MOREY HOULE CHEVRIER ENGINEERING LTD.

2204 Abbott Road, RR5
Kemptville, Ontario K0G 1J0
Tel: (613) 258-3742
Fax: (613) 258-4541

REPORT ON

HYDROGEOLOGICAL INVESTIGATION AND TERRAIN EVALUATION PROPOSED RESIDENTIAL SUBDIVISION MERRICKVILLE ESTATES SCOTCH LINE ROAD TOWNSHIP OF MERRICKVILLE WOLFORD, ONTARIO

Submitted to:

1605861 Ontario Ltd
(Merrickville Estates)
4273 Green Gables Lane
Gloucester, Ontario
K1V 1S4

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February 2005

041-444

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February 28, 2005

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1605861 Ontario Ltd
(Merrickville Estates)
4273 Green Gables Lane
Gloucester, Ontario
K1V 1S4

Attention: Mr. C. Fournier, P. Eng.

RE: HYDROGEOLOGICAL INVESTIGATION AND TERRAIN EVALUATION
PROPOSED RESIDENTIAL SUBDIVISION
MERRICKVILLE ESTATES, SCOTCH LINE ROAD
TOWNSHIP OF MERRICKVILLE-WOLFORD, ONTARIO

Dear Sirs:

This report presents the results of a hydrogeological investigation and terrain evaluation conducted by Morey Houle Chevrier Engineering Ltd. for the above noted proposed residential development.

Should you have any questions on any aspect of this report, or if we may be of further assistance to you on this project, please do not hesitate to contact the undersigned at your earliest convenience.

Yours truly,

Morey Houle Chevrier Engineering Ltd.

C. R. Morey, P. Eng.

File 041-444

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1.0 INTRODUCTION

Morey Houle Chevrier Engineering Ltd. was retained by 1605861 Ontario Ltd. of Gloucester, Ontario to undertake a hydrogeological investigation and terrain evaluation for a site located on Scotch Line Road in the Township of Merrickville Wolford, Ontario (See Key Plan, Figure 1). The development project is known as Merrickville Estates.

The site consists of an area of approximately 100 hectares (270 acres) located on the south/west sides of Scotch Line Road about one kilometer southeast of the Village of Merrickville, in the Township of Merrickville Wolford, Ontario. It is understood that due to the presence of a provincially significant wetland located in the southeast portion of the site only about two thirds of the site, or about 67 hectares, will be developed for residential purposes. The present development plan is to subdivide that portion of the site into some 67 lots for single family dwelling construction. The proposed dwellings will be serviced by private septic systems and wells. The minimum lot size will be 0.8 hectares with the average lot size in excess of 1.0 hectare. Local residential roadways will be constructed to service the lots.

The site is bordered on the north by some scattered residential development, undeveloped land development and the Village of Merrickville beyond. A former land fill, closed some 20 to 25 years ago, exists about 400 metres north of the site. All of the dwellings near the site are serviced by private septic systems and wells. Undeveloped land and wetlands/low lying areas exist on the east, south and west sides.

Based on a review of the surficial geology map for the site area, it is expected that the portion of the site to be developed is underlain for the most part by a thin veneer of sandy overburden follow by bedrock consisting of dolomite of the Oxford formation. Some fine to medium sand deposits may be present in the northwest portion of the site.

A report entitled Village of Merrickville -Wolford Municipal Groundwater Management Study, prepared by Golder Associates Ltd. in 2000, includes the present study area. That report indicates that the groundwater flow for the aquifer intercepted by the Village of Merrickville wells is from south to north towards the Rideau River. The report indicates that the average precipitation for the area is 910 millimetres, with normal annual potential evapotranspiration of 547 millimetres and normal annual water surplus of 364 millimetres . The report indicates that most of the Village of Merrickville-Wolford is a transitional zone with regards to groundwater discharge/recharge. The report indicates that the proposed subdivision is within a "Restricted Use Zone" from a municipal well head protection point of view. The County of Leeds Grenville has

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confirmed that there are no known or documented environmental constraints to residential development on private on-site services on or in the area of the subject lands.

2.0 FIELD PROCEDURES

The objectives of this study were:

* to determine the shallow subsurface soil and groundwater conditions relative to the design of Class IV septic sewage disposal systems.

* to investigate the potential quantity and quality of groundwater available from drilled wells for domestic supply.

* to investigate any inter connectivity between the supply aquifer and the receiving aquifer.

2.1 Terrain Evaluation

The field work for the terrain evaluation was carried out on November 4, 2004 at which time sixteen test pits were put down across the site. The test pits were advanced to depths of some 0.2 to 2.3 metres below the existing ground surface using a tire mounted back hoe supplied and operated by a local excavating contractor. The soils types, depths to strata changes, and groundwater conditions were recorded at each test pit location by a member of our engineering staff. Monitoring wells were installed in test pits 6, 10 and 16 and two additional monitoring wells with installations, number MW 2-1/2-2 and MW 3-1/3-2 were drilled into the upper bedrock for the purpose of sampling and testing for nitrate and to determine the upper groundwater flow direction. A sample of groundwater was obtained from each of the monitoring wells and submitted to Accutest Laboratories for nitrate testing on February 22, 2005.

The approximate locations of the test pits and monitoring wells are shown on the attached Site Plan, Figure 2 and a description of the various soils and groundwater conditions encountered in the test pits is given in the attached Table I.

2.2 Groundwater Supply Investigation

To determine the quantity and quality of groundwater available for domestic water supply, six test wells numbered TW 1, TW 2, TW 3, TW 4, TW 5 and TW 6 were pump tested and sampled. The approximate locations of the test wells are shown on the attached Site Plan, Figure 2, as symbols W1 to W6, respectively. Test wells TW 1 and TW 2 were drilled on December 14, 2004, TW 3 on November 29, 2004, and TW 5 and TW 6 on January 31, 2005 by Air-Rock Drilling Co. Ltd. of Richmond, Ontario. (see Appendix C).

The water well records for the test wells supplied by the well drillers indicate that nominal 16 centimetre inside diameter steel casings were installed through the overburden and were set well into the bedrock and grouted in place. The wells were drilled to final depths using a 15 centimetre diameter bit and completed as an open hole in the bedrock. TW 1, TW 2, TW 3, TW 4, TW 5 and TW 6 were drilled into the bedrock to final depths of some 36.6, 30.5, 30.5, 30.5, 24.4 and 24.4 metres, respectively, below the existing ground surface.

Pumping tests were conducted on TW 2 and TW 3 on December 29 and December 9, 2004, respectively and on TW 1, TW 4, TW 5 and TW 6 on January 9, February 11, February 7 and February 8, 2005, respectively. The pumping tests consisted of a 6 to 10.5 hour duration constant discharge rate pumping test. During the pumping tests, water level measurements were made on a regular basis to monitor the drawdown of the water level in the wells in response to pumping. After the pumping period, the pump was shut off and the recovery of the water level in the test wells was monitored for a period of time.

Groundwater samples were collected from the test wells at about hour 1 or 3 and at hour 6 of the pump tests to characterize groundwater quality. The groundwater samples from the test wells were collected and prepared/preserved in the field using appropriate techniques and submitted to Accutest Laboratories Ltd. in Nepean, Ontario for the chemical, physical and bacteriological analyses listed in the Ministry of the Environment (MOE) guideline entitled Procedure D-5-5, Technical Guideline for Private Wells: Water Supply Assessment, August 1996. The temperature, conductivity, pH, turbidity, sulphide and residual chlorine levels of the groundwater were measured at periodic intervals during the pumping tests.

3.0 TERRAIN EVALUATION

3.1 Soil and Groundwater Conditions

This section provides a summarized account of the subsurface soil and groundwater conditions on the subject property based on the information obtained at the test pit locations. Details of the subsurface conditions at each test hole location are presented in the attached Table I. It is noted that in some cases the stratigraphic boundaries within the overburden represent a transition between soil types rather than an exact plane of geologic change. Subsurface conditions differing somewhat from those reported can be expected to exist at the site.

In general, the overburden materials at the site are indicated to consist of topsoil followed by bedrock or topsoil overlying a relatively thin layer of sand or silty sand followed by bedrock.

Topsoil was encountered from the surface at all of the test pit locations except test pit 16. The topsoil typically ranges in thickness from some 0.2 to 0.3 metres. Beneath the topsoil, at most of the test pits a deposit of red brown to yellow brown to grey brown sand to silty sand was encountered ranging in thickness from about 0.2 to 2.0 metres. Test pit 16 encountered sand fill from the surface and was terminated in the native sand material at a depth of some 2.1 metres below the existing ground surface. Bedrock was encountered beneath the topsoil or sand/silty sand, at all of the remaining test pits.

All of the test pits were dry upon completion of excavating on November 4, 2004.

The total overburden thickness, as indicated by the test well records provided by the well driller and the results of the test pits ranges from about 0.2 to 2.3 metres.

3.2 Class IV Septic Sewage Disposal Systems

This section discusses the implications of the site-specific terrain conditions in terms of the feasibility of installing Class IV septic sewage disposal systems on the proposed lots.

3.2.1 Septic System Envelopes

The septic system envelope area (septic envelope) represents the area on a lot set aside for the construction of the leaching bed and is for the leaching bed only and does not include that area required for the septic tank or the isolation/separation distances required by the Ontario Building Code. The deposit or disposal of any materials or the placement of any structure or the operation of any equipment, other than material, structures or equipment required for the construction of the sewage system within or upon the septic envelope is prohibited.

The size of the septic envelopes are a function of the percolation time of the native soil in the vicinity of the septic envelope or the fill used for construction of a septic bed and the daily effluent loading to the septic bed. The percolation rate for the sand and silty sand soils at this site is estimated at between 5 and 20 minutes per centimeter.

As a conservative approach to determining the expected largest septic system envelope required to service a single family dwelling at this site, a septic system envelope size was calculated assuming a fully raised bed using a percolation rate of 8 minutes per centimetre for the imported sand required and a daily sewage flow of 3000 litres. A design flow of 3000 litres per day is suitable for a five bedroom dwelling with 250 square metres of finished area and 30 fixture units. For comparison purposes, the septic system envelope for a more traditional size dwelling having a daily effluent design flow of 2000 litres per day was also calculated. The following formulae were used to calculate the size of the septic envelope:

The larger of

$$A = Q/6$$

or

$$A = 1.6\ QT/200$$

plus

4:1 Leaching Bed Side Slopes and

Typical Mantle Area of 15 x 15 metres

where Q = daily sewage flow for the proposed dwelling (i.e., 3,000 litres per day)

T = percolation rate of imported fill material

The required size of the septic envelopes, based on the approach described above, is approximately 700 square metres (design flow 3000 l/d) and 550 square metres (design flow 2000 l/d). Given the proposed lot areas, sewage servicing using septic systems is considered acceptable.

Prior to establishing the actual septic envelope (leaching bed) location on any particular lot, several test holes should be excavated to determine the consistency/variability of the overburden in the vicinity of the proposed septic envelope and percolation rate tests should be carried out to determine the actual envelope area required. Where possible, the septic envelope on the proposed lots should be located in an area with the greatest thickness of native soil. Where less than about a 300 millimetre thickness of native soil will exist over the bedrock in a septic envelope area, it may be necessary to provide a suitable thickness of relatively impermeable material such as silty clay throughout the septic envelope to prevent direct entry of septic effluent into the bedrock.

Other site-specific considerations with respect to the locations of the septic envelopes (leaching beds) on the proposed lots are as follows:

* assuming that shallow groundwater flow within the upper overburden is from topographically higher areas to topographically lower areas, the septic envelopes should be situated in the topographically lower areas with the wells in the topographically higher areas.

* the separation distances between leaching beds and properly constructed drilled wells should be at least 15 metres for any inground beds and up to 18 metres for fully raised beds as required under the Ontario Building Code.

* in view of the shallow bedrock conditions throughout most of the site it is considered that Ontario Building Code approved tertiary treatment systems should be incorporated in the design of all the septic systems for the proposed development.

3.2.2 Leaching Bed Design Considerations

The design of leaching beds is a combination of a number of interrelated factors including effluent discharge volume, properties of the soil materials in the leaching bed, length of distribution lines and the subsurface conditions. The construction of individual septic disposal systems on the proposed lots should be carried out in accordance with the specifications set out in the Ontario Building Code.

The design must ensure that the bottom of the absorption trenches is at least 0.9 metres above bedrock or soils which are unsuitable for treatment of septic effluent (those with excessively low permeability), and at least 0.9 metres above the seasonally high groundwater table.

Based on the soil and groundwater conditions at the site, partially to fully raised type septic system leaching beds are likely to be used. In view of the variable subsurface conditions encountered in the test pits which range from sand to silty sand to bedrock, the actual leaching bed type appropriate for each lot will depend on the individual lot specific soil, bedrock and groundwater conditions.

Any partially to fully raised leaching beds should be constructed of imported sand having a percolation time of between 4 and 8 minutes per centimetre. It is recommended that in situ percolation rate tests and/or gradation analyses be carried out on any potential sand fill prior to leaching bed construction in order to verify that the percolation time of the fill material is acceptable.

Current regulations require that the upper 0.25 metre thickness of soil (soil mantle) underlying the raised portion of the leaching bed and extending at least 15 metres beyond the outer distribution pipes in any direction that effluent may migrate, has a percolation time between 1 and 50 minutes per centimetre. Although the native sandy soil in some portions of the site likely conforms to the desired percolation time for the purpose of constructing the soil mantle, the overburden in the downgradient directions from the leaching bed should be investigated on a lot-specific basis to ensure that the 0.25 metre depth requirement is met. If necessary, suitable imported fill may be used to construct the mantle or to augment the natural soil. It is suggested that the native soils be left in place when the leaching beds are constructed.

3.3 Groundwater Impact Assessment

The results of the test pits put down at the site for the terrain evaluation described above indicate that the aquifer receiving effluent from the proposed on site septic systems is for the most part the upper overburden consisting of sand and silty sand. Some areas of relatively shallow bedrock were encountered at the test pits and accordingly, for a portion of the site, the receiving aquifer may consist of the upper bedrock

To obtain a general indication as to the potential impact of septic effluent on the properties adjoining the proposed subdivision, a nitrate dilution model was utilized. Information from the Ministry of the Environment indicates that for sandy soils and fractured bedrock a water surplus of 372 millimetres per year

and 460 millimetres per year, respectively, may be used for the Ottawa area. In addition the previously mentioned Village of Merrickville-Wolford Municipal Groundwater Study indicates an annual surplus of 364 millimetres. A daily effluent loading of 1000 litres per day per septic system was assumed. A maximum nitrate level of 1.27 milligrams per litre was measured in the receiving aquifer at the overburden and upper bedrock monitoring wells That nitrate level was used as the background nitrate level for the impact dilution calculation.

With regard to treatment and dispersal of effluent from the leaching beds, the expected impact of septic systems at this site was determined by considering the attenuation of nitrate in the effluent from an assumed 40 milligrams per litre (mg/l) (as N) at the septic tanks to 10 mg/l (as N) at the property boundary by dilution as a result of the infiltration of meteoric water only. The results of the calculations indicate that the expected concentration of nitrate at the site boundaries due to 67 septic systems including the maximum measured nitrate background level is about 4.7 milligrams per litre which is well within the Ministry of the Environment acceptable nitrate impact limit of 10 milligrams per litre (See Appendix G).

Based on the impact assessment, the development of the site on private sewage disposal systems is not expected to have an adverse impact on groundwater resources in the site area.

4.0 GROUNDWATER SUPPLY INVESTIGATION

4.1 Supply Aquifer

As mentioned above, bedrock geology maps indicate that the site is underlain by dolomite of the Oxford formation. A review of the attached MOE water well records for the test wells supplied by the well drillers indicate water was found during drilling in grey limestone at depths of some 19 to 34 metres.

4.2 Water Quality

The results of the chemical, physical and bacteriological analyses of water samples from the test wells are provided in the attached Appendix B and in Table I. The water meets all the Ontario Drinking Water Standards (ODWS) health and aesthetic parameters tested for at the wells except for the following,

- turbidity and hardness at all of the wells

- iron at TW 1, TW 2, TW 4 and TW 5
- hydrogen sulphide at TW 3
- total organic nitrogen at TW 4
- total coliform at TW 5

The turbidity levels in the water samples from the test wells measured at the laboratory ranged from 0.2 to 19.5 NTU compared to the Ontario Drinking Water Standard (ODWS) of 1 NTU. It is expected that the turbidity levels measured at the laboratory reflect the precipitation of iron in the samples between the time sampled and tested in the laboratory. Well head turbidity testing carried out during the pump tests gave values for turbidity of less than 1 NTU at all of the test wells.

The water sample obtained from TW 5 contained one total coliform for the 6 hour sample and 0 total coliform for the 3 hour sample. The presence of total coliform in a newly drilled well is common. It is considered that TW 5 could be adequately disinfected by chlorination.

The level of hydrogen sulphide measured in the water sample from TW 4 and the levels of iron measured in the water samples from test wells TW 1, TW 2, TW 4 and TW 5 were above the ODWS but are well within the MOE treatability limit using water softeners or manganese greensand filters. The water samples from all the test wells are considered to be somewhat hard by water treatment standards. Water with a hardness above 80 to 100 milligrams per litre as $CaC0^3$ is often softened for domestic use. Water softening by conventional sodium ion exchange may introduce undesirably high concentrations of sodium into the drinking water. Where ion exchange water softeners are used, a separate unsoftened water supply could be used for drinking and culinary purposes.

The level of organic nitrogen measured at TW 4 was 0.07 milligrams per litre at hour 3 and 0.27 milligrams per litre at hour 6 compared to the ODWS of 0.15 milligrams per litre. Total organic nitrogen measured above the ODWS can possibly indicate a source of surface contamination. However, as the results of the bacteriological testing, which is a more positive indicator of surface source contamination, indicated no bacteriological contamination in either the 3 hour sample or the 6 hour sample, it is considered that the measured organic nitrogen level measured at TW 4 is of no health related concern.

The level of sodium measured at TW 3 was slightly above 20 milligrams per litre (21 milligrams per litre) and accordingly may be of interest to persons on a sodium restricted diet. The sodium levels measured may

be of interest to the local Medical Officer of Health to be passed on to local physicians for their use with patients on sodium restricted diets.

A sample of water from the well servicing the existing dwelling at 173 Collar Hill Road located in close proximity of the northeast corner of the site was obtained and delivered to Accutest Laboratories Ltd for testing for the Subdivision Package list of parameters. The results of that testing are provided in the attached Appendix K and indicated that the sample meets all of the ODWS tested for except hardness which is well within the MOE treatability limits.

4.3 Water Quantity

The drawdown and recovery data and plots for the test wells are shown in Appendices D, E, F, G, H and I. The drawdown and recovery data provided were measured with reference to the top of the well casing at each test well location.

The pumping test data for the test wells were analyzed using the method of Cooper and Jacob (1946). Although the assumptions on which these equations are based are not strictly met, this method provides a reasonable estimate of the aquifer transmissivity.

The following sections discuss the results of the analysis of the data obtained during the pumping tests with respect to the test well yield.

4.3.1 Test Well TW 1

The 7.5 hour duration pumping test was conducted at a discharge rate of about 112 litres per minute (25 Igpm). The static water level prior to pumping was 2.63 metres below the top of the well casing and the water level after 7.5 hours of pumping was 5.87 metres below the top of the well casing for a total drawdown at the end of pumping of 3.24 metres. The available drawdown in the well is about 32.5 metres. The specific capacity of the well at this pumping rate is approximately 50 cubic metres per day per metre of drawdown.

Based on the pumping test drawdown data the transmissivity of the aquifer is calculated to be 250.1 m^2/day. Based on the recovery data the aquifer transmissivity is calculated to be 200.1 m^2/day. The average transmissivity of the bedrock aquifer in the area of the test well is calculated to be 225.1 m^2/day.

At the end of pumping, it required 25 minutes for 95 percent recovery of the total drawdown in the static water level created during pumping.

Based on the data obtained during the pumping test, it can be concluded that the well is capable of sustaining a short term yield of at least 112 litres per minute (25 Igpm), and that during the course of the 7.5 hour pumping period only about 10 percent of the available drawdown in the test well was utilized.

4.3.2 Test Well TW 2

The 10.5 hour duration pumping test was conducted at a discharge rate of about 79 litres per minute (17 Igpm). The static water level prior to pumping was 0.2 metres below the top of the well casing and the water level after 10.5 hours of pumping was 12.83 metres below the top of the well casing for a total drawdown at the end of pumping of 12.63 metres. The available drawdown in the well is about 28.8 metres. The specific capacity of the well at this pumping rate is approximately 9 cubic metres per day per metre of drawdown.

Based on the pumping test drawdown data the transmissivity of the aquifer is calculated to be 43.2 m^2/day. Based on the recovery data the aquifer transmissivity is calculated to be 1.8 m^2/day. The average transmissivity of the bedrock aquifer in the area of the test well is calculated to be 22.5 m^2/day. At the end of pumping, it required 18 minutes for 99 percent recovery of the total drawdown in the static water level created during pumping.

Based on the data obtained during the pumping test, it can be concluded that the well is capable of sustaining a short term yield of at least 79 litres per minute (17 Igpm), and that during the course of the six hour pumping period only about 44 percent of the available drawdown in the test well was utilized.

4.3.3 Test Well TW 3

The 8 hour duration pumping test was conducted at a discharge rate of about 102 litres per minute (22 Igpm). The static water level prior to pumping was 2.65 metres below the top of the well casing and the water level after 8 hours of pumping was 2.83 metres below the top of the well casing for a total drawdown at the end of pumping of 0.18 metres. The available drawdown in the well is about 26.4 metres. The specific capacity of the well at this pumping rate is approximately 817 cubic metres per day per metre of drawdown.

Based on the pumping test drawdown data the transmissivity of the aquifer is calculated to be 375.2 m^2/day. Based on the recovery data the aquifer transmissivity is calculated to be 150.0 m^2/day. The average transmissivity of the bedrock aquifer in the area of the test well is calculated to be 262.3 m^2/day. At the end of pumping, it required 54 minutes for 83 percent recovery of the total drawdown in the static water level created during pumping.

Based on the data obtained during the pumping test, it can be concluded that the well is capable of sustaining a short term yield of at least 102 litres per minute (22 Igpm), and that during the course of the 8 hour pumping period only about 1 percent of the available drawdown in the test well was utilized.

4.3.4 Test Well TW 4

The six hour duration pumping test was conducted at a discharge rate of about 114 litres per minute (25 Igpm). The static water level prior to pumping was 5.19 metres below the top of the well casing and the water level after six hours of pumping was 5.72 metres below the top of the well casing for a total drawdown at the end of pumping of 0.53 metres. The available drawdown in the well is about 23.8 metres. The specific capacity of the well at this pumping rate is approximately 309 cubic metres per day per metre of drawdown.

Based on the pumping test drawdown data the transmissivity of the aquifer is calculated to be 142.9 m^2/day. Based on the recovery data the aquifer transmissivity is calculated to be 200.1 m^2/day. The average transmissivity of the bedrock aquifer in the area of the test well is calculated to be 171.5 m^2/day. At the end of pumping, it required 30 minutes for 89 percent recovery of the total drawdown in the static water level created during pumping.

Based on the data obtained during the pumping test, it can be concluded that the well is capable of sustaining a short term yield of at least114 litres per minute (25 Igpm), and that during the course of the six hour pumping period only about 2 percent of the available drawdown in the test well was utilized.

4.3.5 Test Well TW 5

The six hour duration pumping test was conducted at a discharge rate of about 114 litres per minute

(25Igpm). The static water level prior to pumping was 4.45 metres below the top of the well casing and the water level after six hours of pumping was 4.73 metres below the top of the well casing for a total drawdownat the end of pumping of 0.28 metres. The available drawdown in the well is about 18.5 metres.

The specific capacity of the well at this pumping rate is approximately 586 cubic metres per day per metre of drawdown.

Based on the pumping test drawdown data the transmissivity of the aquifer is estimated to be 500.3 m^2/day. Based on the recovery data the aquifer transmissivity is calculated to be 300.2 m^2/day. The average transmissivity of the bedrock aquifer in the area of the test well is calculated to be 400.2 m^2/day. At the end of pumping, it required 18 minutes for 61 percent recovery of the total drawdown in the static water level created during pumping. The well recovered to 96 percent of the total drawdown in 965 minutes.

Based on the data obtained during the pumping test, it can be concluded that the well is capable of sustaining a short term yield of at least 114 litres per minute (25 Igpm), and that during the course of the six hour pumping period only about 2 percent of the available drawdown in the test well was utilized.

