinking Water Objectives (ODWO), specifically: sodium, turbidity, colour, total organic carbon (TOC), total dissolved solids (TDS), hydrogen sulphide, and organic nitrogen. The chemical results from TW-9 indicate better quality groundwater than that encountered in OW-54. However, two parameters exceeded ODWO, as follows: colour and hydrogen sulphide.

In conclusion, water treatment would be required at TW-9 for colour and hydrogen sulphide. Furthermore, it is possible that with long term pumping of TW-9, water quality may decline as groundwater in the vicinity of OW-54 migrates towards TW-9. In addition, locations for additional production wells to the north, east and west of TW-9, as recommended by JWEL (1994), may intersect poor quality water, as indicated by results from OW-54, which is north of TW-9.

The areas to the north, east, and west of TW-9 are still recommended for exploration based on anticipated well yields in the area and/or distance from domestic wells.

5.0 RECOMMENDATIONS

Based on results provided in the above letter report and in JWEL, 1994, we make the following recommendations:

- The cost for a communal well system should be updated incorporating the above comments with respect to water treatment, domestic well interference, and additional drilling, to determine the feasibility of this alternative.
- Potential well locations which could be explored are to the north, west, and east of TW-9. Locations to the north and east should be recommended for exploration first, based on potential higher transmissivity zones trending north and northeast, and distance from domestic wells.
- Any test wells that are not to be used as monitoring wells or production wells should be properly abandoned.

6.0 CLOSURE

We trust that the above is satisfactory for your current requirements. Please contact Ms. Ingrid Reichenbach if you have any questions or require additional information.

Yours truly,

JACQUES WHITFORD ENVIRONMENT LIMITED

Ingrid Reichenbach, M.Sc., Hydrogeologist

TABLE 2
GROUNDWATER CHEMICAL RESULTS

Parameter	Units	MDL	TW 5 94/01/26	TW 7 94/06/02	TW 9 94/09/19 @ 1 hr	TW 9 94/09/22 @ 72 hr	TW 9 94/11/03 @ 24 hr	SUM 95/6/16 @ 24 hr	TW 9 95/6/22 @ 72 hr	ODWO
Fe	mg/L	0.01	0.13	0.04	0.08	0.02	0.02	0.11	0.05	0.30 ^{ao}
Mn	mg/L	0.01	0.01	nd	nd	nd	nd	0.01	nd	0.05 ^{ao}
Hardness	mg/L CaCO3	1	149	103	75	89	94	22	97	80-100 ^{og}
Alkalinity	mg/L CaCO3	1	200	242	269	291	285	454	269	500 ^{og}
pH			8.16	8.12	8.51	8.35	8.52	8.66	8.35	6.5-8.5 ^{og}
Conductivity	umhos/cm	3	374	477	543	583	586	1043	545	nve
F	mg/L	0.01	0.43	0.57	0.67	0.65	0.59	1.34	0.60	1.5 ^{hn}
Na	mg/L	1	26	[illegible]	93	98	100	250	83	20/200 ^{ao}
N-NO3	mg/L	0.1	nd	nd	nd	nd	nd	0.19	nd	10.0 ^{hn}
N-NO2	mg/L	0.1	nd	nd	nd	nd	nd	nd	nd	1.0 ^{hn}
N-NH3	mg/L	0.01	0.37	0.40	0.53	0.50	0.54	0.45	0.49	nve
SO4	mg/L	3	9	10	15	12	15	4	16	500 ^{ao}
Cl	mg/L	1	2	6	7	11	14	50	12	250 ^{ao}
Phenols	mg/L	0.002	nd	nd	nd	nd	nd	nd	nd	nve
Turbidity	NTU	0.1	3.2	3.0	5.1	1.2	0.7	26	0.5	1.0 ^{hn}
Colour	Pt/Co units	2	3	10	22	18	19	146	8	5 ^{ao}
Ca	mg/L	1	25	19	12	14	13	4	14	nve
Mg	mg/L	1	20	16	11	13	15	3	15	nve
Tannin & Lignin	mg/L	0.1	nd	0.6	1.1	0.6	0.6	3.2	0.4	nve
TKN	mg/L	0.01	0.37	0.41	0.65	0.88	0.54	0.92	0.54	nve

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TABLE 2 (CONTINUED)
GROUNDWATER CHEMICAL RESULTS

Parameter	Units	MDL	TW 5 94/01/26	TW 7 94/06/02	TW 9 94/09/19 @ 1 hr	TW 9 94/09/22 @ 72 hr	TW 9 94/11/03 @ 24 hr	SUM 95/6/16 @ 24 hr	TW 9 95/6/22 @ 72 hr	ODWO
K	mg/L	1	5	7	6	6	6	4	7	nve
TOC	mg/L	0.2	1.0	2.10	3.2	3.2	2.9	9.61	2.6	5.0 [ao]
TDS	mg/L	1	210	280	330	330	300	624	326	500 [ao]
H2S	mg/L	0.01	0.02	0.42	0.14	0.34	0.27	0.43	0.30	0.05 [ao]
Organic Nitrogen	mg/L	0.01	0.00	0.00	0.12	0.18	0.00	0.45	0.05	0.15 [og]
Ion Balance	mg/L		0.98	1.09	0.96	0.96	0.99			
Total Coliforms	cts/100 mls		4	0	10	0	0	0	0	0 [ho]
Faecal Coliforms	cts/100 mls		0	[illegible]	6	0	0	0	0	0 [ho]
Faecal Streptococci	cts/100 mls		0	0	0	0	0	2	0	nve
E.Coli	cts/100 mls		0	0	0	0	0	0	0	0 [ho]
Standard Plate Count	cts/1 ml		< 1	< 1	39	Bacteria	5	< 1	< 1	500

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Notes:

nd = not detected
MDL = Method Detection Limit
ODWO = Ontario Drinking Water Objectives (MOEE, 1994); shaded values exceed ODWO
nve = no value established
ao = aesthetic objective
og = operational guideline
ho = health-related objective

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