4.3.6 Test Well TW 6

The six hour duration pumping test was conducted at a discharge rate of about 65 litres per minute (14 Igpm). The static water level prior to pumping was 5.93 metres below the top of the well casing and the water level after six hours of pumping was 19.46 metres below the top of the well casing for a total drawdown at the end of pumping of 13.53 metres. The available drawdown in the well is about 17.0 metres. The specific capacity of the well at this pumping rate is approximately 7 cubic metres per day per metre of drawdown.

Based on the pumping test drawdown data the transmissivity of the aquifer is calculated to be 8.6 m^2/day. Based on the recovery data the aquifer transmissivity is calculated to be 1.8 m^2/day. The average transmissivity of the bedrock aquifer in the area of the test well is calculated to be 5.2 m^2/day. At the end of pumping, it required 8 minutes for 98 percent recovery of the total drawdown in the static water level created during pumping.

Based on the data obtained during the pumping test, it can be concluded that the well is capable of sustaining a short term yield of at least 65 litres per minute (14 Igpm), and that during the course of the six hour pumping period only about 84 percent of the available drawdown in the test well was utilized.

4.3.7 Interference Effects

During the pumping of TW 2, periodic water level measurements were made at TW 1 and TW 3, and during the pumping of TW 4, periodic water level measurements were made at TW 2 and TW 3 in order to assess the potential interference effects between the wells. A maximum drawdown of 0.03 metres and 0.07 metres was measured at TW 1 and TW 3, respectively, during the pumping of TW 2. No drawdown was measured at TW 2 and TW 3 during the pump test at TW 4. TW 2 is some 420 and 730 metres from TW 1 and TW 3, respectively, and TW 4 is some 320 and 370 metres from TW 2 and TW 3, respectively.

In order to estimate the maximum interference between future wells at the site, the maximum drawdown measured at the non pumped wells during the pumping of the test wells was used along with the relationship that the drawdown at a well is directly related to the pumping rate. The average drawdown at the test wells was calculated for a thirty year pumping rate of 1100 litres per day which allows for four persons per household. Calculations of expected 30 year drawdown are provided below.

Test Well	TW1	TW2	TW3	TW4	TW5	TW6
30 Year Drawdown Extrapolation of drawdown curves (metres)	4.9	14.5	0.5	1.0	0.7	20.0
30 Year Drawdown Adjusted to 1100 L/D	0.033	0.135	0.003	0.007	0.005	0.230
Average adjusted 30 year drawdown	0.033	0.135	0.003	0.007	0.005	0.230/6 = 0.07 metres

Conservatively, assuming that each well causes an average 30 year drawdown of 0.07 metres at a centrally located well within the proposed subdivision, the total drawdown at the centrally located well due to the interference from the other 66 wells plus the drawdown at the well itself is (0.07 x 67 wells) or 4.7 metres which is acceptable given the available drawdown at each of the test wells.

4.4 Groundwater Flow Directions

Five monitoring wells were installed at the site as described on the Record of Test Pits, Table I and on the attached Table IV. On December 29, 2004 the water levels were measured at the monitoring wells and at the test wells. The elevation of the ground surface at the monitoring wells and the test wells were supplied to us by the client. It is understood that the topography was developed from on-site topographic control survey data by John Kennedy Surveyors Ltd. (OLS), and stereoscopic elevation model developed by Base Mapping Ltd. using OMNR 1:10,000 scale air photographs, and that the elevations are referenced to Geodetic datum. The results of the groundwater level measurements are shown in the attached Table IV.

Based on the groundwater level measurements and elevation survey described above the groundwater flow direction in the supply aquifer and the receiving aquifer was calculated. The groundwater in the supply aquifer is indicated to flow outward to the north and east from a topographical high area near the centre of the site on the west side as shown on the attached Figure 3. The groundwater flow direction in the receiving aquifer is indicated to be towards the wetland in the south portion of the site as shown on the attached Figure 4, and in general follows the site topography.

4.5 Supply Aquifer Protection

In view of the shallow bedrock conditions encountered at the site a series of extra monitoring wells were installed and the water levels in the monitoring wells measured during pumping of adjacent test wells. This monitoring was carried out to check for any hydraulic connection between the overburden/upper bedrock receiving aquifer and the underlying supply aquifer.

During the pumping of TW 1, TW 2 and TW3 observations of any drawdown in the monitoring wells MW2-1, MW2-2, MW3-1, 3-2 and TP SP6 were made. The observation wells were located within 10 metres of the adjacent test well. About 49,000 to 49,500 litres was pumped from the test wells during the monitoring well observation periods.

The results of the monitoring well observations are provided in the attached Table IV and indicate that no measurable hydraulic connection exits between the receiving aquifer and the supply aquifer.

4.6 Development Impacts and Neighbouring Land Uses

The upper groundwater flow as shown on the attached Figure 4 is indicated to be towards the wetland in the south portion of the site. A buffer zone has been incorporated in the proposed development plans to mitigate any potential impact on the wetland due to the proposed development. Accordingly, no negative impact of the proposed development on neighbouring lands is expected.

The groundwater flow in the supply aquifer is indicated on the attached Figure 3. The groundwater flow is indicated to be from the west and to disperse to the north and east across the site. There is no development of the lands for more than 500 metres to the west of the site. Accordingly, no impact on the supply aquifer is expected from any existing off site sources.

As previously mentioned, a former land fill exists some 400 metres north of the site. The groundwater flow direction in the supply aquifer is toward that landfill and also towards the only development (three dwellings) within 500 metres of the site. Accordingly, no impact on the supply aquifer due to the former landfill or the existing development near the site is expected.

The neighbouring land uses within 500 metres of for the subject site consist of the following:

North side - former land fill and three single family dwellings, Village of Merrickville further than 500 meters from the site

East side - undeveloped lands, woodlands

South side - undeveloped lands, wetlands

West side - undeveloped lands, woodlands

4.7 Well Construction Methodology

Future wells drilled on the site should be constructed with a minimum 18 metre length of casing through the overburden materials and set at least 1 metre into the sound bedrock. The steel casing placed in the boreholes should be pressure grouted. The material used to seal the annular space could consist of a cement grout which is more resistant to artesian groundwater conditions than commercially available bentonite grout. Cement grout mixtures should be allowed to set for a minimum two day period for normal cement or twelve hours for a high early strength cement prior to advancing the well further into bedrock.

Once the casing has been sealed, the well should be advanced uncased into the bedrock until a water supply of sufficient quantity and quality is encountered. The completed well should then be developed to maximize the yield. The well casings should be completed at least 300 millimetres above finished ground surface and should be fitted with a pitless adapter to facilitate below ground plumbing and electrical connections.

Surface grading should direct surface water away from the well.

4.8 Post Development Monitoring Program

The results of this investigation indicate no existing or expected impact on the groundwater quality at this site due to existing land uses or the proposed development itself. Septic effluent dilution calculations, which by experience are known to be a conservative estimate of actual impact, indicate any septic system impact at the site should be well within Ministry of the Environment requirements. Accordingly, a groundwater monitoring program is not considered necessary for this site

5.0 SUMMARY AND CONCLUSIONS

Based on the terrain evaluation and groundwater supply investigation at the proposed development and the subsequent analysis of the data collected, the following summary and conclusions are provided:

1) Class IV septic sewage disposal systems with partially to fully raised leaching beds will be used at this site depending on the lot specific soil and groundwater conditions. The leaching beds should be constructed to conform to the specifications set out in the Ontario Building Code. It is suggested that imported sand with a percolation rate of between 4 and 8 minutes per centimetre be used to construct the partially to fully raised leaching beds. In situ percolation rate tests and/or gradation analyses should be carried out on any potential sand fill material prior to leaching bed construction in order to verify that the percolation time is acceptable. In shallow bedrock areas, provision of a suitable thickness of silty clay could be required to prevent direct entry of septic effluent into the bedrock. Ontario Building Code approved tertiary treatment systems should be incorporated in the design of the septic systems.

Yours truly,

Morey Houle Chevrier Engineering Ltd.

C. R. Morey, P. Eng.

File 041-444

2) There is a sufficient groundwater supply in the bedrock aquifer system to satisfy the water requirements of the proposed development. It is indicated that most wells will have to be drilled to depths of about 24 to 37 metres and that individual well yields of about 65 to 114 litres per minute (14 to 25 Imperial gallons per minute) will be typical. However, because it is impossible to predict with certainty the depth at which water-producing fractures will be encountered during drilling, it may be necessary to drill to depths greater than 37 metres on some lots to produce a sufficient water supply.

3) The groundwater quality at this site is indicated to be suitable for a potable water supply as it meets all the ODWS concentrations for all health related chemical, physical and bacteriological parameters tested for except iron, hydrogen sulphide, total organic carbon and hardness. Water softeners and manganese green sand filters are indicated to be adequate to lower iron, hydrogen sulphide and hardness to within the ODWS. Sodium levels may be of interest to persons on a sodium restricted diet where ion exchange water softeners are used. In that case a separate unsoftened water supply could be used for drinking and culinary purposes to reduce sodium intake.

4) Mutual water level interference effects between neighbouring wells in the proposed subdivision are expected to be minimal.

5) Future wells drilled on this property should be constructed with casing through the overburden materials and set a minimum of one metre into the sound bedrock. The annulus of the casing should be grouted using the pressure injection method. Casing and grouting should extend to at least 18 metres below the existing ground surface. Wells should be located at least 15 to 18 metres from septic fields for inground and raised bed, respectively, and upgradient of septic fields.

6) Based on the impact assessment, the septic systems at the proposed 80 lots at this site are indicated to result in the impact on the groundwater quality at the site boundaries to be within acceptable limits established by the MOE.

7) It is considered that the type of existing surrounding land use adjacent to the subject property should not impact the subject site from a water supply or water quality point of view.

8) The results of the investigation indicate that no measurable hydraulic connection exits between the receiving aquifer and the supply aquifer.

TABLE I

RECORD OF TEST PITS
PROPOSED MERRICKVILLE ESTATES SUBDIVISION
SCOTCH LINE ROAD, MERRICKVILLE, ONTARIO

TEST PIT NUMBER	DEPTH (METRES)	DESCRIPTION
TP1	0.00 - 0.18	TOPSOIL
	0.18	End of test pit, BEDROCK
Test pit dry upon completion of excavating, November 4, 2004		
TP2	0.00 - 0.20	TOPSOIL
	0.20 - 0.66	Red brown fine to medium SAND
	0.66	End of test pit, BEDROCK
Test pit dry upon completion of excavating, November 4, 2004		
TP3	0.00 - 0.15	TOPSOIL
	0.15 - 0.33	Red brown fine to medium SAND, some gravel
	0.33	End of test pit, BEDROCK
Test pit dry upon completion of excavating, November 4, 2004		

TABLE I

RECORD OF TEST PITS (CONTINUED)

TEST PIT NUMBER	DEPTH (METRES)	DESCRIPTION
TP4	0.00 - 0.25	TOPSOIL
	0.25	End of test pit, BEDROCK
Test pit dry upon completion of excavating, November 4, 2004		
TP5	0.00 - 0.20	TOPSOIL
	0.20 - 0.60	Yellow brown fine to medium SAND, some cobbles, trace silt
	0.60	End of test pit, BEDROCK
Test pit dry upon completion of excavating, November 4, 2004		
TP6	0.00 - 0.30	TOPSOIL
	0.30 - 0.60	Red brown SILTY SAND, some gravel and cobbles
	0.60 - 1.20	Grey brown SAND and GRAVEL, some cobbles
	1.20 - 2.26	Grey brown SILTY SAND some gravel and cobbles, trace clay (GLACIAL TILL)
	2.26	End of test pit
Test pit dry upon completion of excavating, November 4, 2004. Installed standpipe to 2.2 metres depth, 50 millimetre diameter PVC slotted in lower 1.5 metres and backfilled with native materials.		

TABLE I

RECORD OF TEST PITS (CONTINUED)

TEST PIT NUMBER	DEPTH (METRES)	DESCRIPTION
TP7	0.00 - 0.25	TOPSOIL
	0.25 - 0.43	Grey brown SILTY SAND, some gravel
	0.43	End of test pit, BEDROCK
Test pit dry upon completion of excavating, November 4, 2004		
TP8	0.00 - 0.20	TOPSOIL
	0.20	End of test pit, BEDROCK
Test pit dry upon completion of excavating, November 4, 2004		
TP9	0.00 - 0.20	TOPSOIL
	0.20 - 0.41	Red brown fine SAND, some silt
	0.41	End of test pit, BEDROCK
Test pit dry upon completion of excavating, November 4, 2004		
TP10	0.00 - 0.30	TOPSOIL
	0.30 - 0.84	Grey brown SILTY SAND, some gravel trace clay (GLACIAL TILL)
	0.84	End of test pit, BEDROCK
Test pit dry upon completion of excavating, November 4, 2004. Installed standpipe to 0.8 metres depth, 50 millimetre diameter PVC slotted full length and backfilled with native materials.		

ACCUTEST LABORATORIES LTD

REPORT OF ANALYSIS

Client: Morey Houle Chevrier Engineering
28 Clothier St E., Unit B, Box 910
Kemptville, ON
K0G 1J0
Attention: Mr. Randy Morey

Report Number: 2500525
Date: 2005-01-20
Date Submitted: 2005-01-11

Project:

P.O. Number:
Matrix: Water

	LAB ID:	363905	363906	363907			GUIDELINE		
	Sample Date:	2005-01-09	2005-01-09	2005-01-10					
	Sample ID:	041-444 TW1 HR1	041-444 TW1 HR6	031-532 TW1 HR2					
PARAMETER	UNITS	MDL					TYPE	LIMIT	UNITS
Alkalinity as CaCO3	mg/L	5	253	258	360				
Chloride	mg/L	1	12	14	847				
Colour	TCU	2	<2	<2	<2				
Conductivity	uS/cm	5	534	541	3400				
Dissolved Organic Carbon	mg/L	0.5	1.6	1.4	1.2				
Fluoride	mg/L	0.10	0.35	0.36	0.20				
Hydrogen Sulphide	mg/L	0.01	0.03	<0.01	<0.01				
N-NH3 (Ammonia)	mg/L	0.02	0.05	0.05	<0.02				
N-NO2 (Nitrite)	mg/L	0.10	<0.10	<0.10	<0.10				
N-NO3 (Nitrate)	mg/L	0.10	<0.10	<0.10	0.60				
pH			7.72	7.71	7.45				
Phenols	mg/L	0.001	<0.001	<0.001	<0.001				
Sulphate	mg/L	1	30	26	171				
Tannin & Lignin	mg/L	0.1	<0.1	<0.1	<0.1				
TDS (COND - CALC)	mg/L	5	347	352	2210				
Total Kjeldahl Nitrogen	mg/L	0.05	0.13	0.18	0.24				
Turbidity	NTU	0.1	19.5	7.6	6.2				
Hardness as CaCO3	mg/L	1	280	287	568				
Ion Balance		0.01	0.98	0.99	1.00				
Calcium	mg/L	1	71	72	183				
Magnesium	mg/L	1	25	26	27				
Potassium	mg/L	1	3	3	3				
Sodium	mg/L	2	5	5	532				
Iron	mg/L	0.01	0.93	0.64	0.45				
Manganese	mg/L	0.01	0.04	0.03	0.03				

MDL = Method Detection Limit INC = Incomplete AO = Aesthetic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration
Comment:

APPROVAL:
Ewan McRobbie
Inorganic Lab Supervisor

ACCUTEST LABORATORIES LTD

REPORT OF ANALYSIS

Client: **Morey Houle Chevrier Engineering**
28 Clothier St E., Unit B, Box 910
Kemptville, ON
K0G 1J0
Attention: **Mr. Randy Morey**

Report Number: 2424857
Date: 2005-01-04
Date Submitted: 2004-12-30

Project: 041-474

P.O. Number:
Matrix: Water

			LAB ID:	362754	362755				GUIDELINE		
			Sample Date:	2004-12-29	2004-12-29				MOE REG. 170/03		
			Sample ID:	HR3 TW2	HR6 TW2						
PARAMETER	UNITS	MDL							TYPE	LIMIT	UNITS
Total Coliforms	ct/100mL		0	0					MAC	0	ct/100mL
Escherichia Coli	ct/100mL		0	0					MAC	0	ct/100mL
Heterotrophic Plate Count	ct/1mL		0	0					MAC	500	ct/1mL
Faecal Coliforms	ct/100mL		0	0					MAC	0	ct/100mL
Faecal Streptococcus	ct/100mL		0	0							ct/100mL

MDL = Method Detection Limit INC = Incomplete AO = Aesthetic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration
Comment:

APPROVAL: Krista Quantrill
Microbiology Analyst

ACCUTEST LABORATORIES LTD

REPORT OF ANALYSIS

Client: Morey Houle Chevrier Engineering
28 Clothier St E., Unit B, Box 910
Kemptville, ON
K0G 1J0
Attention: Mr. Randy Morey

Report Number: 2500523
Date: 2005-01-13
Date Submitted: 2005-01-11

Project:

P.O. Number:
Matrix: Water

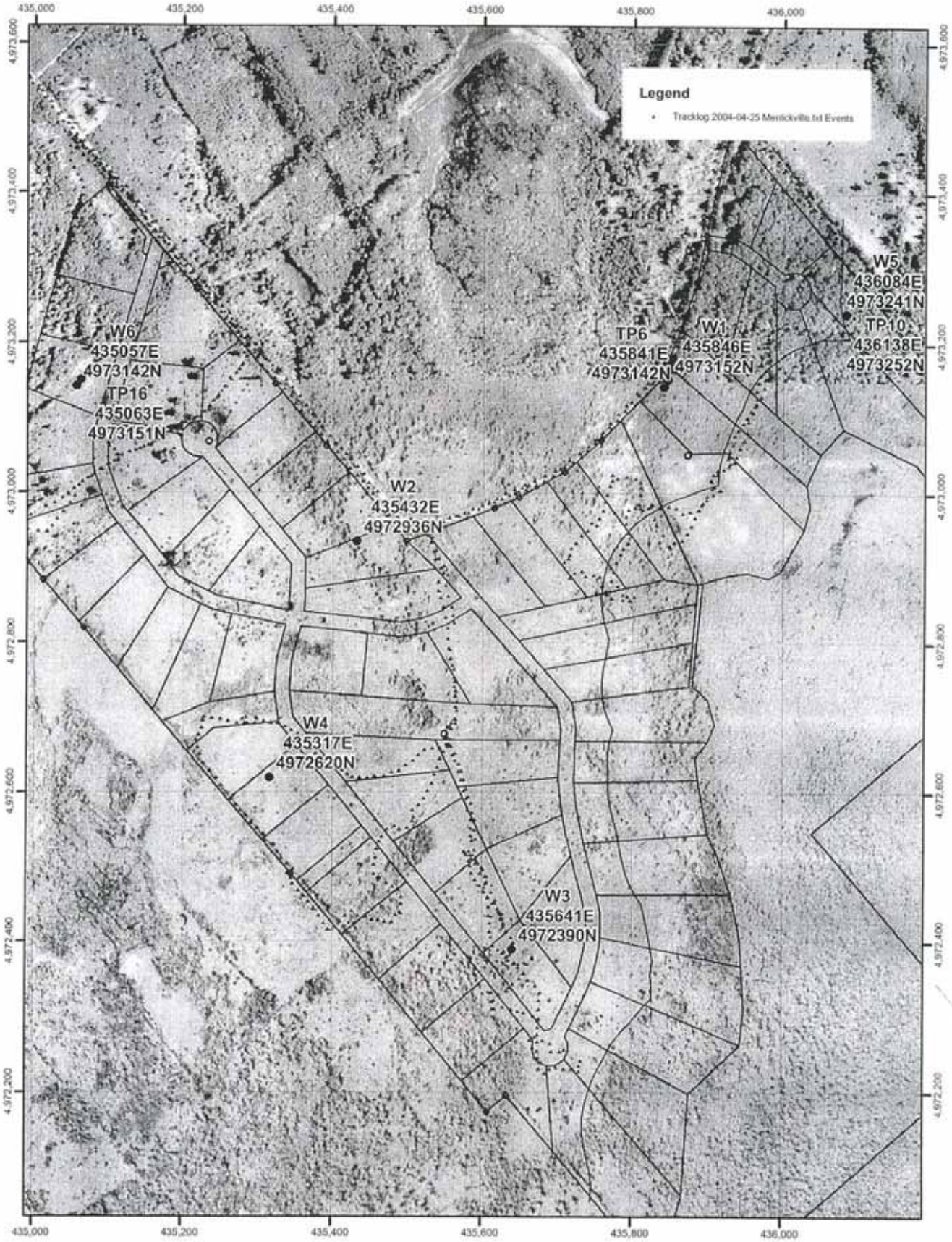
			LAB ID:	363902	363903	363904			GUIDELINE		
			Sample Date:	2005-01-09	2005-01-09	2005-01-10					
			Sample ID:	041-444 TW1 HR 1	041-444 TW1 HR 6	031-532 TW1 HR2					
PARAMETER	UNITS	MDL							TYPE	LIMIT	UNITS
Total Coliforms	ct/100mL			0	0	37					
Escherichia Coli	ct/100mL			0	0	0					
Heterotrophic Plate Count	ct/1mL			280	20	40					
Faecal Coliforms	ct/100mL			0	0	0					
Faecal Streptococcus	ct/100mL			0	0	0					

MDL = Method Detection Limit INC = Incomplete AO = Aesthetic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration
Comment:

APPROVAL: Krista Quantrill
Microbiology Analyst

APPENDIX B

RESULTS OF LABORATORY TESTING OF TEST WELL WATER SAMPLES



1:6,500

Hydro Geology - Planning Wells - Nov 2004

APPENDIX A

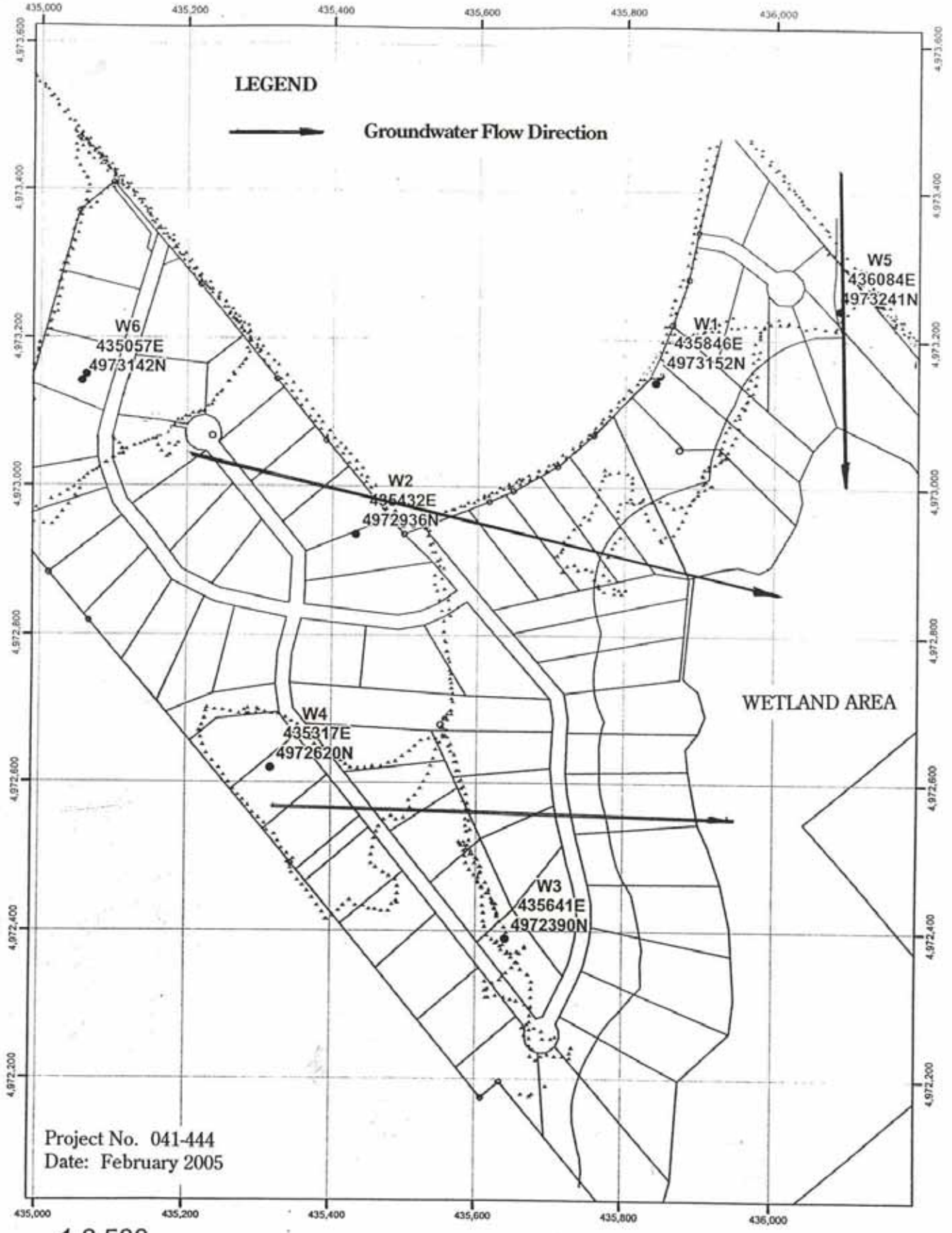
TEST WELL LOCATIONS WITH NORTHINGS AND EASTINGS

PROVIDED BY

MR. C. FOURNIER, P. ENG.

GROUNDWATER FLOW IN RECEIVING AQUIFER

FIGURE 4



Project No. 041-444
Date: February 2005

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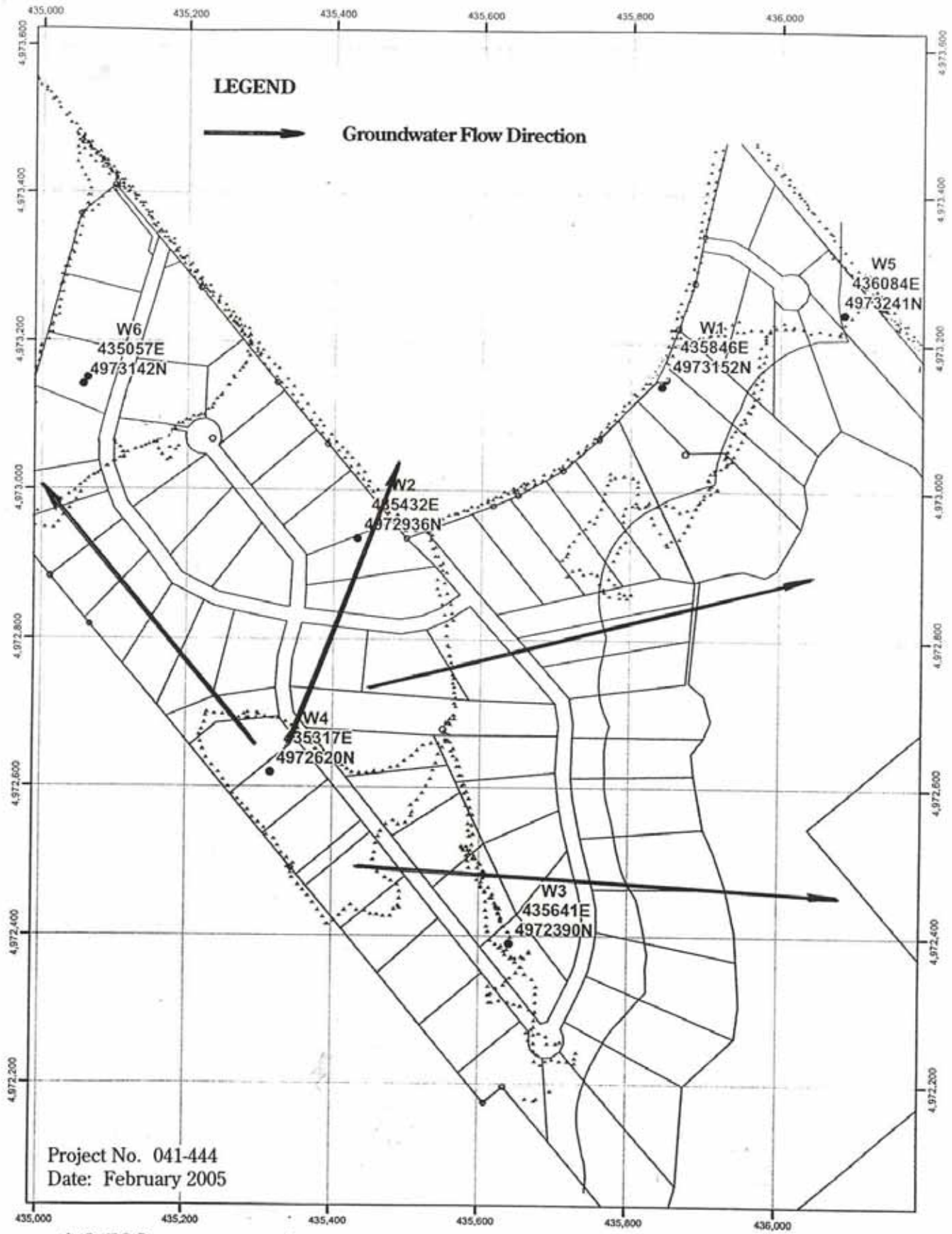
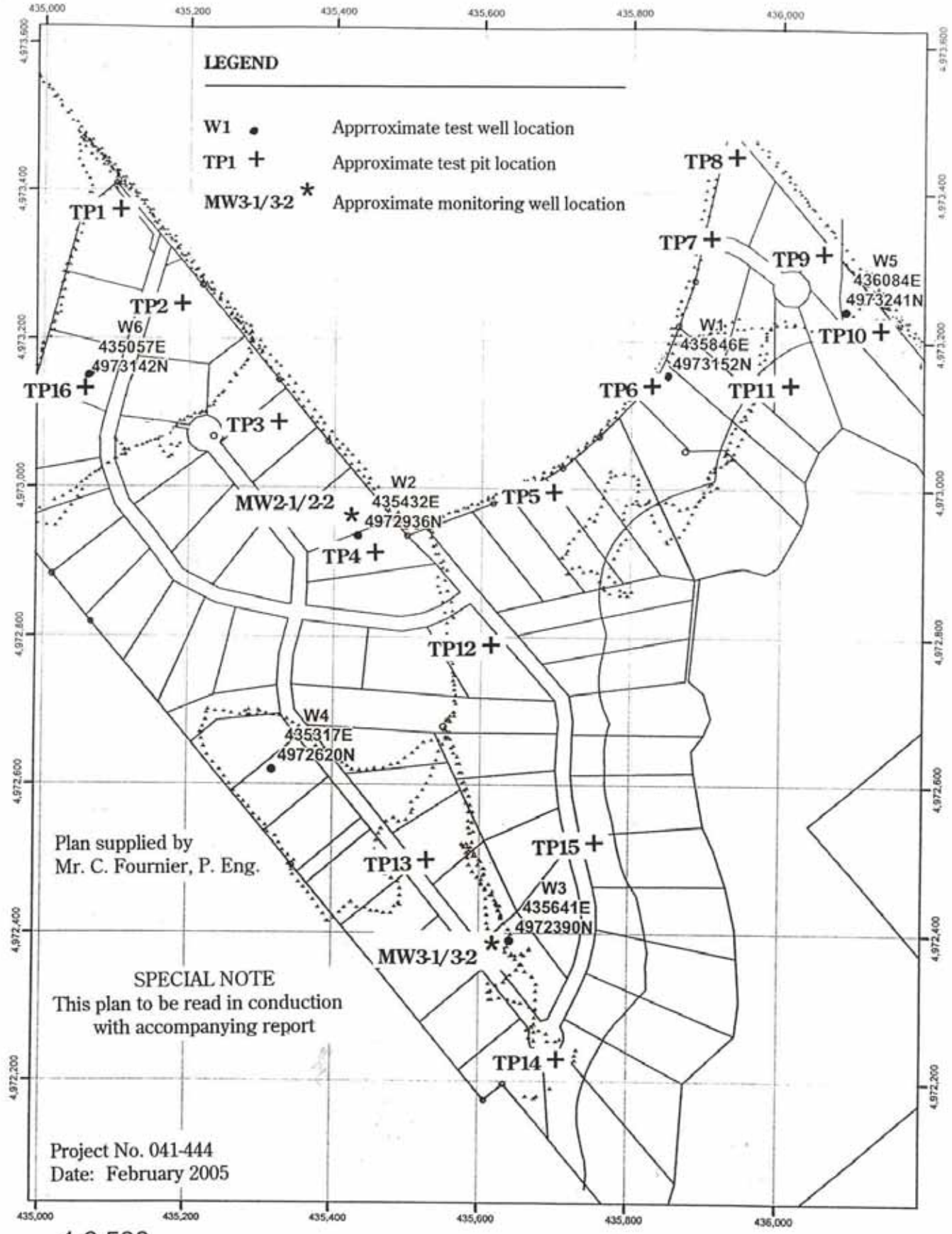
GROUNDWATER FLOW IN SUPPLY AQUIFER FIGURE 3



Project No. 041-444
Date: February 2005

1:6,500

SITE PLAN FIGURE 2



Plan supplied by
Mr. C. Fournier, P. Eng.

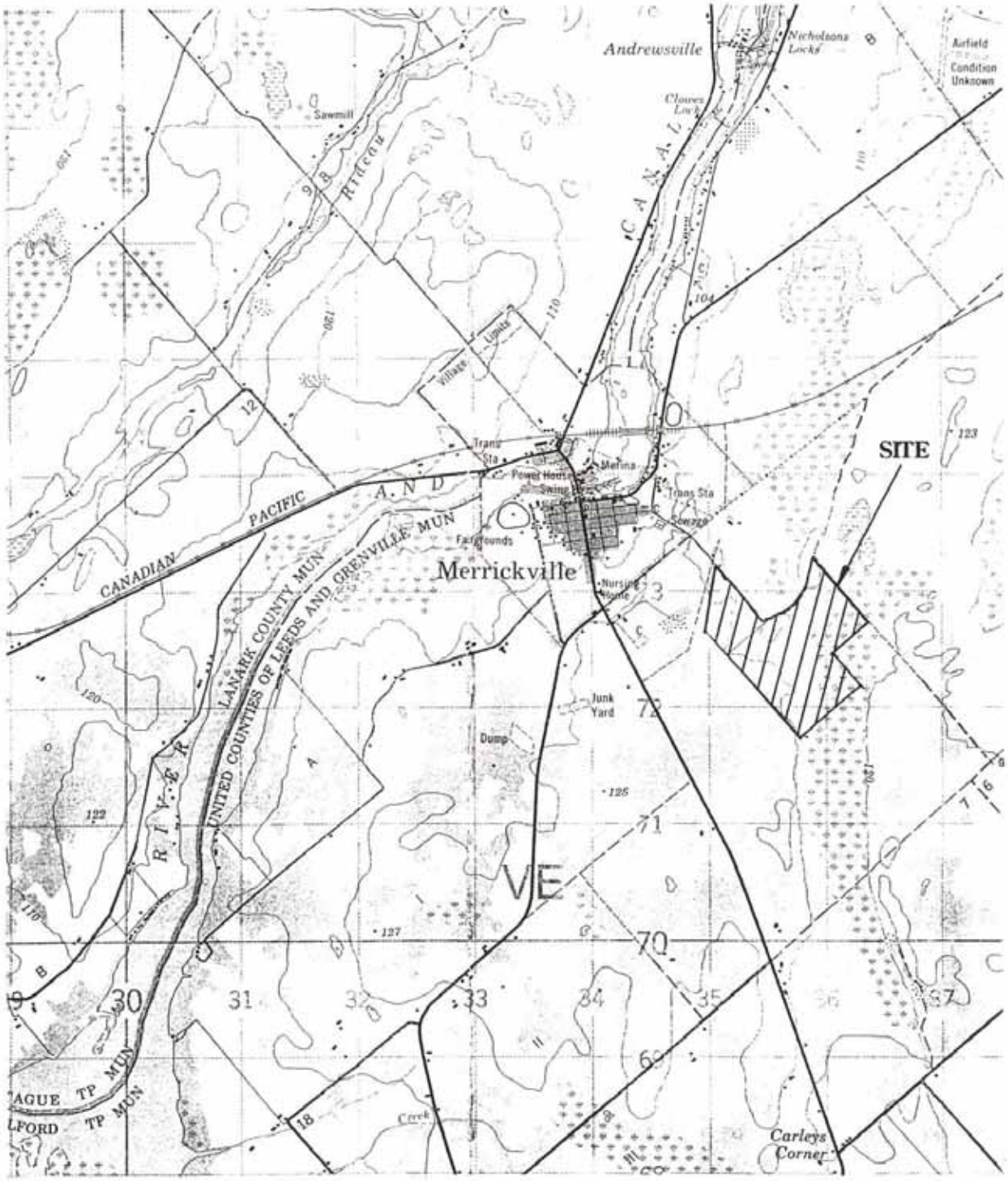
SPECIAL NOTE
This plan to be read in conduction with accompanying report

Project No. 041-444
Date: February 2005

1:6,500

KEY PLAN

FIGURE 1



SCALE: 1:50,000

Project No. 041-444
Date: February 2005

MOREY HOULE CHEVRIER ENGINEERING LTD.

TABLE V

RESULTS OF GROUNDWATER LEVEL MEASURMENTS
(December 29, 2004)

	Water Level below top of casing (metres)
MW 2-1 (Elev. 118)	frozen
MW 2-2 (Elev. 118)	2.55
MW 3-1 (Elev. 118)	2.70
MW 3-2 (Elev. 118)	2.70
TP 6 - SP (Elev. 116)	1.50
TP 10 -SP (Elev. 116)	0.42
TW1 (Elev. 116)	2.03
TW2 (Elev. 118)	-0.40
TW3 (Elev. 118)	1.95
TW4 (Elev. 124)	4.72
TW5 (Elev. 116)	3.75
TW6 (Elev. 119)	5.46

TABLE IV (CONTINUED)

TIME SINCE START OF PUMPING (MINUTES)	DRAWDOWN (METRES)							
	TW1	TP6-SP	TW2	MW2-1	MW2-2	TW3	MW3-1	MW3-2
20	3.04	0.00						
180	3.17	0.00						
197	3.17		0.00	frozen	0.00			
207	3.17					0.01	0.00	0.00
240	3.18	0.00						
360	3.21	0.00						
373	3.21		0.03	frozen	0.00			
375	3.21					0.02	0.00	0.00
444	3.24	0.00						

ABOUT 49,500 LITRES PUMPED FROM TW 1 DURING OBSERVATION PERIOD

Log of Monitoring Well 2

0.0 - 9.1 metres grey limestone, two standpipes installed, 50mm PVC pipe with screen 8.2m to 9.1m then solid riser to surface, 50mm PVC pipe installed with screen 5.2 m to 6.1 m then solid riser to surface, backfilled with sand 9.1m to 7.6m, hole plug 7.6m to 6.1m , sand 6.1m to 0.6m, hole plug 0.6m to 0.0m

Log of Monitoring Well 3

0.0 - 9.1 metres grey limestone, two standpipes installed, 50mm PVC pipe with screen 8.2m to 9.1m then solid riser to surface, 50mm PVC pipe installed with screen 5.2 m to 6.1 m then solid riser to surface, backfilled with sand 9.1m to 7.6m, hole plug 7.6m to 6.1m , sand 6.1m to 0.6m, hole plug 0.6m to 0.0m

TABLE IV

MONITORING WELL OBSERVATIONS
MERRICKVILLE ESTATES
TOWNSHIP OF MERRICKVILLE-WOLFORD, ONTARIO

TIME SINCE START OF PUMPING (MINUTES)	DRAWDOWN (METRES)		
	TW3	MW3-1	MW3-2
4	0.06	0.00	0.00
60	0.14	0.00	0.00
120	0.17	0.00	0.00
300	0.18	0.00	0.00
360	0.18	0.00	0.00
420	0.18	0.00	0.00
480	0.18	0.00	0.00

ABOUT 49,000 LITRES PUMPED FROM TW 3 DURING OBSERVATION PERIOD

TIME SINCE START OF PUMPING (MINUTES)	DRAWDOWN (METRES)							
	TW2	MW2-1	MW2-1	TW3	MW3-1	MW3-1	TW1	TP6-SP
21	11.28	0.00	0.00					
41	11.96	0.00	0.00					
128	12.34	0.00	0.00					
138	12.39			0.01	0.00	0.00		
153	12.43						0.00	0.00
253	12.32	0.00	0.00					
308	12.47						0.00	0.00
318	12.47			0.03	0.00	0.00		
378	12.52	0.00	0.00					
466	12.58						0.02	0.00
478	12.58			0.04	0.00	0.00		
600	12.62						0.03	0.00
613	12.62			0.07	0.00	0.00		
624	12.63	0.00	0.00					

ABOUT 49,000 LITRES PUMPED FROM TW 2 DURING OBSERVATION PERIOD

TABLE II (CONTINUED)

Test Well	Hours Since Pumping Started	Temp. (°C)	Conductivity (uS/cm)	pH (pH units)	Turbidity (NTU)	Free Chlorine	Sulphide
TW 5	1	9.1	165	8.1	0.2	ND	ND
	2	8.1	119	7.8	0.1	ND	ND
	3	-	-	-	-	-	-
	4	7.3	143	7.8	0.2	ND	ND
	5	7.6	130	7.6	0.2	ND	ND
	6	7.0	146	7.0	0.2	ND	ND
TW 6	1	7.9	156	8.0	0.6	ND	ND
	2	-	-	-	-	-	-
	3	10.7	259	8.0	0.2	ND	ND
	4	9.3	250	7.8	0.2	ND	ND
	5	10.8	202	7.8	0.3	ND	ND
	6	7.8	190	7.8	0.2	ND	ND

ND = not detected D = detected

TABLE III

SUMMARY OF PUMPING TEST RESULTS AND WELL PARAMETERS

Well	Tp	Tr	Tav	Q	SC	ho	hf	Td	TD	CS
TW 1	250.1	200.1	225.1	161	50	2.63	5.87	3.24	36.6	0.6
TW 2	43.2	1.8	22.5	114	9	0.20	12.83	12.63	30.5	0.6
TW 3	375.2	150.0	262.3	147	817	2.65	2.83	0.18	30.5	0.7
TW 4	142.9	200.1	171.5	164	309	5.19	5.72	0.53	30.5	0.5
TW 5	500.3	300.2	400.2	164	586	4.45	4.73	0.28	24.4	0.7
TW 6	8.6	1.8	5.2	94	7	5.93	19.46	13.53	24.4	0.5

Note: Tp: Transmissivity as calculated from pumping data (m^2/day)
Tr: Transmissivity as calculated from recovery data (m^2/day)
Tav: Average transmissivity (average of pumping and recovery) (m^2/day)
Q: Test pumping rate (m^3/day)
SC: Specific Capacity (m^3/day/m)
ho: Static water level (below top of casing) at beginning of pumping test (metres)
hf: Water level (below top of casing) at end of 6 hour pumping test (metres)
Td: Total drawdown (metres)
TD: Total depth of well (below ground surface) (metres)
CS: Casing stickup above ground surface (metres)

TABLE II

RESULTS OF THE FIELD WATER QUALITY MEASUREMENTS
FOR TEST WELLS

Test Well	Hours Since Pumping Started	Temp. (°C)	Conductivity (uS/cm)	pH (pH units)	Turbidity (NTU)	Free Chlorine	Sulphide
TW 1	1	7.3	79	7.8	0.7	ND	ND
	2	-	-	-	-	-	-
	3	9.5	197	8.0	0.0	ND	ND
	4	8.6	197	7.7	0.5	ND	ND
	5	7.7	195	8.5	0.2	ND	ND
	6	7.7	119	7.7	0.2	ND	ND
TW 2	1	9.0	210	7.9	0.1	ND	ND
	2	10.5	178	8.1	0.5	ND	ND
	3	-	-	-	-	-	-
	4	9.1	45	7.9	0.0	ND	ND
	5	9.7	273	7.8	0.1	ND	ND
	6	7.7	141	7.9	0.1	ND	ND
TW 3	1	7.8	198	7.9	-	ND	ND
	2	7.7	304	7.7	-	ND	ND
	3	8.3	310	8.1	-	ND	ND
	4	-	-	-	-	-	-
	5	7.9	177	8.1	0.0	ND	ND
	6	7.9	291	8.0	0.7	ND	ND
	7	7.4	294	8.0	0.1	ND	ND
TW 4	1	6.5	95	8.0	0.2	ND	D
	2	-	-	-	-	-	-
	3	9.5	273	7.8	0.2	ND	D
	4	9.6	303	7.7	0.3	ND	D
	5	9.7	193	7.8	0.1	ND	D
	6	10.0	328	7.7	0.4	ND	D

TABLE I

RECORD OF TEST PITS (CONTINUED)

TEST PIT NUMBER	DEPTH (METRES)	DESCRIPTION
TP11	0.00 - 0.18	TOPSOIL
	0.18 - 0.81	Red brown to yellow brown fine to medium SAND
	0.81	End of test pit, BEDROCK
Test pit dry upon completion of excavating, November 4, 2004		
TP12	0.00 - 0.23	TOPSOIL
	0.23	End of test pit, BEDROCK
Test pit dry upon completion of excavating, November 4, 2004		
TP 13	0.00 - 0.15	TOPSOIL
	0.15 - 0.28	Yellow brown SILTY SAND some gravel and cobbles, trace clay (GLACIAL TILL)
	0.28	End of test pit
Test pit dry upon completion of excavating, November 4, 2004		
TP14	0.00 - 0.15	TOPSOIL
	0.15	End of test pit, BEDROCK
Test pit dry upon completion of excavating, November 4, 2004		

TABLE I

RECORD OF TEST PITS (CONTINUED)

TEST PIT NUMBER	DEPTH (METRES)	DESCRIPTION
TP15	0.00 - 0.15	TOPSOIL
	0.15	End of test pit, BEDROCK

Test pit dry upon completion of excavating, November 4, 2004

TP16	0.00 - 0.48	Topsoil and sand (FILL)
	0.48 - 2.13	Red brown fine to medium SAND
	2.13	End of test pit

Test pit dry upon completion of excavating, November 4, 2004. Installed standpipe to 2.1 metres depth, 50 millimetre diameter PVC slotted in lower 1.5 metres and backfilled with native materials.

ACCUTEST LABORATORIES LTD

REPORT OF ANALYSIS

Client: Morey Houle Chevrier Engineering
28 Clothier St E., Unit B, Box 910
Kemptville, ON
K0G 1J0
Attention: Mr. Randy Morey

Report Number: 2424858
Date: 2005-01-10
Date Submitted: 2004-12-30
Project: 041-474
P.O. Number:
Matrix: Water

	LAB ID:	362756	362757				GUIDELINE		
	Sample Date:	2004-12-29	2004-12-29						
	Sample ID:	-HR3 TW2	-HR6 TW2				MOE REG. 170/03		
PARAMETER	UNITS	MDL					TYPE	LIMIT	UNITS
Alkalinity as CaCO3	mg/L	5	266	267			OG	500	mg/L
Chloride	mg/L	1	17	17			AO	250	mg/L
Colour	TCU	2	<2	<2			AO	5	TCU
Conductivity	uS/cm	5	548	551					TCU
Dissolved Organic Carbon	mg/L	0.5	0.5	<0.5			AO	5	mg/L
Fluoride	mg/L	0.10	0.37	0.43			MAC	1.5	mg/L
Hydrogen Sulphide	mg/L	0.01	<0.01	<0.01			AO	0.05	mg/L
N-NH3 (Ammonia)	mg/L	0.02	0.08	0.08					mg/L
N-NO2 (Nitrite)	mg/L	0.10	<0.10	<0.10			MAC	1.0	mg/L
N-NO3 (Nitrate)	mg/L	0.10	<0.10	<0.10			MAC	10.0	mg/L
pH			7.52	7.53			AO	6.5-8.5	
Phenols	mg/L	0.001	<0.001	<0.001					
Sulphate	mg/L	1	21	22			AO	500	mg/L
Tannin & Lignin	mg/L	0.1	<0.1	<0.1					mg/L
TDS (COND - CALC)	mg/L	5	356	358			AO	500	mg/L
Total Kjeldahl Nitrogen	mg/L	0.05	0.09	0.10					mg/L
Turbidity	NTU	0.1	5.5	5.6			AO	1.0	NTU
Hardness as CaCO3	mg/L	1	281	281			OG	100	mg/L
Ion Balance		0.01	0.96	0.95					mg/L
Calcium	mg/L	1	68	68					mg/L
Magnesium	mg/L	1	27	27					mg/L
Potassium	mg/L	1	3	3					mg/L
Sodium	mg/L	2	7	7			AO	20	mg/L
Iron	mg/L	0.01	0.56	0.57			AO	0.3	mg/L
Manganese	mg/L	0.01	0.04	0.04			AO	0.05	mg/L

MDL = Method Detection Limit INC = Incomplete AO = Aesthetic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration
Comment:

APPROVAL:
Ewan McRobbie
Inorganic Lab Supervisor

ACCUTEST LABORATORIES LTD

REPORT OF ANALYSIS

Client: Morey Houle Chevrier Engineering
28 Clothier St E., Unit B, Box 910
Kemptville, ON
K0G 1J0
Attention: Mr. Randy Morey

Report Number: 2423966
Date: 2004-12-13
Date Submitted: 2004-12-11

Project:

P.O. Number:
Matrix: Water

	LAB ID:	360699	360700				GUIDELINE		
	Sample Date:	2004-12-09	2004-12-09						
	Sample ID:	Dec 9 HR1 TW3	Dec 9 HR 6 TW3						
PARAMETER	UNITS	MDL					TYPE	LIMIT	UNITS
Total Coliforms	ct/100mL		0	0					
Escherichia Coli	ct/100mL		0	0					
Heterotrophic Plate Count	ct/1mL		3	0					
Faecal Coliforms	ct/100mL		0	0					
Faecal Streptococcus	ct/100mL		0	0					

MDL = Method Detection Limit INC = Incomplete AO = Aesthetic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration

Comment:

APPROVAL:

Peter Haulena
Analytical Services Manager

ACCUTEST LABORATORIES LTD

REPORT OF ANALYSIS

Client: Morey Houle Chevrier Engineering
28 Clothier St E., Unit B, Box 910
Kemptville, ON
K0G 1J0
Attention: Mr. Randy Morey

Report Number: 2423967
Date: 2004-12-17
Date Submitted: 2004-12-11
Project:
P.O. Number:
Matrix: Water

	LAB ID:	360701	360702				GUIDELINE		
	Sample Date:	2004-12-09	2004-12-09						
	Sample ID:	Dec 9 HR 1 TW3	Dec 9 HR 6 TW3						
PARAMETER	UNITS	MDL					TYPE	LIMIT	UNITS
Alkalinity as CaCO3	mg/L	5	272	276					
Chloride	mg/L	1	44	43					
Colour	TCU	2	<2	<2					
Conductivity	uS/cm	5	655	658					
Dissolved Organic Carbon	mg/L	0.5	1.0	0.7					
Fluoride	mg/L	0.10	0.19	0.24					
Hydrogen Sulphide	mg/L	0.01	<0.01	<0.01					
N-NH3 (Ammonia)	mg/L	0.02	0.04	0.03					
N-NO2 (Nitrite)	mg/L	0.10	<0.10	<0.10					
N-NO3 (Nitrate)	mg/L	0.10	<0.10	<0.10					
pH			7.68	7.67					
Phenols	mg/L	0.001	<0.001	<0.001					
Sulphate	mg/L	1	24	24					
Tannin & Lignin	mg/L	0.1	<0.1	<0.1					
TDS (COND - CALC)	mg/L	5	426	428					
Total Kjeldahl Nitrogen	mg/L	0.05	0.12	0.10					
Turbidity	NTU	0.1	3.2	1.4					
Hardness as CaCO3	mg/L	1	340	347					
Ion Balance		0.01	1.08	1.08					
Calcium	mg/L	1	85	86					
Magnesium	mg/L	1	31	32					
Potassium	mg/L	1	2	2					
Sodium	mg/L	2	21	20					
Iron	mg/L	0.01	0.20	0.19					
Manganese	mg/L	0.01	0.03	0.03					

MDL = Method Detection Limit INC = Incomplete AO = Aesthetic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration
Comment:

APPROVAL:
Ewan McRobbie
Inorganic Lab Supervisor

AC TEST LABORATORIES LTD

REPORT OF ANALYSIS

Client: Morey Houle Chevrier Engineering
28 Clothier St E., Unit B, Box 910
Kemptville, ON
K0G 1J0
Attention: Mr. Randy Morey

Report Number: 2502362
Date: 2005-02-14
Date Submitted: 2005-02-12
Project: 041-444
P.O Number:
Matrix: Water

	LAB ID:	368443	368444				GUIDELINE		
	Sample Date:	2005-02-11	2005-02-11						
	Sample ID:	TW4 HR3 041-444	TW4 HR6 041-444						
PARAMETER	UNITS	MDL					TYPE	LIMIT	UNITS
Total Coliforms	ct/100mL		0	0					
Escherichia Coli	ct/100mL		0	0					
Heterotrophic Plate Count	ct/1mL		1	0					
Faecal Coliforms	ct/100mL		0	0					
Faecal Streptococcus	ct/100mL		0	0					

MDL = Method Detection Limit INC = Incomplete AO = Aesthetic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration
Comment:

APPROVAL:
Peter Haulena

ACCUTEST LABORATORIES LTD

REPORT OF ANALYSIS

Client: Morey Houle Chevrier Engineering
28 Clothier St E., Unit B, Box 910
Kemptville, ON
K0G 1J0
Attention: Mr. Randy Morey

Report Number: 2502363
Date: 2005-02-17
Date Submitted: 2005-02-12

Project: 041-444

P.O. Number:
Matrix: Water

	LAB ID:	368445	368446				GUIDELINE		
	Sample Date:	2005-02-11	2005-02-11						
	Sample ID:	TW4 HR3 041-444	TW4 HR6 041-444						
PARAMETER	UNITS	MDL					TYPE	LIMIT	UNITS
Alkalinity as CaCO3	mg/L	5	261	260					
Chloride	mg/L	1	28	28					
Colour	TCU	2	<2	<2					
Conductivity	uS/cm	5	609	608					
Dissolved Organic Carbon	mg/L	0.5	0.9	0.9					
Fluoride	mg/L	0.10	0.58	0.56					
Hydrogen Sulphide	mg/L	0.01	0.07	0.12					
N-NH3 (Ammonia)	mg/L	0.02	0.15	0.09					
N-NO2 (Nitrite)	mg/L	0.10	<0.10	<0.10					
N-NO3 (Nitrate)	mg/L	0.10	<0.10	<0.10					
pH			7.78	7.78					
Phenols	mg/L	0.001	<0.001	<0.001					
Sulphate	mg/L	1	23	22					
Tannin & Lignin	mg/L	0.1	<0.1	<0.1					
TDS (COND - CALC)	mg/L	5	396	395					
Total Kjeldahl Nitrogen	mg/L	0.05	0.24	0.36					
Turbidity	NTU	0.1	1.2	0.2					
Hardness as CaCO3	mg/L	1	285	281					
Ion Balance		0.01	0.93	0.93					
Calcium	mg/L	1	68	68					
Magnesium	mg/L	1	28	27					
Potassium	mg/L	1	6	6					
Sodium	mg/L	2	4	5					
Iron	mg/L	0.01	0.12	0.02					
Manganese	mg/L	0.01	0.02	0.02					

MDL = Method Detection Limit INC = Incomplete AO = Aesthetic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration

Comment:

APPROVAL

Ewan M. Robbins
Inorganic Lab Supervisor

ACCUTEST LABORATORIES LTD

REPORT OF ANALYSIS

Client: Morey Houle Chevrier Engineering
28 Clothier St E., Unit B, Box 910
Kemptville, ON
K0G 1J0
Attention: Mr. Randy Morey

Report Number: 2502009
Date: 2005-02-10
Date Submitted: 2005-02-08

Project: 041-444

P.O. Number:
Matrix: Water

	LAB ID:	367427	367428				GUIDELINE		
	Sample Date:	2005-02-07	2005-02-07				MOE REG. 170/03		
	Sample ID:	MHCEL HR3 TWS	MHCEL HR6 TWS						
PARAMETER	UNITS	MDL					TYPE	LIMIT	UNITS
Total Coliforms	ct/100mL		0	1			MAC	0	ct/100mL
Escherichia Coli	ct/100mL		0	0			MAC	0	ct/100mL
Heterotrophic Plate Count	ct/1mL		4	50			MAC	500	ct/1mL
Faecal Coliforms	ct/100mL		0	0			MAC	0	ct/100mL
Faecal Streptococcus	ct/100mL		0	0					ct/100mL

MDL = Method Detection Limit INC = Incomplete AO = Aesthetic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration
Comment:

APPROVAL: Krista Quantrill
Microbiology Analyst

ACCUTEST LABORATORIES LTD

REPORT OF ANALYSIS

Client: **Morey Houle Chevrier Engineering**
28 Clothier St E., Unit B, Box 910
Kemptville, ON
K0G 1J0
Attention: **Mr. Randy Morey**

Report Number: 2502011
Date: 2005-02-15
Date Submitted: 2005-02-08

Project: 041-444

P.O. Number:
Matrix: Water

			LAB ID:	367430	367431				GUIDELINE		
			Sample Date:	2005-02-07	2005-02-07						
			Sample ID:	MHCEL HR3 TW5	MHCEL HR6 TW5				MOE REG. 170/03		
PARAMETER	UNITS	MDL							TYPE	LIMIT	UNITS
Alkalinity as CaCO3	mg/L	5		261	263				OG	500	mg/L
Chloride	mg/L	1		4	4				AO	250	mg/L
Colour	TCU	2		<2	<2				AO	5	TCU
Conductivity	uS/cm	5		505	508						TCU
Dissolved Organic Carbon	mg/L	0.5		1.8	1.9				AO	5	mg/L
Fluoride	mg/L	0.10		0.26	0.26				MAC	1.5	mg/L
Hydrogen Sulphide	mg/L	0.01		0.01	0.02				AO	0.05	mg/L
N-NH3 (Ammonia)	mg/L	0.02		0.05	<0.02						mg/L
N-NO2 (Nitrite)	mg/L	0.10		<0.10	<0.10				MAC	1.0	mg/L
N-NO3 (Nitrate)	mg/L	0.10		<0.10	<0.10				MAC	10.0	mg/L
pH				7.76	7.75				AO	6.5-8.5	
Phenols	mg/L	0.001		<0.001	<0.001						
Sulphate	mg/L	1		16	16				AO	500	mg/L
Tannin & Lignin	mg/L	0.1		0.1	<0.1						mg/L
TDS (COND - CALC)	mg/L	5		328	330				AO	500	mg/L
Total Kjeldahl Nitrogen	mg/L	0.05		0.11	0.05						mg/L
Turbidity	NTU	0.1		6.7	1.2				AO	1.0	NTU
Hardness as CaCO3	mg/L	1		279	283				OG	100	mg/L
Ion Balance		0.01		0.98	0.99						mg/L
Calcium	mg/L	1		69	69						mg/L
Magnesium	mg/L	1		26	27						mg/L
Potassium	mg/L	1		<1	<1						mg/L
Sodium	mg/L	2		<2	<2				AO	20	mg/L
Iron	mg/L	0.01		0.43	0.08				AO	0.3	mg/L
Manganese	mg/L	0.01		0.01	<0.01				AO	0.05	mg/L

MDL = Method Detection Limit INC = Incomplete AO = Aesthetic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration
Comment:

APPROVAL:
Ewan McRobbie
Inorganic Lab Supervisor

ACCUTEST LABORATORIES LTD

REPORT OF ANALYSIS

Client: Morey Houle Chevrier Engineering
28 Clothier St E., Unit B, Box 910
Kemptville, ON
K0G 1J0
Attention: Mr. Randy Morey

Report Number: 2502168
Date: 2005-02-11
Date Submitted: 2005-02-09

Project: 041-444

P.O. Number:
Matrix: Water

			LAB ID:	367782	367783				GUIDELINE		
			Sample Date:	2005-02-08	2005-02-08						
			Sample ID:	HR3 TW6	HR6 TW6				MOE REG 170/03		
PARAMETER	UNITS	MDL							TYPE	LIMIT	UNITS
Total Coliforms	ct/100mL			0	0				MAC	0	ct/100mL
Escherichia Coli	ct/100mL			0	0				MAC	0	ct/100mL
Heterotrophic Plate Count	ct/1mL			6	4				MAC	500	ct/1mL
Faecal Coliforms	ct/100mL			0	0				MAC	0	ct/100mL
Faecal Streptococcus	ct/100mL			0	0						ct/100mL

MDL = Method Detection Limit INC = Incomplete AO = Aesthetic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration
Comment:

APPROVAL
Krista Quantrill

ACCUTEST LABORATORIES LTD

REPORT OF ANALYSIS

Client: Morey Houle Chevrier Engineering
26 Clothier St E., Unit B, Box 910
Kemptville, ON
K0G 1J0
Attention: Mr. Randy Morey

Report Number: 2502169
Date: 2005-02-16
Date Submitted: 2005-02-09

Project: 041-444

P.O. Number:
Matrix: Water

			LAB ID:	367784	367785	367786			GUIDELINE		
			Sample Date:	2005-02-08	2005-02-08	2005-02-08					
			Sample ID:	HR3 TW6	HR6 TW6	HR6 VOC TW6					
PARAMETER	UNITS	MDL							TYPE	LIMIT	UNITS
Alkalinity as CaCO3	mg/L	5		260	260						
Chloride	mg/L	1		20	21						
Colour	TCU	2		<2	<2						
Conductivity	uS/cm	5		548	558						
Dissolved Organic Carbon	mg/L	0.5		1.4	1.3						
Fluoride	mg/L	0.10		0.23	0.22						
Hydrogen Sulphide	mg/L	0.01		<0.01	<0.01						
N-NH3 (Ammonia)	mg/L	0.02		0.04	0.04						
N-NO2 (Nitrite)	mg/L	0.10		<0.10	<0.10						
N-NO3 (Nitrate)	mg/L	0.10		<0.10	<0.10						
pH				7.63	7.62						
Phenols	mg/L	0.001		<0.001	<0.001						
Sulphate	mg/L	1		19	19						
Tannin & Lignin	mg/L	0.1		<0.1	<0.1						
TDS (COND - CALC)	mg/L	5		357	363						
Total Kjeldahl Nitrogen	mg/L	0.05		0.11	0.06						
Turbidity	NTU	0.1		3.0	1.6						
Hardness as CaCO3	mg/L	1		277	270						
Ion Balance		0.01		0.93	0.91						
Calcium	mg/L	1		68	67						
Magnesium	mg/L	1		26	25						
Potassium	mg/L	1		2	2						
Sodium	mg/L	2		4	4	4					
Antimony	mg/L	0.001				<0.001					
Arsenic	mg/L	0.001				<0.001					
Barium	mg/L	0.01				0.21					
Beryllium	mg/L	0.001				<0.001					
Boron	mg/L	0.01				0.04					
Cadmium	mg/L	0.0001				<0.0001					
Chromium	mg/L	0.001				0.002					

MDL = Method Detection Limit INC = Incomplete AO = Aesthetic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration

Comment:

APPROVAL

Ewan McRobbie
Inorganic Op Supervisor

ACCUTEST LABORATORIES LTD

REPORT OF ANALYSIS

Client: **Morey Houle Chevrier Engineering**
28 Clothier St E., Unit B, Box 910
Kemptville, ON
K0G 1J0
Attention: **Mr. Randy Morey**

Report Number: 2502169
Date: 2005-02-16
Date Submitted: 2005-02-09

Project: 041-444

P.O. Number:
Matrix: Water

			367784	367785	367786			GUIDELINE		
			2005-02-08	2005-02-08	2005-02-08					
			HR3 TW6	HR6 TW6	HR6 VOC TW6					
PARAMETER	UNITS	MDL						TYPE	LIMIT	UNITS
Cobalt	mg/L	0.0002			<0.0002					
Copper	mg/L	0.001			<0.001					
Cr(VI)	mg/L	0.05			<0.05					
Iron	mg/L	0.01	0.20	0.21						
Lead	mg/L	0.001			<0.001					
Manganese	mg/L	0.01	0.03	0.03						
Mercury	mg/L	0.0001			<0.0001					
Molybdenum	mg/L	0.005			<0.005					
Nickel	mg/L	0.005			<0.005					
Selenium	mg/L	0.001			0.001					
Silver	mg/L	0.0001			<0.0001					
Thallium	mg/L	0.0001			<0.0001					
Vanadium	mg/L	0.001			0.003					
Zinc	mg/L	0.01			<0.01					

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Comment:

APPROVAL
Ewan McRobbie
Inorganic Lab Supervisor

ACCUTEST LABORATORIES LTD

REPORT OF ANALYSIS

Client: Morey Houle Chevrier Engineering
26 Clothier St E., Unit B, Box 910
Kemptville, ON
K0G 1J0
Attention: Mr. Randy Morey

Report Number: 2502169
Date: 2005-02-16
Date Submitted: 2005-02-09

Project: 041-444

P.O Number:
Matrix: Water

			367786					GUIDELINE		
			2005-02-08							
			HR6 VOC TW 6							
PARAMETER	UNITS	MDL						TYPE	LIMIT	UNITS
Styrene	ug/L	0.5	<0.5							
t-1,2-Dichloroethylene	ug/L	0.4	<0.4							
t-1,3-Dichloropropylene	ug/L	0.2	<0.2							
Tetrachloroethylene	ug/L	0.3	<0.3							
Toluene	ug/L	0.5	<0.5							
Trichloroethylene	ug/L	0.3	<0.3							
Trichlorofluoromethane	ug/L	0.5	<0.5							
Vinyl Chloride	ug/L	0.2	<0.2							
VOC SURROGATES										
1,2-dichloroethane-d4	%		97							
4-bromofluorobenzene	%		83							
Toluene-d8	%		100							

MDL = Method Detection Limit INC = Incomplete AO = Aesthetic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration
Comment:

APPROVAL

Mina Nasirai
Organic Lab Supervisor

ACCUTEST LABORATORIES LTD **REPORT OF ANALYSIS**

Client: Morey Houle Chevrier Engineering
28 Clothier St E , Unit B, Box 910
Kemptville, ON
K0G 1J0
Attention: Mr. Randy Morey

Report Number: 2502169
Date: 2005-02-16
Date Submitted 2005-02-09

Project: 041-444

P.O. Number:
Matrix: Water

	LAB ID:	367786					GUIDELINE		
	Sample Date:	2005-02-08							
	Sample ID:	HR6 VOC TW 6							
PARAMETER	UNITS	MDL					TYPE	LIMIT	UNITS
VOLATILE ORGANIC COMPOUNDS - VOCs									
1,1,1,2-tetrachloroethane	ug/L	0.6	<0.6						
1,1,1-trichloroethane	ug/L	0.4	<0.4						
1,1,2,2-tetrachloroethane	ug/L	0.6	<0.6						
1,1,2-trichloroethane	ug/L	0.4	<0.4						
1,1-dichloroethane	ug/L	0.4	<0.4						
1,1-dichloroethylene	ug/L	0.5	<0.5						
1,2-dibromoethane	ug/L	1.0	<1.0						
1,2-dichlorobenzene	ug/L	0.4	<0.4						
1,2-dichloroethane	ug/L	0.5	<0.5						
1,2-dichloropropane	ug/L	0.7	<0.7						
1,3,5-trimethylbenzene	ug/L	0.3	<0.3						
1,3-dichlorobenzene	ug/L	0.4	<0.4						
1,4-dichlorobenzene	ug/L	0.4	<0.4						
Benzene	ug/L	0.5	<0.5						
Bromodichloromethane	ug/L	0.3	<0.3						
Bromoform	ug/L	0.4	<0.4						
Bromomethane	ug/L	0.5	<0.5						
c-1,2-Dichloroethylene	ug/L	0.4	<0.4						
c-1,3-Dichloropropylene	ug/L	0.2	<0.2						
Carbon Tetrachloride	ug/L	0.5	<0.5						
Chloroethane	ug/L	1.0	<1.0						
Chloroform	ug/L	0.5	<0.5						
Chloromethane	ug/L	1.0	<1.0						
Dibromochloromethane	ug/L	0.3	<0.3						
Dichloromethane	ug/L	4.0	<4.0						
Ethylbenzene	ug/L	0.5	<0.5						
m/p-xylene	ug/L	1.0	<1.0						
Monochlorobenzene	ug/L	0.2	<0.2						
o-xylene	ug/L	0.5	<0.5						

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Comment:

APPROVAL
Mina Nasr
Organic Lab Supervisor

APPENDIX C

WELL RECORDS PROVIDED BY WELL DRILLER

Ontario Ministry of the Environment

Well Tag Number

Well Record

Regulation 903 Ontario Water Resources Act

TW 1 — page ___ of ___

Instructions for Completing Form

- For use in the Province of Ontario only. This document is a permanent legal document. Please retain for future reference.
- All Sections must be completed in full to avoid delays in processing. Further instructions and explanations are available on the back of this form.
- Questions regarding completing this application can be directed to the Water Well Management Coordinator at 416-235-6203.
- All metre measurements shall be reported to 1/10th of a metre.
- Please print clearly in blue or black ink only.

Ministry Use Only: MUN | CON | LOT

Well Owner's Information and Location of Well Information

Field	Entry
First Name	1605861
Last Name	ONTARIO LTD
Mailing Address (Street Number/Name, RR, Lot, Concession)	4273 GREEN GABLES LANE
County/District/Municipality	
Township/City/Town/Village	GLOUCESTER
Province	Ontario
Postal Code	K1V 1S4
Telephone Number (include area code)	
Address of Well Location (County/District/Municipality)	LANARK
Township	WOLFORD
Lot	7
Concession	
RR#/Street Number/Name	
City/Town/Village	MERRICKVILLE
Site/Compartment/Block/Tract etc.	
GPS Reading: NAD	83
Zone	18
Easting	435846
Northing	4973157
Unit Make/Model	magellan
Mode of Operation	Averaged

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth From (Metres)	Depth To (Metres)
	rocky clay			0	2.13
grey	limestone		broken	2.13	36.6

Hole Diameter

Depth From (Metres)	Depth To (Metres)	Diameter (Centimetres)
0	36.6	15.55

Construction Record

Inside diam (centimetres)	Material	Wall thickness (centimetres)	Depth From (Metres)	Depth To (Metres)
Casing				
15.88	Steel	.48	0	18.3
Screen				
No Casing or Screen				
	Open hole		17.7	36.6

Water Record

Water found at Metres	Kind of Water
32 m	Other: NOT
34.1 m	Other: tested

After test of well yield, water was: Other, specify: not tested

Chlorinated: Yes

Test of Well Yield

Rec'd Feb 25 2005

- Pumping test method: Sub pump
- Pump intake set at (metres): 24.4
- Pumping rate (litres/min): 113
- Duration of pumping: 7 hrs + 24 min
- Final water level end of pumping: 5.9 metres
- Recommended pump type: Deep
- Recommended pump depth: 33.5 metres
- Recommended pump rate: 136 (litres/min)

Draw Down Time (min)	Water Level (Metres)	Recovery Time (min)	Water Level (Metres)
Static Level	2.63		5.87
1	4.60	1	2.95
2	5.15	2	
3		3	
4	5.47	4	2.87
5		5	
6	5.54	6	2.84
10	5.63	10	
15	5.65	15	
20	5.67	20	
25	5.68	25	2.80
30	5.69	30	
40	5.71	40	
50	5.72	50	
60	5.73	60	

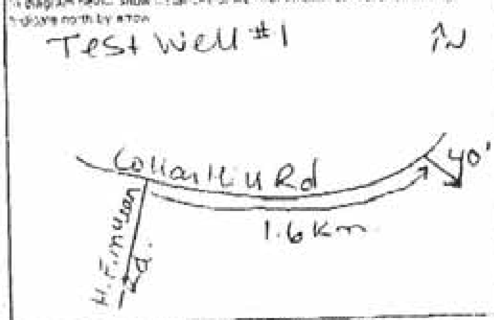
Plugging and Sealing Record

Annular space

Depth set at From (Metres)	To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
17.7	0	neat cement slurry	.3632

Location of Well

In diagram below show distances of well from road, lot line, and building. Indicate north by arrow.



Method of Construction

Air percussion

Water Use

Not used

Final Status of Well

Test Hole

Audit No. Z 23194 — Date Well Completed: 2004 12 19

Well Contractor/Technician Information

- Name of Well Contractor: A. Rodd Drilling Co Ltd
- Well Contractor's Licence No.: 1119
- Business Address: RR#1 Richmond, Ont
- Name of Well Technician: Logan Dan
- Well Technician's Licence No.: T2058

Ministry Use Only: Data Source | Contractor | Date Received | Date of Inspection | Remarks | Well Record Number

Ontario Ministry of the Environment

Well Tag Number (Place sticker and print number below)

Well Record

Regulation 903 Ontario Water Resources Act

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Instructions for Completing Form

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- Questions regarding completing this application can be directed to the Water Well Management Coordinator at 416-235-6203
- **All metre measurements shall be reported to 1/10th of a metre.**
- Please print clearly in blue or black ink only.

Ministry Use Only: MUN | CON | LOT

Well Owner's Information and Location of Well Information

First Name: 1605861 | Last Name: ONTARIO LTD | Mailing Address (Street No./Name, RR#, Lot, Concession): 4273 GREEN GABLES LANE

County/District/Municipality | Township/City/Town/Village: GLOUCESTER | Province: Ontario | Postal Code: K1V 1S1 | Telephone Number (include area code)

Address of Well Location (County/District/Municipality): LANARK | Township: LOCHIEL RD | Lot: 8 | Concession: 1

RR#/Street Number/Name | City/Town/Village: MERRICKVILLE | Site/Compartment/Block/Tract etc.

GPS Reading: NAD 83 | Zone 18 | Easting 435432 | Northing 4972936 | Unit Make/Model: magellan | Mode of Operation: ☐ Undifferentiated ☒ Averaged ☐ Differentiated, specify

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth (Metres) From	To
	broken rock			0	0.30
grey	limestone		broken	0.30	30.5

Hole Diameter

Depth (Metres) From	To	Diameter Centimetres
0	30.5	15.55

Construction Record

Inside diam centimetres	Material	Wall thickness centimetres	Depth (Metres) From	To
Casing				
15.88	☒ Steel	.48	0	18.3
Screen				
Outside diam	☐ Steel ☐ Fibreglass ☐ Plastic ☐ Concrete ☐ Galvanized	Slot No.		
No Casing or Screen				
	☒ Open hole		17.7	30.5

Water Record

Water found at Metres: 28.3 | Kind of Water: Not tested

After test of well yield, water was: not tested

Chlorinated ☒ Yes ☐ No

Test of Well Yield

Rec'd Feb 25

Pumping test method: Sub pump

Pump intake set at (metres): 21.3

Pumping rate (litres/min): 79

Duration of pumping: 10 hrs + 25 min

Final water level end of pumping: 12.8 metres

Recommended pump type: ☐ Shallow ☒ Deep

Recommended pump depth: 27 metres

Recommended pumping rate: 91 (litres/min)

Draw Down Time min	Water Level Metres	Recovery Time min	Water Level Metres
Static Level	0.2		12.83
1	3.23	1	9.75
2	6.33	2	7.14
3		3	
4	9.41	4	2.07
5		5	
6	0.72	6	0.73
10	9.37	10	0.39
15	11.07	15	0.34
20	11.48	20	
25	11.71	25	
30	11.92	30	
40	12.16	40	
50	12.30	50	
60	12.34	60	

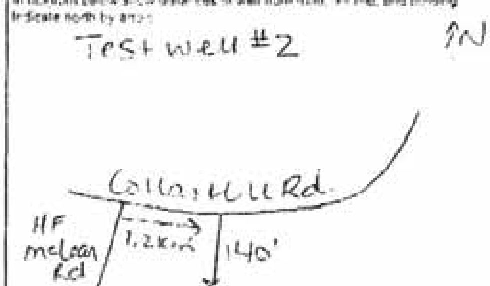
Plugging and Sealing Record

☒ Annular space ☐ Abandonment

Depth set at - Metres From	To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
17.7	0	neat Cement Slurry	.3632

Location of Well

In diagram below show distances of well from road, lot line, and building. Indicate north by arrow.



Method of Construction

☐ Cable Tool ☐ Rotary (air) ☐ Diamond ☐ Digging ☐ Rotary (conventional) ☒ Air percussion ☐ Jetting ☐ Other ☐ Rotary (reverse) ☐ Boring ☐ Driving

Water Use

☐ Domestic ☐ Industrial ☐ Public Supply ☐ Other ☐ Stock ☐ Commercial ☒ Not used ☐ Irrigation ☐ Municipal ☐ Cooling & air conditioning

Final Status of Well

☐ Water Supply ☐ Recharge well ☐ Unfinished ☐ Abandoned (Other) ☐ Observation well ☐ Abandoned, insufficient supply ☐ Dewatering ☒ Test Hole ☐ Abandoned, poor quality ☐ Replacement well

Audit No. Z 23193 | Date Well Completed: 2004 12 14

Was the well owner's information package delivered? ☐ Yes ☐ No | Date Delivered

Well Contractor/Technician Information

Name of Well Contractor: Air Rock Drilling Co Ltd | Well Contractor's Licence No.: 1119

Business Address (street name, number, city etc.): RR#1 Richmond, Ont

Name of Well Technician (last name, first name): Logan Dan | Well Technician's Licence No.: T2398

Signature of Technician/Contractor | Date Submitted

Ministry Use Only

Data Source | Contractor

Date Received | Date of Inspection

Remarks | Well Record Number

Ontario — Ministry of the Environment

Well Tag Number

Well Record

Regulation 903 Ontario Water Resources Act

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- Please print clearly in blue or black ink only.

Ministry Use Only: MUN ___ CON ___ LOT ___

Well Owner's Information and Location of Well Information

First Name / Last Name: 1605861 ONTARIO LTD
Mailing Address (Street Number/Name, RR, Lot, Concession): 4273 GREEN GABLES LANE
County/District/Municipality: ___ Township/City/Town/Village: GLOUCESTER Province: Ontario Postal Code: K1V 1S4 Telephone Number (include area code): ___

Address of Well Location (County/District/Municipality): LANARK Township: WOLFORD Lot: 8 Concession: ___
RR#/Street Number/Name: ___ City/Town/Village: MERRICKVILLE Site/Compartment/Block/Tract etc: ___

GPS Reading: NAD 83 Zone 18 Easting 435[illegible] Northing 497[illegible] Unit Make/Model: magellan Mode of Operation: Undifferentiated / Differentiated / Averaged

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth From (Metres)	Depth To (Metres)
	clay			0	0.61
black+grey	limestone			0.61	30.5

Hole Diameter

Depth From (Metres)	Depth To (Metres)	Diameter (Centimetres)
0	30.5	15.55

Construction Record

Inside diam (centimetres)	Material	Wall thickness (centimetres)	Depth From (Metres)	Depth To (Metres)
Casing				
15.88	Steel	.48	0	18.3
Screen				
No Casing or Screen				
	Open hole		17.7	30.5

Water Record

Water found at Metres	Kind of Water
25 m	Not
29.2	tested

After test of well yield, water was: Other, specify: not tested

Chlorinated: Yes

Test of Well Yield

Rec'd 07/25

Pumping test method: Sub pump
Pump intake set at (metres): 21.3
Pumping rate (litres/min): 102
Duration of pumping: 8 hrs + ___ min
Final water level end of pumping: 8.18 metres
Recommended pump type: Shallow / Deep
Recommended pump depth: 27 metres
Recommended pump rate (litres/min): 136
If flowing give rate (litres/min): ___
If pumping discontinued, give reason: —

Draw Down Time (min)	Water Level (Metres)	Recovery Time (min)	Water Level (Metres)
Static Level	2.65		2.83
1	2.71	1	2.78
2	2.71	2	2.72
3		3	
4	2.71	4	
5	2.72	5	
10	2.73	10	
15	2.75	15	2.71
20	2.75	20	
25	2.75	25	
30	2.76	30	
40	2.77	40	
50	2.78	50	2.65
60	2.79	60	

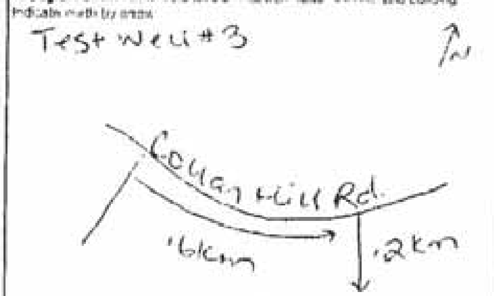
Plugging and Sealing Record

Annular space / Abandonment

Depth set at From (Metres)	To (Metres)	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
17.7	0	neat cement slurry	.4086

Location of Well

In diagram below show distances of well from road, lot line, and building. Indicate north by arrow.



Method of Construction

Cable Tool / Rotary (conventional) / Rotary (reverse) / Rotary (air) / Air percussion [checked] / Boring / Diamond / Jetting / Driving / Digging / Other

Water Use

Domestic / Stock / Irrigation / Industrial / Commercial / Municipal / Public Supply / Not used / Cooling & air conditioning / Other

Final Status of Well

Water Supply / Observation well / Test Hole [checked] / Recharge well / Abandoned, insufficient supply / Abandoned, poor quality / Unfinished / Dewatering / Replacement well / Abandoned (Other)

Audit No. Z 23187 — Date Well Completed: 2004 10 27

Was the well owner's information package delivered? ___ Date Delivered ___

Well Contractor/Technician Information

Name of Well Contractor: Air Rock Drilling Co Ltd — Well Contractor's Licence No.: 1119
Business Address (street name, number, city etc.): R#1 Richmond, Ont
Name of Well Technician (last name, first name): Hogan Dan — Well Technician's Licence No.: T3058
Signature of Technician/Contractor: [illegible] — Date Submitted: ___

Ministry Use Only

Data Source ___ Contractor ___
Date Received ___ Date of Inspection ___
Remarks ___ Well Record Number ___

Ontario Ministry of the Environment

Well Record

Regulation 903 Ontario Water Resources Act

Well Tag Number (Place sticker and print number below)

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Instructions for Completing Form

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- Questions regarding completing this application can be directed to the Water Well Management Coordinator at 416-235-5293.
- **All metre measurements shall be reported to 1/10th of a metre.**
- Please print clearly in blue or black ink only.

Ministry Use Only

MUN | CON | LOT

Well Owner's Information and Location of Well Information

First Name: 160586 | Last Name: ONTARIO LTD | Email Address (Street Number/Name, RR, Lot, Concession): 427 3 GREEN GABLES LANE

County/District/Municipality: GLOUCESTER | Township/City/Town/Village: | Province: Ontario | Postal Code: K1V 1S4 | Telephone Number (include area code):

Address of Well Location (County, District, Municipality): LANARK | Township: WOLFORD | Lot: 8 | Concession: 1

RR#, Street Number/Name: | City, Town, Village: MERRICKVILLE | Site Compartment, Block/Tract etc.

GPS Reading: NAD: 18 | Zone: 18 | Easting: 435317 | Northing: 4972420 | Method of Operation: Magellan | Differentiated | Differentiated, specify

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth From	Depth To
	rocky earth			0	0.30
grey	limestone		broken	0.30	30.5

Hole Diameter

Depth From	Depth To	Diameter Centimetres
0	30.5	15.24

Water Record

Water found at Metres | Kind of Water

- 24.7 — ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other: NOT
- 29.72 — ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other: tested
- ___ — ☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other:

After test of well yield, water was: ☐ Clear and sediment free ☐ Other (specify): NOT tested

Chlorinated: ☒ Yes ☐ No

Construction Record

Inside diam (centimetres) | Material | Wall Thickness (centimetres) | Depth From | Depth To

Casing

Inside diam	Material	Wall Thickness	Depth From	Depth To
15.88	☒ Steel ☐ Plastic ☐ Galvanized ☐ Fibreglass ☐ Concrete ☐ Other	.148	0	18.3

Screen

Outside diam	Material	Slot No.
	☐ Steel ☐ Plastic ☐ Galvanized ☐ Fibreglass ☐ Concrete ☐ Other	

No Casing or Screen

☒ Open Hole: 17.7 — 30.5

Test of Well Yield

Pumping test method: Submersible pump

Pumping rate (litres/minute): 114

Duration of pumping: 2 hrs + — min

Final water level end of pumping (metres): 21.3

If pumping discontinued, give reason:

Recommended pump depth: 24 metres

Recommended pump rate: 11 (litres/minute)

Recommended well yield: (litres/minute)

Draw Down Time (min)	Draw Down Water Level (Metres)	Recovery Time (min)	Recovery Water Level (Metres)
Static level	5.19		5.72
1	5.41	1	5.34
2	5.42	2	5.34
3		3	
4	5.43	4	
5		5	
6	5.49		
10	5.64	10	
15	5.65	15	
20	5.66	20	5.25
25	5.67	25	
30	5.67	30	5.25
40	5.68	40	
50	5.69	50	
60	5.69	60	

Plugging and Sealing Record

Annular space | Abandoned, sealed

Depth set at - Metres From	To	Material and type (bentonite slurry, neat cement slurry, etc.)	Volume Placed (cubic metres)
17.7	0	neat cement slurry	.2724

Method of Construction

☐ Cable Tool ☐ Rotary (air) ☐ Diamond ☐ Jetting
☐ Rotary (conventional) ☒ Air percussion ☐ Jetting ☐ Other
☐ Rotary (reverse) ☐ Boring ☐ Driving

Water Use

☐ Domestic ☐ Industrial ☐ Public Supply ☐ Other
☐ Stock ☐ Commercial ☒ Not used
☐ Irrigation ☐ Municipal ☐ Cooling & Air Conditioning

Final Status of Well

☐ Water Supply ☐ Recharge well ☐ Dewatering ☐ Abandoned, (Other)
☐ Observation well ☐ Abandoned, insufficient supply ☐ Dewatering
☐ Test Hole ☐ Abandoned, poor quality ☐ Replacement well

Well Contractor/Technician Information

Name of Well Contractor: Ambrock Drilling Ltd | Well Contractor's Licence No: 1119

Business Address (Street name, number, city etc.): RR#1 Richmond, Ont

Name of Well Technician (last name, first name): Hogan Dan | Well Technician's Licence No: T 3058

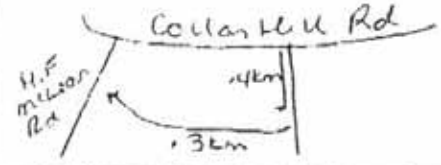
Signature of Technician/Contractor:

Location of Well

In diagram below show distances of well from road, lot line, and building. Indicate north by arrow.

TEST WELL #4

N



Order No.: Z 23196 | Date Well Completed: 2005 01 13

Was the well owner's information package delivered? ☐ Yes ☐ No | Date Delivered: Year Month Day

Ministry Use Only

Data Source | Contractor

Date Received: Year Month Day | Date of Inspection: Year Month Day

Remarks | Well Record Number

Ontario | Ministry of the Environment

Well Tag Number

Well Record

Regulation 903 Ontario Water Resources Act

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Instructions for Completing Form

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- **All metre measurements shall be reported to 1/10th of a metre.**
- Please print clearly in blue or black ink only.

Ministry Use Only — MUN | CON | LOT

Well Owner's Information and Location of Well Information

First Name: 1605861 | Last Name: ONTARIO LTD | Mailing Address (Street Number/Name, RR, Lot, Concession): 4273 GREEN GABLES LANE

County/District/Municipality: | Township/City/Town/Village: GLOUCESTER | Province: Ontario | Postal Code: K1V 1S4 | Telephone Number (include area code):

Address of Well Location (County/District/Municipality): LANARK | Township: WOLFORD | Lot: 7 | Concession: 1

RR#/Street Number/Name: | City/Town/Village: MERRICKVILLE | Site/Compartment/Block/Tract etc.:

GPS Reading: NAD 83 | Zone 18 | Easting 436084 | Northing 4973741 | Unit Make/Model: Magellan | Mode of Operation: Undifferentiated / Averaged (X) / Differentiated, specify

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth Metres From	Depth Metres To
	rocky clay			0	0.91
grey	limestone		broken	0.91	24.4

Hole Diameter

Depth Metres From	Depth Metres To	Diameter Centimetres
0	24.4	15.23

Construction Record

Inside diam centimetres	Material	Wall thickness centimetres	Depth Metres From	Depth Metres To
Casing				
15.88	(X) Steel	.48	0	18.3
Screen				
No Casing or Screen				
	(X) Open hole		17.7	24.4

Water Record

Water found at Metres	Kind of Water
20.7	Other – NOT
21.9	Other – tested
22.8	

After test of well yield, water was: Clear and sediment free / Other, specify: NOT tested

Chlorinated: (X) Yes / No

Test of Well Yield

Pumping test method: Sub pump

Pump intake set at (metres): 18.3

Pumping rate (litres/min): 114

Duration of pumping: 6 hrs + — min

Final water level end of pumping: 4.7 metres

Recommended pump type: Shallow / (X) Deep

Recommended pump depth: 21.3 metres

Recommended pump rate: 136 (litres/min)

If flowing give rate (litres/min):

If pumping discontinued, give reason: —

Draw Down Time min	Draw Down Water Level Metres	Recovery Time min	Recovery Water Level Metres
Static Level	4.45		4.7
1	4.60	1	4.57
2	4.61	2	4.57
3		3	
4	4.62	4	4.57
5		5	
6	4.62	6	4.57
10	4.62	10	4.57
15	4.63	15	4.56
20	4.64	20	4.56
25	4.64	25	
30	4.64	30	
40	4.65	40	
50	4.65	50	
60	4.66	60 / 90	4.46

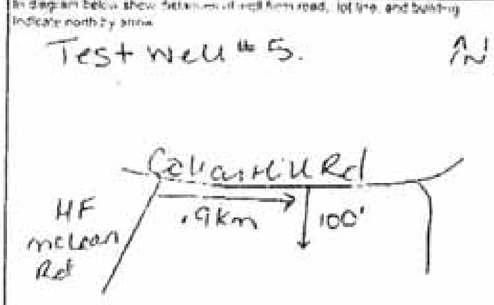
Plugging and Sealing Record

(X) Annular space / Abandonment

Depth set at - Metres From	To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
17.7	0	neat cement slurry	.3178

Location of Well

In diagram below show distances of well from road, lot line, and building. Indicate north by arrow.



Method of Construction

Cable Tool / Rotary (air) / Diamond / Digging / Rotary (conventional) / (X) Air percussion / Jetting / Other / Rotary (reverse) / Boring / Driving

Water Use

Domestic / Industrial / Public Supply / Other / Stock / Commercial / Not used / Irrigation / Municipal / Cooling & air conditioning

Final Status of Well

Water Supply / Recharge well / Unfinished / Abandoned, (Other) / Observation well / Abandoned, insufficient supply / Dewatering / (X) Test Hole / Abandoned, poor quality / Replacement well

Audit No. Z 23195 | Date Well Completed: 2005 / 01 / 31

Was the well owner's information package delivered? Yes / No | Date Delivered: YYYY MM DD

Well Contractor/Technician Information

Name of Well Contractor: A. Roach Drilling Co Ltd | Well Contractor's Licence No.: 1119

Business Address (street name, number, city etc.): RR#1 Richmond, Ont

Name of Well Technician (last name, first name): Hogan Dan | Well Technician's Licence No.: T3098

Signature of Technician/Contractor: | Date Submitted: YYYY MM DD

Ministry Use Only

Data Source | Contractor

Date Received YYYY MM DD | Date of Inspection YYYY MM DD

Remarks | Well Record Number

Ontario — Ministry of the Environment

Well Tag Number

Well Record

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- **All metre measurements shall be reported to 1/10th of a metre**
- Please print clearly in blue or black ink only.

Ministry Use Only: MUN / CON / LOT

Well Owner's Information and Location of Well Information

First Name	Last Name	Mailing Address (Street Number/Name, RR, Lot, Concession)
1605861	ONTARIO LTD	4373 GREEN GABLES LANE

County/District/Municipality	Township/City/Town/Village	Province	Postal Code	Telephone Number
	GLOUCESTER	Ontario	K1V 1S4	

Address of Well Location (County/District/Municipality)	Township	Lot	Concession
LANARK	WOLFORD	8	1

RR#/Street Number/Name: | City/Town/Village: MERRICKVILLE | Site/Compartment/Block/Tract etc.

GPS Reading: NAD 83 | Zone 18 | Easting 435057 | Northing [illegible]73042 | Unit Make/Model: Magellan | Mode of Operation: Averaged

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth From (Metres)	Depth To (Metres)
	rocky clay			0	1.22
grey	limestone		broken	1.22	24.4

Hole Diameter

Depth From (Metres)	Depth To (Metres)	Diameter (Centimetres)
0	24.4	15.23

Construction Record

Inside diam (centimetres)	Material	Wall thickness (centimetres)	Depth From (Metres)	Depth To (Metres)
Casing				
15.88	Steel	.48	0	18.3
Screen				
No Casing or Screen				
	Open hole		17.7	24.4

Water Record

Water found at (Metres)	Kind of Water
18.6	Other: not
21.9	Other: tested

After test of well yield, water was: not tested

Chlorinated: ☑ Yes ☐ No

Test of Well Yield

Pumping test method: Sub pump

Pump intake set at (metres): 18.3

Pumping rate (litres/min): 65

Duration of pumping: 6 hrs

Final water level end of pumping: 19.5 metres

Recommended pump type: ☑ Deep

Recommended pump depth: 21.3 metres

Recommended pump rate: 91 (l/min)

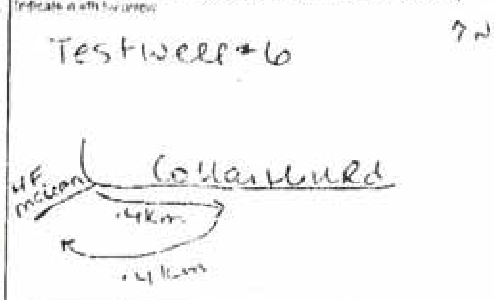
Draw Down Time (min)	Water Level (Metres)	Recovery Time (min)	Water Level (Metres)
Static Level	5.93		19.46
1	7.72	1	15.27
2	9.72	2	13.06
3		3	
4	13.15	4	9.77
5		6	7.55
6	15.41	8	6.17
10	16.21	10	
15	16.41	15	
20	16.89	20	
25	17.35	25	
30	17.62	30	
40	18.06	40	
50	17.65	50	
60	17.69	60	

Plugging and Sealing Record ☑ Annular space ☐ Abandonment

Depth From (Metres)	Depth To (Metres)	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
17.7	0	neat cement slurry: .2724	

Location of Well

In diagram below show distances of well from road, lot line, and building. Indicate north by arrow.



Method of Construction: ☑ Air percussion

Water Use: ☑ Not used

Audit No. Z 23197 | Date Well Completed 2005 01 31

Final Status of Well: ☑ Test Hole

Well Contractor/Technician Information

Name of Well Contractor: A. Rock Drilling Ltd. | Well Contractor's Licence No.: 1119

Business Address: RR#1 Richmond, Ont

Name of Well Technician: Logan Dan | Well Technician's Licence No.: T3058

Signature of Technician/Contractor

Ministry Use Only

Ontario Ministry of the Environment

Well Tag Number

Well Record

Regulation 903 Ontario Water Resources Act

MW2

Instructions for Completing Form

- For use in the Province of Ontario only. This document is a permanent legal document. Please retain for future reference.
- All Sections must be completed in full to avoid delays in processing. Further instructions and explanations are available on the back of this form.
- Questions regarding completing this application can be directed to the Water Well Management Coordinator at 416-235-6203.
- All metre measurements shall be reported to 1/10th of a metre.
- Please print clearly in blue or black ink only.

Ministry Use Only: MUN / CON / LOT

Well Owner's Information and Location of Well Information

First Name: 1605861 | Last Name: Ontario Ltd | Mailing Address: 4273 Greengaldeslane

County/District/Municipality: | Township/City/Town/Village: Gloucester | Province: Ontario | Postal Code: K1V 1S4 | Telephone Number:

Address of Well Location (County/District/Municipality): Lanark | Township: Wolford | Lot: 8 | Concession: 1

RR#/Street Number/Name: | City/Town/Village: Merrickville

GPS Reading: NAD 83 | Zone 18 | Easting 436432 | Northing 4972736 | Unit Make/Model: Magellan | Mode of Operation: Averaged

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth From (Metres)	Depth To (Metres)
grey	limestone		broken	0	9.1

Hole Diameter

Depth From (Metres)	Depth To (Metres)	Diameter (Centimetres)
0	9.1	15.24

Construction Record

Inside diam (centimetres)	Material	Wall thickness (centimetres)	Depth From (Metres)	Depth To (Metres)
Casing				
2"	Plastic	(2-1)	+0.9	5.2
2"	Plastic	(2-2)	+0.9	8.2
Screen				
	Slot	(2-1)	5.2	6.1
2"		(2-2)	8.2	9.1

No Casing or Screen / Open hole

Water Record

Water found at Metres / Kind of Water: (struck through)

After test of well yield, water was: Clear and sediment free / Other, specify

Chlorinated: Yes / No

Test of Well Yield

(struck through)

Draw Down Time min	Recovery Time min
Static Level	
1	1
2	2
3	3
4	4
5	5
10	10
15	15
20	20
25	25
30	30
40	40
50	50
60	60

Plugging and Sealing Record

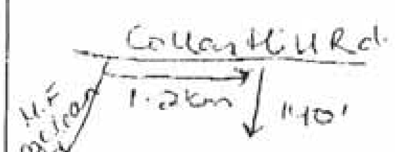
☑ Annular space ☐ Abandonment

Depth set at - Metres From	To	Material and type	Volume Placed (cubic metres)
9.1	7.6	sand	
7.6	6.1	holeplug	
6.1	0.6	sand	
0.6	0	holeplug	

Location of Well

In diagram below show distances of well from road, lot line, and building. Indicate north by arrow.

Monitoringwell #2



Method of Construction

Air percussion (checked)

Water Use

Other (checked)

Final Status of Well

Observation well (checked)

Audit No. Z 23170 | Date Well Completed: 2004 12 14

Well Contractor/Technician Information

Name of Well Contractor: Airrock Drilling Co Ltd | Well Contractor's Licence No.: 1119

Business Address: RR#1 Richmond, Ont

Name of Well Technician: Hogan Dan | Well Technician's Licence No.: T3058

Signature of Technician/Contractor:

Ministry Use Only

Ontario Ministry of the Environment

Well Tag Number (Place sticker and print number below)

Well Record

Regulation 903 Ontario Water Resources Act

MW3

page ___ of ___

Instructions for Completing Form

- For use in the Province of Ontario only. This document is a permanent legal document. Please retain for future reference.
- All Sections must be completed in full to avoid delays in processing. Further instructions and explanations are available on the back of this form.
- Questions regarding completing this application can be directed to the Water Well Management Coordinator at 416-235-6203.
- **All metre measurements shall be reported to 1/10th of a metre.**
- Please print clearly in blue or black ink only.

Ministry Use Only: MUN ___ CON ___ LOT ___

Well Owner's Information and Location of Well Information

Field	Entry
First Name / Last Name	1605861 Ontario Ltd
Mailing Address (Street Number/Name, RR, Lot, Concession)	4273 Green Gables Lane
County/District/Municipality	
Township/City/Town/Village	Gloucester
Province	Ontario
Postal Code	K1V 1S4
Telephone Number (include area code)	
Address of Well Location (County/District/Municipality)	Lanark
Township	Wolford
Lot	8
Concession	
RR#/Street Number/Name	
City/Town/Village	Merrickville
Site/Compartment/Block/Tract etc.	
GPS Reading	NAD 83, Zone 18, Easting 435641, Northing 4972390
Unit Make/Model	Magellan
Mode of Operation	Undifferentiated / ☑ Averaged / Differentiated, specify

Log of Overburden and Bedrock Materials (see instructions)

General Colour	Most common material	Other Materials	General Description	Depth (Metres) From	To
grey	limestone		broken	0	9.1

Hole Diameter

Depth (Metres) From	To	Diameter (Centimetres)
0	9.1	15.24

Construction Record

Inside diam (centimetres)	Material	Wall thickness (centimetres)	Depth (Metres) From	To
Casing				
2"	☒ Plastic	(3-1)	+0.9	5.2
2"	☒ Plastic	(3-2)	+0.9	8.2
Screen (Outside diam)		Slot No.		
2"	☒ Plastic	(3-1)	5.2	6.1
		(3-2)	8.2	9.1
No Casing or Screen	☐ Open hole			

Water Record

Water found at Metres	Kind of Water
___ m	☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other (struck through)
___ m	☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other (struck through)
___ m	☐ Fresh ☐ Sulphur ☐ Gas ☐ Salty ☐ Minerals ☐ Other (struck through)

After test of well yield, water was: ☐ Clear and sediment free ☐ Other, specify ___

Chlorinated ☐ Yes ☐ No

Test of Well Yield

(Section struck through, not completed)

Pumping test method; Pump intake set at (metres); Pumping rate (litres/min); Duration of pumping ___ hrs + ___ min; Final water level end of pumping ___ metres; Recommended pump type ☐ Shallow ☐ Deep; Recommended pump depth ___ metres; Recommended pump rate (litres/min); If flowing give rate (litres/min); If pumping discontinued, give reason.

Draw Down Time min	Water Level Metres	Recovery Time min	Water Level Metres
Static Level			
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	
20		20	
25		25	
30		30	
40		40	
50		50	
60		60	

Plugging and Sealing Record

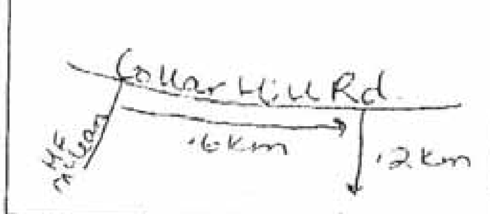
☑ Annular space ☐ Abandonment

Depth set at (Metres) From	To	Material and type (bentonite slurry, neat cement slurry) etc.	Volume Placed (cubic metres)
9.1	7.6	Sand	
7.6	6.1	holeplug	
6.1	0.6	Sand	
0.6	0	holeplug	

Location of Well

In diagram below show distances of well from road, lot line, and building. Indicate north by arrow.

Monitoring well #3



Method of Construction

☐ Cable Tool ☐ Rotary (air) ☐ Diamond ☐ Digging ☐ Rotary (conventional) ☑ Air percussion ☐ Jetting ☐ Other ☐ Rotary (reverse) ☐ Boring ☐ Driving

Water Use

☐ Domestic ☐ Industrial ☐ Public Supply ☐ Other ☐ Stock ☐ Commercial ☑ Not used ☐ Irrigation ☐ Municipal ☐ Cooling & air conditioning

Final Status of Well

☐ Water Supply ☐ Recharge well ☐ Unfinished ☐ Abandoned, (Other) ☑ Observation well ☐ Abandoned, insufficient supply ☐ Dewatering ☐ Test Hole ☐ Abandoned, poor quality ☐ Replacement well

Audit No. Z 23169

Date Well Completed: 2004 11 29

Was the well owner's information package delivered? ☐ Yes ☐ No — Date Delivered ___

Well Contractor/Technician Information

Field	Entry
Name of Well Contractor	Air Rock Drilling Co Ltd
Well Contractor's Licence No.	1119
Business Address (street name, number, city etc.)	RR #1 Richmond Ont
Name of Well Technician (last name, first name)	Hogan Dan
Well Technician's Licence No.	13058
Signature of Technician/Contractor	
Date Submitted	

Ministry Use Only

Data Source ___ Contractor ___

Date Received ___ Date of Inspection ___

Remarks ___ Well Record Number ___

APPENDIX D

PUMPING TEST DATA
TEST WELL 1

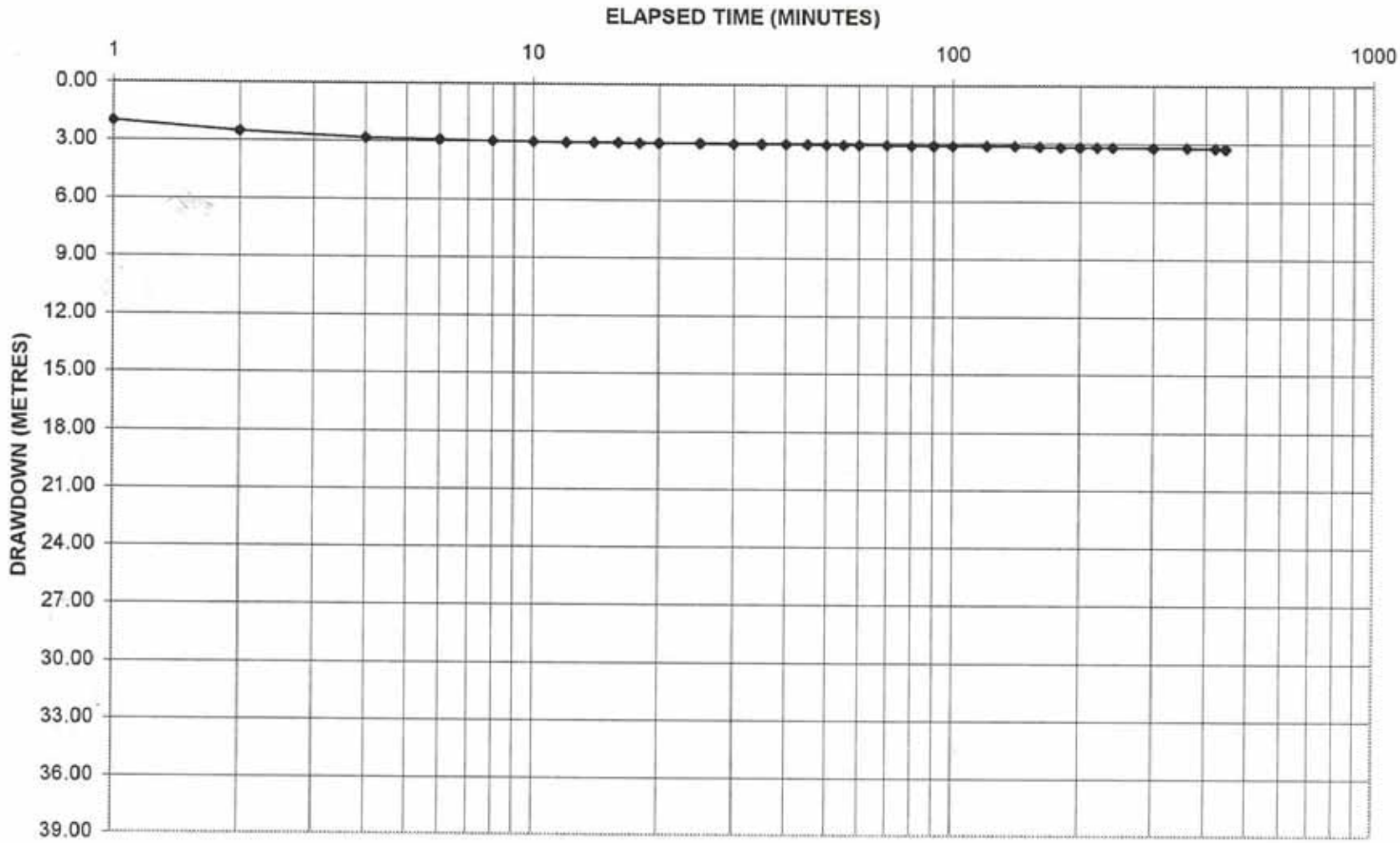
DRAWDOWN DATA
TW1
Proposed Residential Subdivision

Time	Elapsed Time (hours)	Elapsed Time (min)	Water Level Below Top of Casing (metres)	Drawdown (metres)
10:47:00	0:00:00	0	2.63	0.00
10:48:00	0:01:00	1	4.60	1.97
10:49:00	0:02:00	2	5.15	2.52
10:51:00	0:04:00	4	5.47	2.84
10:53:00	0:06:00	6	5.54	2.91
10:55:00	0:08:00	8	5.60	2.97
10:57:00	0:10:00	10	5.63	3.00
10:59:00	0:12:00	12	5.64	3.01
11:01:00	0:14:00	14	5.64	3.01
11:03:00	0:16:00	16	5.65	3.02
11:05:00	0:18:00	18	5.66	3.03
11:07:00	0:20:00	20	5.67	3.04
11:12:00	0:25:00	25	5.68	3.05
11:17:00	0:30:00	30	5.69	3.06
11:22:00	0:35:00	35	5.70	3.07
11:27:00	0:40:00	40	5.71	3.08
11:32:00	0:45:00	45	5.71	3.08
11:37:00	0:50:00	50	5.72	3.09
11:42:00	0:55:00	55	5.72	3.09
11:47:00	1:00:00	60	5.73	3.10
11:57:00	1:10:00	70	5.73	3.10
12:07:00	1:20:00	80	5.74	3.11
12:17:00	1:30:00	90	5.74	3.11
12:27:00	1:40:00	100	5.75	3.12
12:47:00	2:00:00	120	5.75	3.12
13:07:00	2:20:00	140	5.76	3.13
13:27:00	2:40:00	160	5.77	3.14
13:47:00	3:00:00	180	5.80	3.17
14:07:00	3:20:00	200	5.80	3.17
14:27:00	3:40:00	220	5.80	3.17
14:47:00	4:00:00	240	5.81	3.18
15:47:00	5:00:00	300	5.82	3.19
16:47:00	6:00:00	360	5.84	3.21
17:47:00	7:00:00	420	5.86	3.23
18:11:00	7:24:00	444	5.87	3.24

Proposed Residential Subdivision

TW1

DRAWDOWN VERSUS LOGTIME



RECOVERY DATA
TW1
Proposed Residential Subdivision

Time	Elapsed Time (hours)	Elapsed Time (min) t'	Time Since Pump Test Started (min) t	Ratio t/t'	Water Level Below Top of Casing (metres)	Recovery (metres)
18:11:00	0:00:00	0	360	0.00	5.87	3.24
18:12:00	0:01:00	1	361	361.00	2.95	0.32
18:15:00	0:04:00	4	364	91.00	2.87	0.24
18:17:00	0:06:00	6	366	61.00	2.84	0.21
18:36:00	0:25:00	25	385	15.40	2.80	0.17

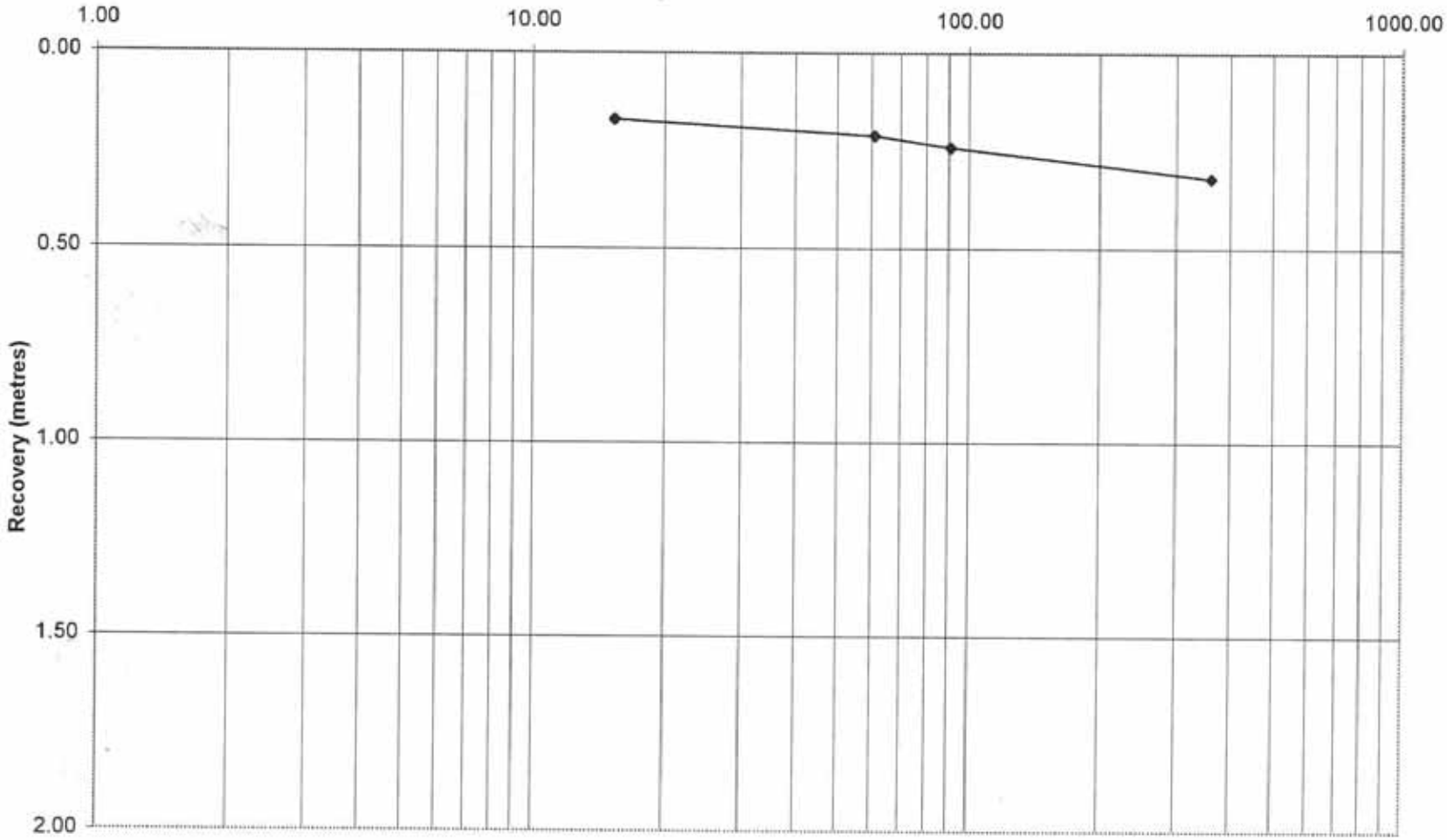
RECOVERY DATA

Proposed Residential Subdivision

TW1

RESIDUAL DRAWDOWN

t/t'



APPENDIX E

PUMPING TEST DATA
TEST WELL 2

November 2004

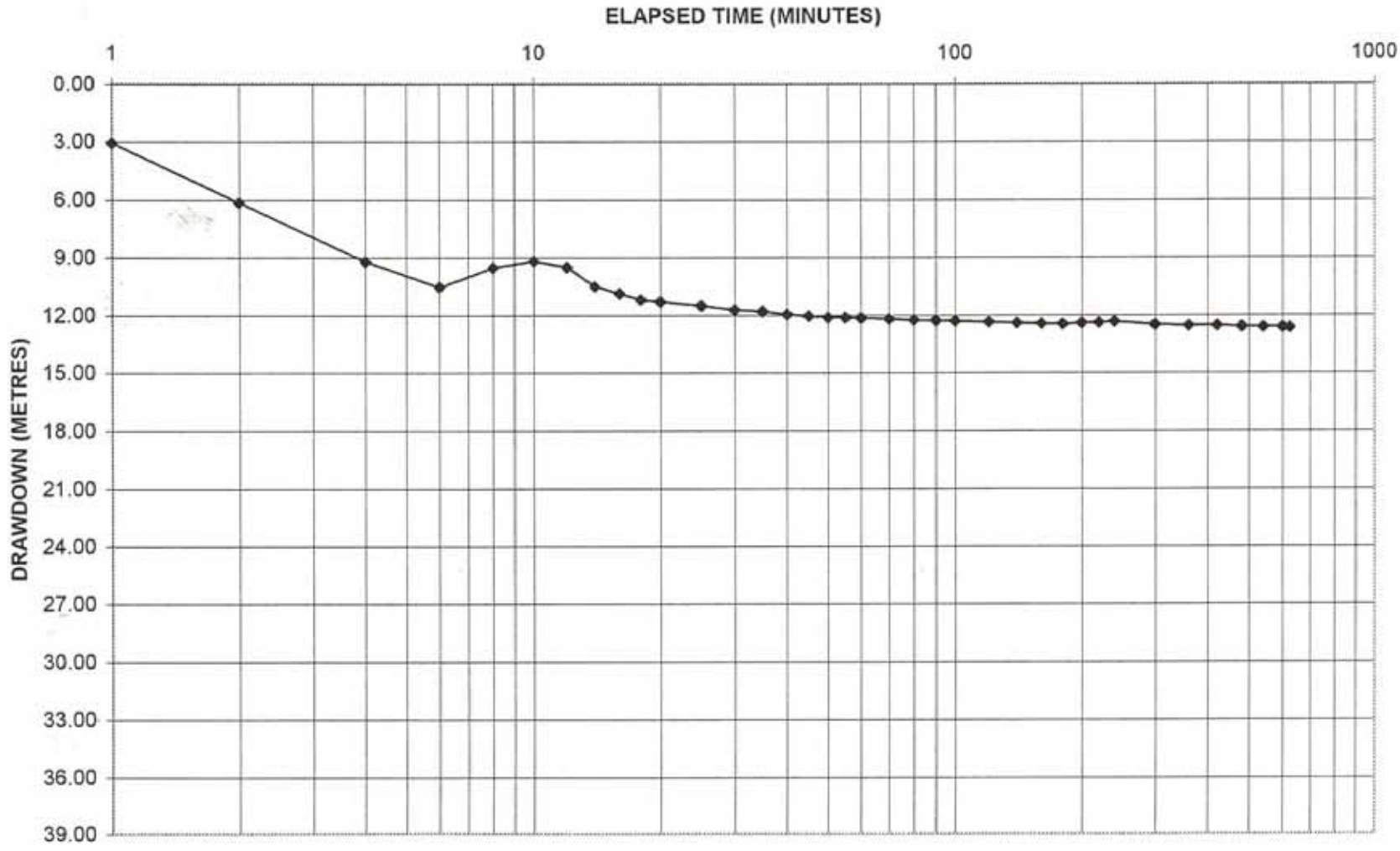
DRAWDOWN DATA
TW2
Proposed Residential Subdivision

Time	Elapsed Time (hours)	Elapsed Time (min)	Water Level Below Top of Casing (metres)	Drawdown (metres)
9:12:00	0:00:00	0	0.2	0.00
9:13:00	0:01:00	1	3.23	3.03
9:14:00	0:02:00	2	6.33	6.13
9:16:00	0:04:00	4	9.41	9.21
9:18:00	0:06:00	6	10.72	10.52
9:20:00	0:08:00	8	9.72	9.52
9:22:00	0:10:00	10	9.37	9.17
9:24:00	0:12:00	12	9.69	9.49
9:26:00	0:14:00	14	10.71	10.51
9:28:00	0:16:00	16	11.07	10.87
9:30:00	0:18:00	18	11.39	11.19
9:32:00	0:20:00	20	11.48	11.28
9:37:00	0:25:00	25	11.71	11.51
9:42:00	0:30:00	30	11.92	11.72
9:47:00	0:35:00	35	11.99	11.79
9:52:00	0:40:00	40	12.16	11.96
9:57:00	0:45:00	45	12.24	12.04
10:02:00	0:50:00	50	12.30	12.10
10:07:00	0:55:00	55	12.32	12.12
10:12:00	1:00:00	60	12.34	12.14
10:22:00	1:10:00	70	12.39	12.19
10:32:00	1:20:00	80	12.43	12.23
10:42:00	1:30:00	90	12.46	12.26
10:52:00	1:40:00	100	12.50	12.30
11:12:00	2:00:00	120	12.54	12.34
11:32:00	2:20:00	140	12.59	12.39
11:52:00	2:40:00	160	12.63	12.43
12:12:00	3:00:00	180	12.65	12.45
12:32:00	3:20:00	200	12.61	12.41
12:52:00	3:40:00	220	12.58	12.38
13:12:00	4:00:00	240	12.52	12.32
14:12:00	5:00:00	300	12.67	12.47
15:12:00	6:00:00	360	12.72	12.52
16:12:00	7:00:00	420	12.74	12.54
17:12:00	8:00:00	480	12.78	12.58
18:12:00	9:00:00	540	12.80	12.60
19:12:00	10:00:00	600	12.82	12.62
19:37:00	10:25:00	625	12.83	12.63

Proposed Residential Subdivision

TW2

DRAWDOWN VERSUS LOGTIME



RECOVERY DATA
TW2
Proposed Residential Subdivision

Time	Elapsed Time (hours)	Elapsed Time (min) t'	Time Since Pump Test Started (min) t	Ratio t/t'	Water Level Below Top of Casing (metres)	Recovery (metres)
19:40:00	0:00:00	0	360	0.00	12.83	12.63
19:41:00	0:01:00	1	361	361.00	9.75	9.55
19:42:00	0:02:00	2	362	181.00	7.14	6.94
19:44:00	0:04:00	4	364	91.00	2.07	1.87
19:46:00	0:06:00	6	366	61.00	0.73	0.53
19:48:00	0:08:00	8	368	46.00	0.39	0.19
19:58:00	0:18:00	18	378	21.00	0.34	0.14

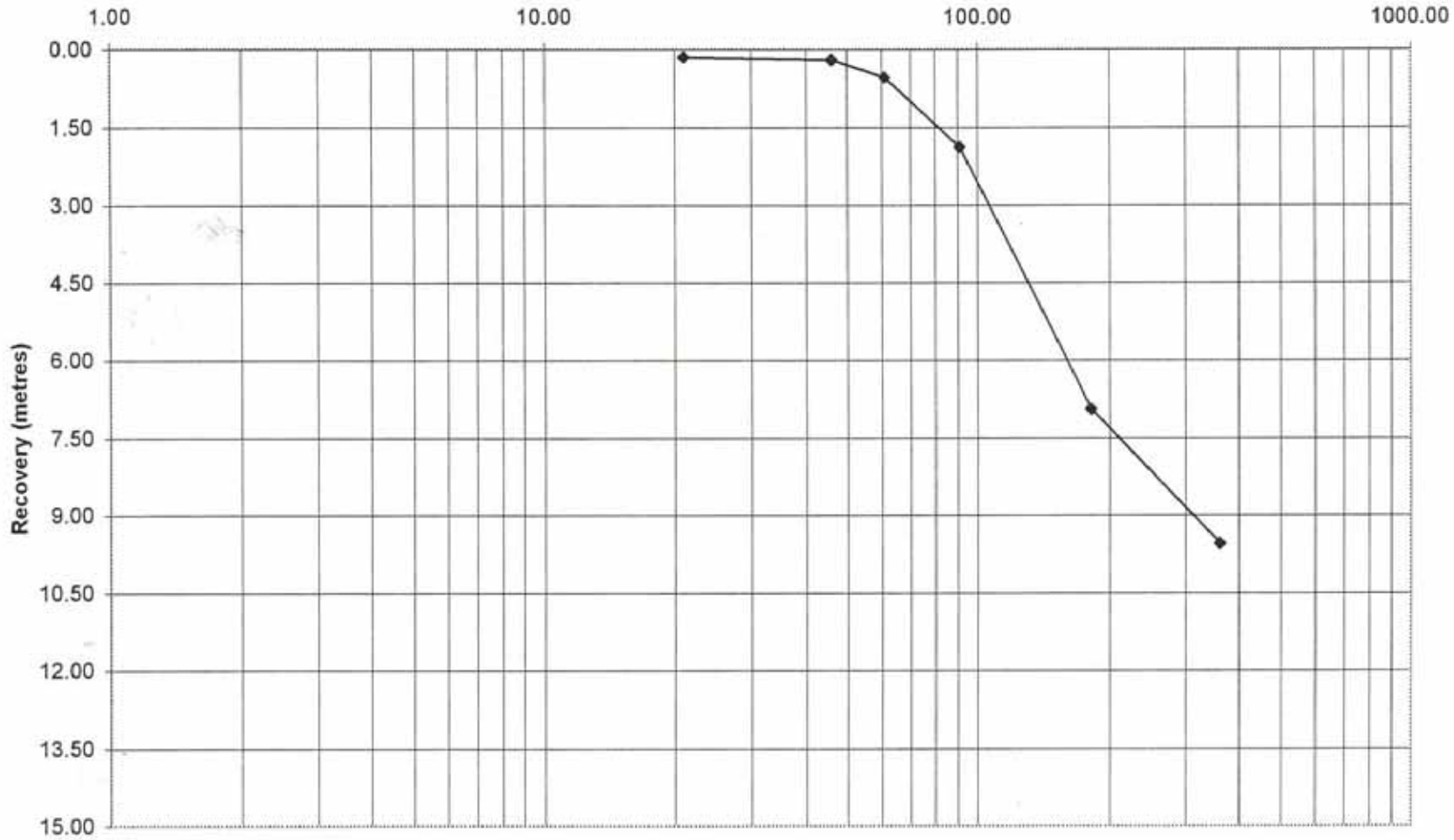
RECOVERY DATA

Proposed Residential Subdivision

TW2

RESIDUAL DRAWDOWN

t/t'



APPENDIX F

PUMPING TEST DATA
TEST WELL 3

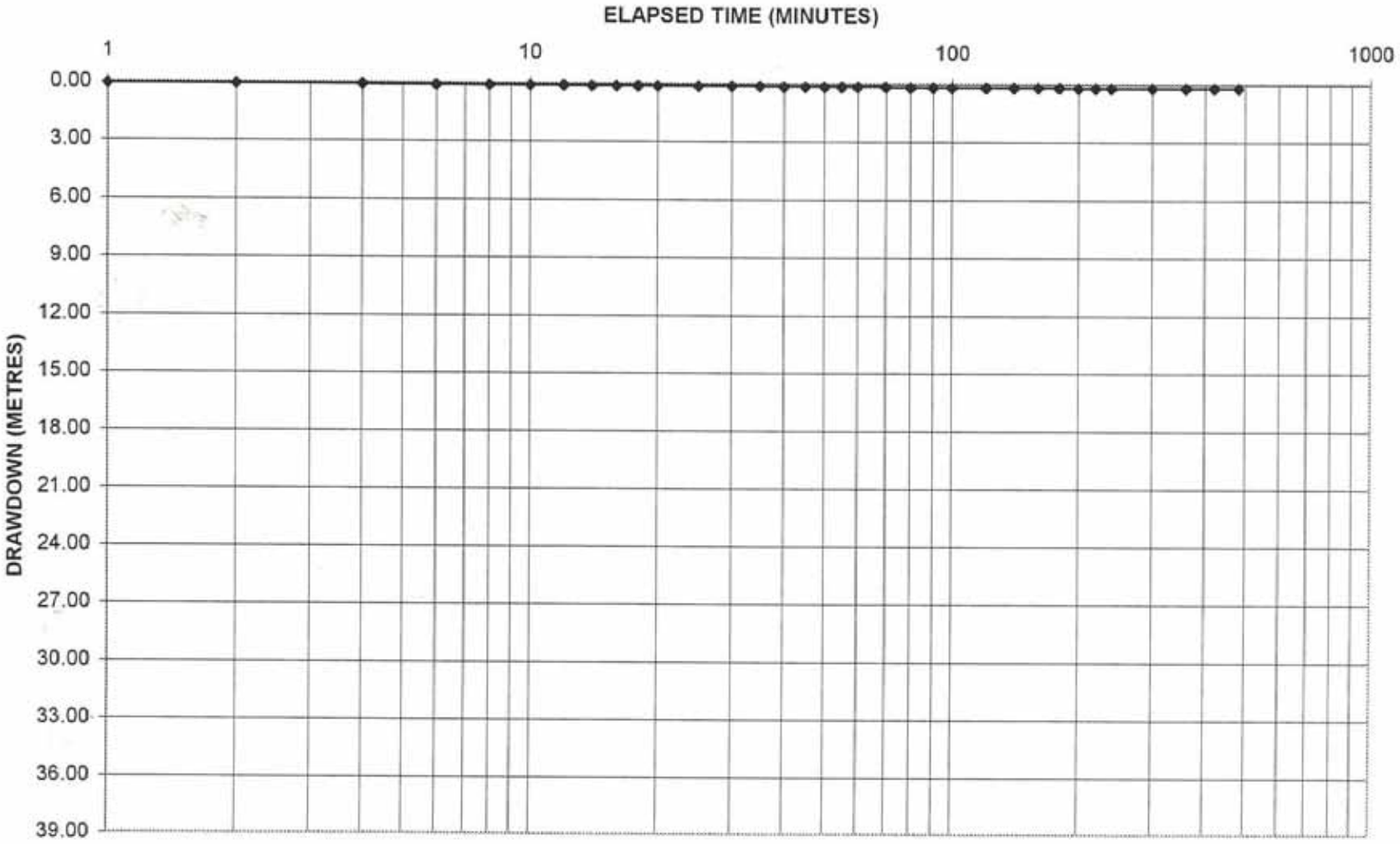
DRAWDOWN DATA
TW3
Proposed Residential Subdivision

Time	Elapsed Time (hours)	Elapsed Time (min)	Water Level Below Top of Casing (metres)	Drawdown (metres)
8:42:00	0:00:00	0	2.65	0.00
8:43:00	0:01:00	1	2.71	0.06
8:44:00	0:02:00	2	2.71	0.06
8:46:00	0:04:00	4	2.71	0.06
8:48:00	0:06:00	6	2.72	0.07
8:50:00	0:08:00	8	2.73	0.08
8:52:00	0:10:00	10	2.73	0.08
8:54:00	0:12:00	12	2.74	0.09
8:56:00	0:14:00	14	2.75	0.10
8:58:00	0:16:00	16	2.75	0.10
9:00:00	0:18:00	18	2.75	0.10
9:02:00	0:20:00	20	2.75	0.10
9:07:00	0:25:00	25	2.75	0.10
9:12:00	0:30:00	30	2.76	0.11
9:17:00	0:35:00	35	2.76	0.11
9:22:00	0:40:00	40	2.77	0.12
9:27:00	0:45:00	45	2.78	0.13
9:32:00	0:50:00	50	2.78	0.13
9:37:00	0:55:00	55	2.78	0.13
9:42:00	1:00:00	60	2.79	0.14
9:52:00	1:10:00	70	2.79	0.14
10:02:00	1:20:00	80	2.80	0.15
10:12:00	1:30:00	90	2.80	0.15
10:22:00	1:40:00	100	2.81	0.16
10:42:00	2:00:00	120	2.82	0.17
11:02:00	2:20:00	140	2.82	0.17
11:22:00	2:40:00	160	2.82	0.17
11:42:00	3:00:00	180	2.82	0.17
12:02:00	3:20:00	200	2.83	0.18
12:22:00	3:40:00	220	2.83	0.18
12:42:00	4:00:00	240	2.83	0.18
13:42:00	5:00:00	300	2.83	0.18
14:42:00	6:00:00	360	2.83	0.18
15:42:00	7:00:00	420	2.83	0.18
16:02:00	8:00:00	480	2.83	0.18

Proposed Residential Subdivision

TW3

DRAWDOWN VERSUS LOGTIME



RECOVERY DATA
TW3
Proposed Residential Subdivision

Time	Elapsed Time (hours)	Elapsed Time (min) t'	Time Since Pump Test Started (min) t	Ratio t/t'	Water Level Below Top of Casing (metres)	Recovery (metres)
16:02:00	0:00:00	0	360	0.00	2.83	0.18
16:03:00	0:01:00	1	361	361.00	2.78	0.13
16:04:00	0:02:00	2	362	181.00	2.78	0.13
16:16:00	0:04:00	14	374	26.71	2.71	0.06
16:18:00	0:06:00	16	376	23.50	2.70	0.05
16:56:00	0:08:00	54	414	7.67	2.68	0.03

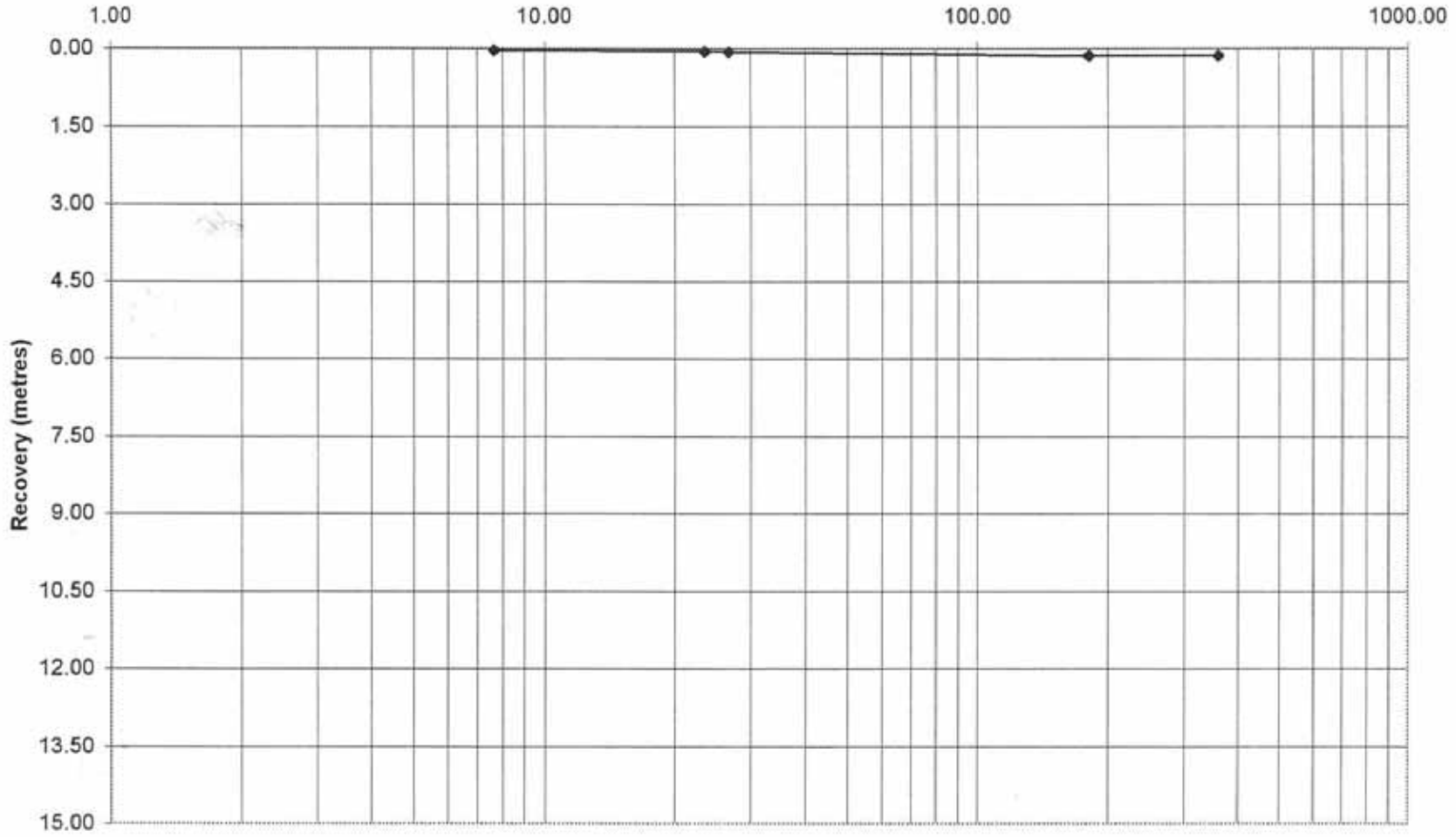
RECOVERY DATA

Proposed Residential Subdivision

TW3

RESIDUAL DRAWDOWN

t/t'



APPENDIX G

PUMPING TEST DATA
TEST WELL 4

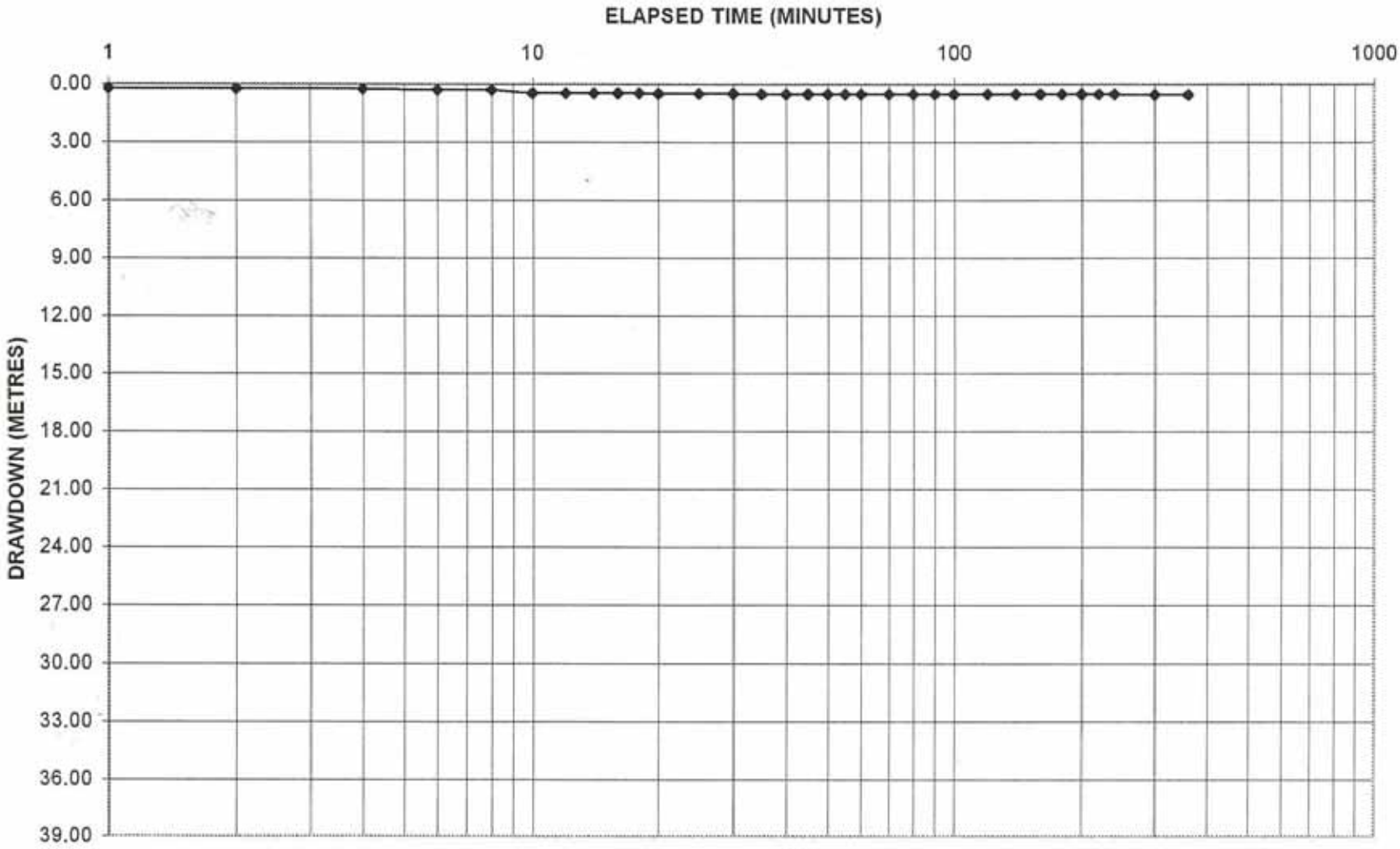
DRAWDOWN DATA
TW4
Proposed Residential Subdivision

Time	Elapsed Time (hours)	Elapsed Time (min)	Water Level Below Top of Casing (metres)	Drawdown (metres)
10:05:00	0:00:00	0	5.19	0.00
10:06:00	0:01:00	1	5.41	0.22
10:07:00	0:02:00	2	5.42	0.23
10:09:00	0:04:00	4	5.43	0.24
10:11:00	0:06:00	6	5.49	0.30
10:13:00	0:08:00	8	5.49	0.30
10:15:00	0:10:00	10	5.64	0.45
10:17:00	0:12:00	12	5.64	0.45
10:19:00	0:14:00	14	5.65	0.46
10:21:00	0:16:00	16	5.65	0.46
10:23:00	0:18:00	18	5.65	0.46
10:25:00	0:20:00	20	5.66	0.47
10:30:00	0:25:00	25	5.67	0.48
10:35:00	0:30:00	30	5.67	0.48
10:40:00	0:35:00	35	5.68	0.49
10:45:00	0:40:00	40	5.68	0.49
10:50:00	0:45:00	45	5.68	0.49
10:55:00	0:50:00	50	5.69	0.50
11:00:00	0:55:00	55	5.69	0.50
11:05:00	1:00:00	60	5.69	0.50
11:15:00	1:10:00	70	5.69	0.50
11:25:00	1:20:00	80	5.69	0.50
11:35:00	1:30:00	90	5.70	0.51
11:45:00	1:40:00	100	5.70	0.51
12:05:00	2:00:00	120	5.70	0.51
12:25:00	2:20:00	140	5.70	0.51
12:45:00	2:40:00	160	5.70	0.51
13:05:00	3:00:00	180	5.70	0.51
13:25:00	3:20:00	200	5.70	0.51
13:45:00	3:40:00	220	5.70	0.51
14:05:00	4:00:00	240	5.70	0.51
15:05:00	5:00:00	300	5.71	0.52
16:05:00	6:00:00	360	5.72	0.53

Proposed Residential Subdivision

TW4

DRAWDOWN VERSUS LOGTIME



RECOVERY DATA
TW4
Proposed Residential Subdivision

Time	Elapsed Time (hours)	Elapsed Time (min) t'	Time Since Pump Test Started (min) t	Ratio t/t'	Water Level Below Top of Casing (metres)	Recovery (metres)
16:05:00	0:00:00	0	360	0.00	5.72	0.53
16:06:00	0:01:00	1	361	361.00	5.34	0.15
16:07:00	0:02:00	2	362	181.00	5.34	0.15
16:25:00	0:20:00	20	380	19.00	5.29	0.10
16:35:00	0:30:00	30	390	13.00	5.25	0.06

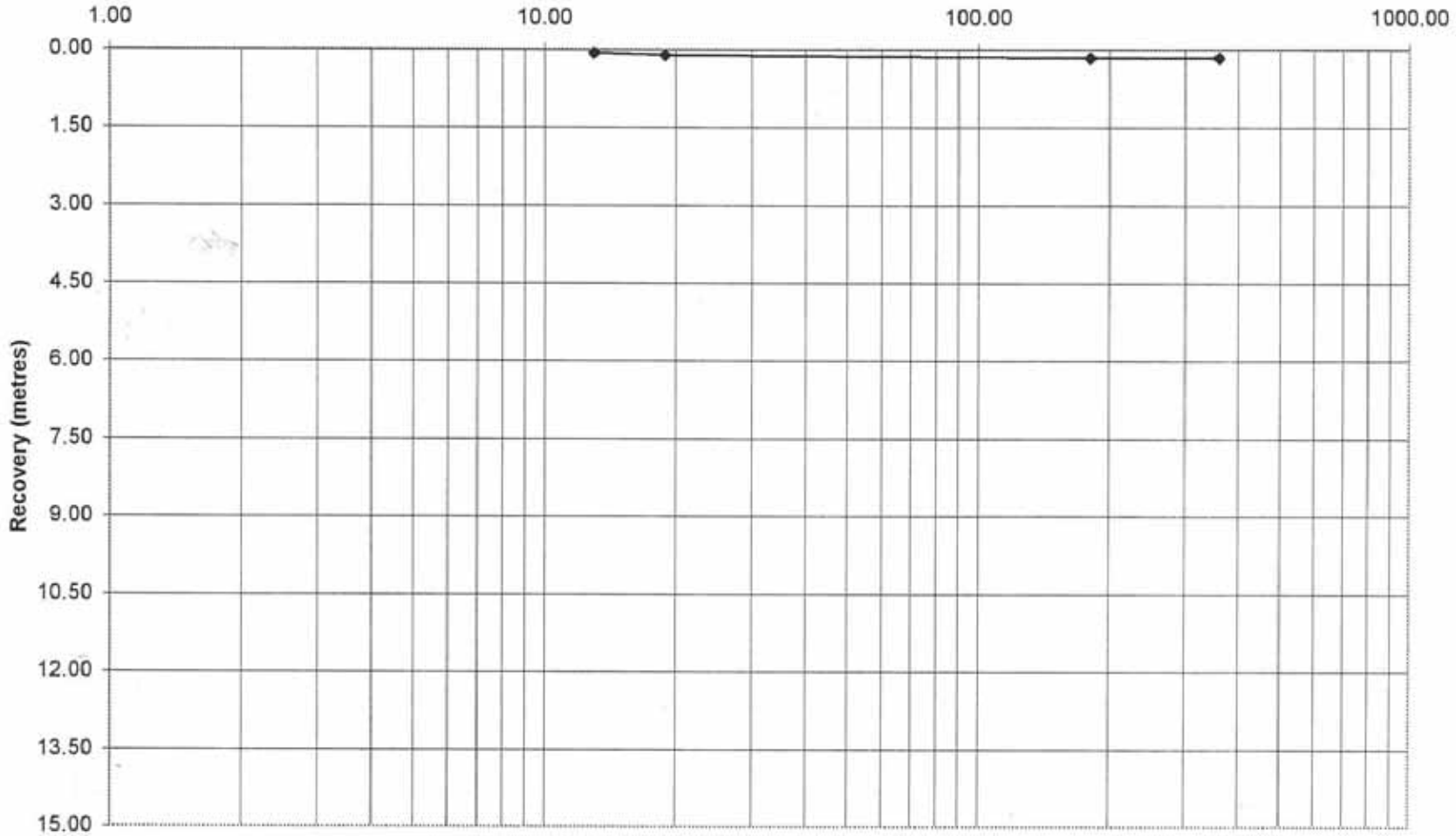
RECOVERY DATA

Proposed Residential Subdivision

TW4

RESIDUAL DRAWDOWN

t/t'



APPENDIX H

PUMPING TEST DATA
TEST WELL 5

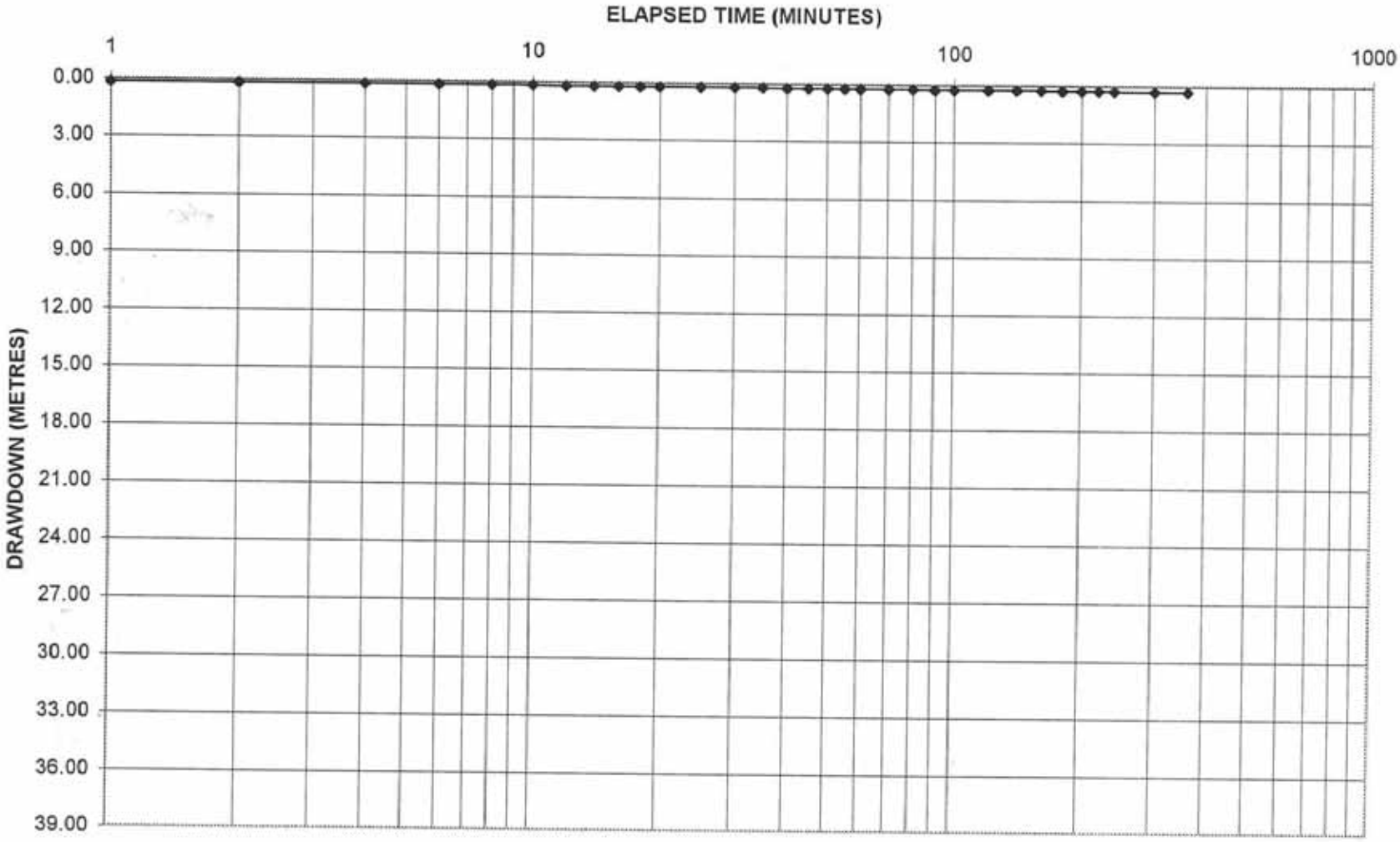
DRAWDOWN DATA
TW5
Proposed Residential Subdivision

Time	Elapsed Time (hours)	Elapsed Time (min)	Water Level Below Top of Casing (metres)	Drawdown (metres)
12:25:00	0:00:00	0	4.45	0.00
12:26:00	0:01:00	1	4.60	0.15
12:27:00	0:02:00	2	4.61	0.16
12:29:00	0:04:00	4	4.62	0.17
12:31:00	0:06:00	6	4.62	0.17
12:33:00	0:08:00	8	4.62	0.17
12:35:00	0:10:00	10	4.62	0.17
12:37:00	0:12:00	12	4.63	0.18
12:39:00	0:14:00	14	4.63	0.18
12:41:00	0:16:00	16	4.63	0.18
12:43:00	0:18:00	18	4.64	0.19
12:45:00	0:20:00	20	4.64	0.19
12:50:00	0:25:00	25	4.64	0.19
12:55:00	0:30:00	30	4.64	0.19
13:00:00	0:35:00	35	4.64	0.19
13:05:00	0:40:00	40	4.65	0.20
13:10:00	0:45:00	45	4.65	0.20
13:15:00	0:50:00	50	4.65	0.20
13:20:00	0:55:00	55	4.66	0.21
13:25:00	1:00:00	60	4.66	0.21
13:35:00	1:10:00	70	4.67	0.22
13:45:00	1:20:00	80	4.67	0.22
13:55:00	1:30:00	90	4.68	0.23
14:05:00	1:40:00	100	4.68	0.23
14:25:00	2:00:00	120	4.68	0.23
14:45:00	2:20:00	140	4.69	0.24
15:05:00	2:40:00	160	4.69	0.24
15:25:00	3:00:00	180	4.71	0.26
15:45:00	3:20:00	200	4.71	0.26
16:05:00	3:40:00	220	4.71	0.26
16:25:00	4:00:00	240	4.72	0.27
17:25:00	5:00:00	300	4.73	0.28
18:25:00	6:00:00	360	4.73	0.28

Proposed Residential Subdivision

TW5

DRAWDOWN VERSUS LOGTIME



RECOVERY DATA
TW5
Proposed Residential Subdivision

Time	Elapsed Time (hours)	Elapsed Time (min) t'	Time Since Pump Test Started (min) t	Ratio t/t'	Water Level Below Top of Casing (metres)	Recovery (metres)
18:25:00	0:00:00	0	360	0.00	4.73	0.28
18:26:00	0:01:00	1	361	361.00	4.57	0.12
18:27:00	0:02:00	2	362	181.00	4.57	0.12
18:29:00	0:04:00	4	364	91.00	4.57	0.12
18:31:00	0:06:00	6	366	61.00	4.57	0.12
18:33:00	0:08:00	8	368	46.00	4.57	0.12
18:35:00	0:10:00	10	370	37.00	4.57	0.12
18:37:00	0:12:00	12	372	31.00	4.57	0.12
18:39:00	0:14:00	14	374	26.71	4.56	0.11
18:41:00	0:16:00	16	376	23.50	4.56	0.11
18:43:00	0:18:00	18	378	21.00	4.56	0.11
10:30:00	16:05:00	965	1325	1.37	4.46	0.01

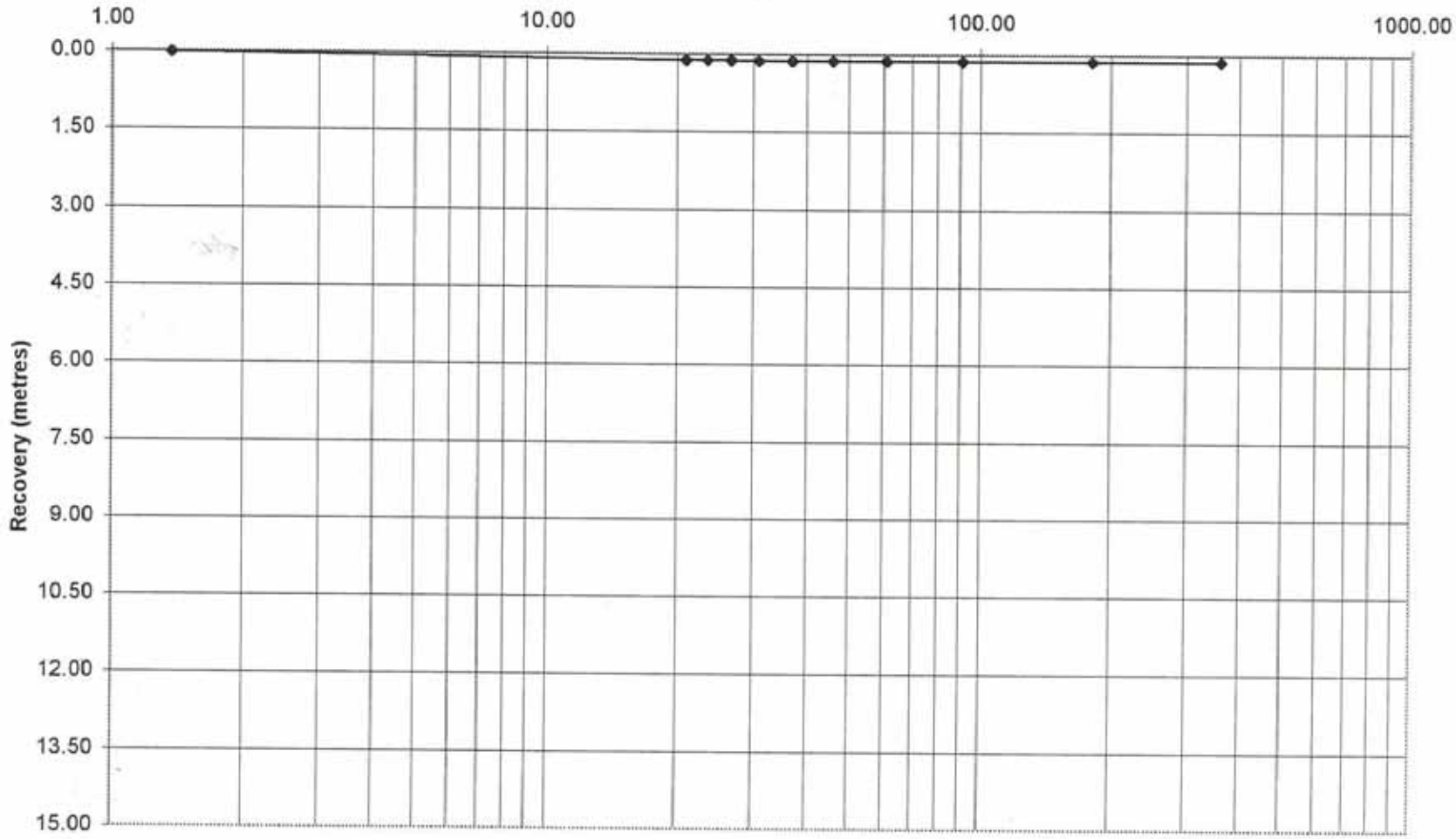
RECOVERY DATA

Proposed Residential Subdivision

TW5

RESIDUAL DRAWDOWN

t/t'



APPENDIX I

PUMPING TEST DATA
TEST WELL 6

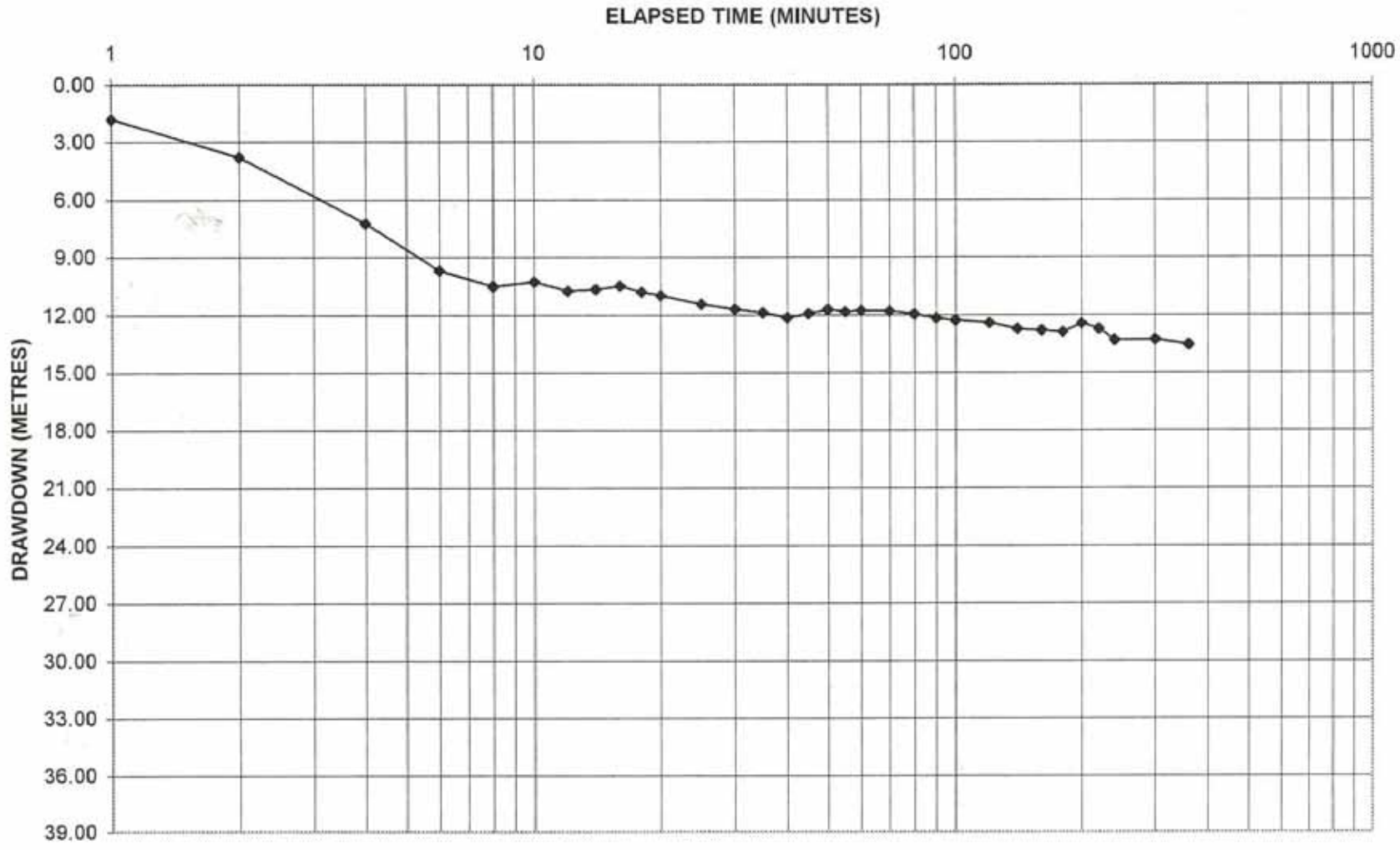
DRAWDOWN DATA
TW6
Proposed Residential Subdivision

Time	Elapsed Time (hours)	Elapsed Time (min)	Water Level Below Top of Casing (metres)	Drawdown (metres)
10:55:00	0:00:00	0	5.93	0.00
10:56:00	0:01:00	1	7.72	1.79
10:57:00	0:02:00	2	9.72	3.79
10:59:00	0:04:00	4	13.15	7.22
11:01:00	0:06:00	6	15.61	9.68
11:03:00	0:08:00	8	16.43	10.50
11:05:00	0:10:00	10	16.20	10.27
11:07:00	0:12:00	12	16.67	10.74
11:09:00	0:14:00	14	16.58	10.65
11:11:00	0:16:00	16	16.41	10.48
11:13:00	0:18:00	18	16.71	10.78
11:15:00	0:20:00	20	16.89	10.96
11:20:00	0:25:00	25	17.35	11.42
11:25:00	0:30:00	30	17.62	11.69
11:30:00	0:35:00	35	17.80	11.87
11:35:00	0:40:00	40	18.06	12.13
11:40:00	0:45:00	45	17.86	11.93
11:45:00	0:50:00	50	17.65	11.72
11:50:00	0:55:00	55	17.74	11.81
11:55:00	1:00:00	60	17.69	11.76
12:05:00	1:10:00	70	17.71	11.78
12:15:00	1:20:00	80	17.88	11.95
12:25:00	1:30:00	90	18.08	12.15
12:35:00	1:40:00	100	18.20	12.27
12:55:00	2:00:00	120	18.34	12.41
13:15:00	2:20:00	140	18.65	12.72
13:35:00	2:40:00	160	18.73	12.80
13:55:00	3:00:00	180	18.81	12.88
14:15:00	3:20:00	200	18.36	12.43
14:35:00	3:40:00	220	18.65	12.72
14:55:00	4:00:00	240	19.24	13.31
15:55:00	5:00:00	300	19.20	13.27
16:55:00	6:00:00	360	19.46	13.53

Proposed Residential Subdivision

TW6

DRAWDOWN VERSUS LOGTIME



RECOVERY DATA
TW6
Proposed Residential Subdivision

Time	Elapsed Time (hours)	Elapsed Time (min) t'	Time Since Pump Test Started (min) t	Ratio t/t'	Water Level Below Top of Casing (metres)	Recovery (metres)
16:55:00	0:00:00	0	360	0.00	19.46	13.53
16:56:00	0:01:00	1	361	361.00	15.27	9.34
16:57:00	0:02:00	2	362	181.00	13.06	7.13
16:59:00	0:04:00	4	364	91.00	9.77	3.84
17:01:00	0:06:00	6	366	61.00	7.55	1.62
17:03:00	0:08:00	8	368	46.00	6.17	0.24

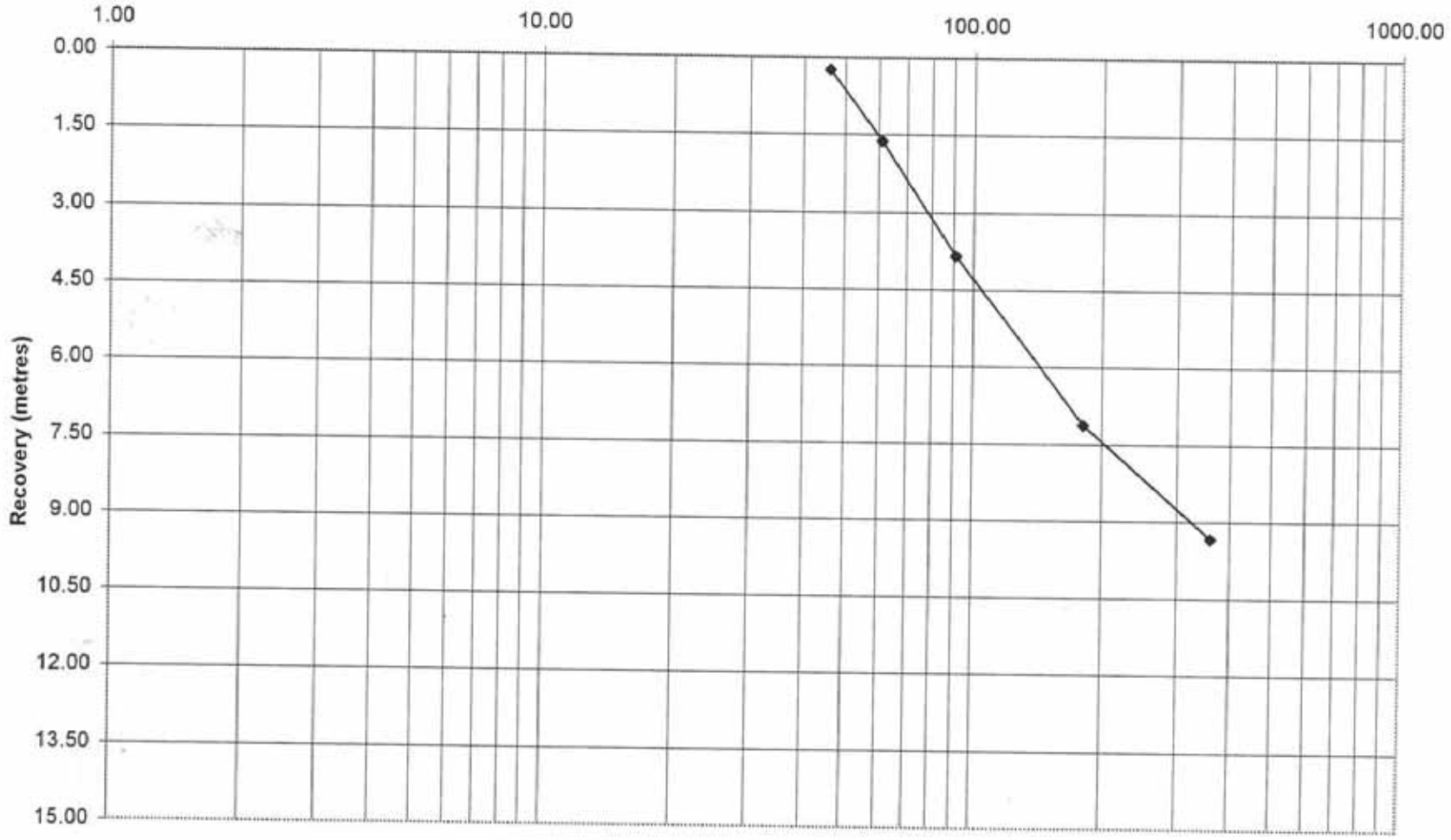
RECOVERY DATA

Proposed Residential Subdivision

TW6

RESIDUAL DRAWDOWN

t/t'



APPENDIX J

SEPTIC EFFLUENT DILUTION CALCULATIONS

February 2005 041-444

SEPTIC EFFLUENT DILUTION CALCULATIONS

The lesser of MOE water surplus for Ottawa sandy soils /Merrickville water surplus area — 364millimetres

Site area – hard surfaces (conservatively 20 percent) — 980,000 x 0.8 = 784,000

Infiltration Reduction Factor (IRF)

Topography (Flat Land)		0.3
Soil (Sand)		0.4
Cover (Woodland)		0.2
	Total	0.9

Background Nitrate Level — 1.27 mg/l

Dilution Calculation for 67 Proposed Septic Systems:

$$1.27\text{mg/l} + \frac{67 \times 365\text{m}^3 \text{ effluent per year} \times 40 \text{ mg/l } NO_3}{67 \times 365\text{m}^3 \text{ effluent} + (784{,}000\text{m}^2 \times 0.364\text{m NPI} \times 0.9 \text{ IRF})} = 4.7 \text{ mg/l } NO_3$$

APPENDIX K

RESULTS OF LABORATORY NITRATE TESTING OF MONITORING WELL WATER SAMPLES

ACCUTEST LABORATORIES LTD

REPORT OF ANALYSIS

Client: Morey Houle Chevrier Engineering
28 Clothier St E., Unit B, Box 910
Kemptville, ON
K0G 1J0
Attention: Mr. Randy Morey

Report Number: 2503059
Date: 2005-02-28
Date Submitted 2005-02-23

Project 041-444

P.O. Number:
Matrix: Water

			LAB ID:	370494	370495	370496	370497	370498	GUIDELINE		
			Sample Date:	2005-02-22	2005-02-22	2005-02-22	2005-02-22	2005-02-22			
			Sample ID:	173 Collar Hill Rd	TW2 SP Tall	TW3 SP Short	TW3 SP Tall	TW5 SP -			
PARAMETER	UNITS	MDL							TYPE	LIMIT	UNITS
Alkalinity as CaCO3	mg/L	5		265							
Chloride	mg/L	1		8							
Colour	TCU	2		<2							
Conductivity	uS/cm	5		521							
Dissolved Organic Carbon	mg/L	0.5		0.7							
Fluoride	mg/L	0.10		0.17							
Hydrogen Sulphide	mg/L	0.01		<0.01							
N-NH3 (Ammonia)	mg/L	0.02		0.02							
N-NO2 (Nitrite)	mg/L	0.10		<0.10							
N-NO3 (Nitrate)	mg/L	0.10		0.23	<0.10	1.27	0.58	<0.10			
pH				7.55							
Phenols	mg/L	0.001		<0.001							
Sulphate	mg/L	1		24							
Tannin & Lignin	mg/L	0.1		<0.1							
TDS (COND - CALC)	mg/L	5		339							
Total Kjeldahl Nitrogen	mg/L	0.05		0.05							
Turbidity	NTU	0.1		0.3							
Hardness as CaCO3	mg/L	1		276							
Ion Balance		0.01		0.96							
Calcium	mg/L	1		70							
Magnesium	mg/L	1		25							
Potassium	mg/L	1		2							
Sodium	mg/L	2		4							
Iron	mg/L	0.01		0.01							
Manganese	mg/L	0.01		<0.01							

MDL = Method Detection Limit INC = Incomplete AO = Aesthetic Objective OG = Operational Guideline MAC = Maximum Allowable Concentration IMAC = Interim Maximum Allowable Concentration

Comment

APPROVAL

Ewan McRobbie
Inorganic Lab Supervisor