

926-1-193

THE CORPORATION OF THE TOWNSHIP OF LANGLEY

RECEIVED
FILE NO. _____
MAY 22 1984
ENGINEERING
DEPARTMENT
TOWNSHIP OF LANGLEY

ALDERGROVE WATER SUPPLY
RESULTS OF THE PUMPING TEST OF WELL NO. 7
AND PROPOSED TEST-PRODUCTION WELL SITES

PACIFIC HYDROLOGY CONSULTANTS LTD.
May 15, 1984

PACIFIC HYDROLOGY CONSULTANTS LTD.
CONSULTING GROUNDWATER GEOLOGISTS

204 - 1929 WEST BROADWAY
VANCOUVER, B.C. V6J 1Z3
TELEPHONE: (604) 738-9232

May 15, 1984

The Corporation of the Township of Langley
4914 - 221st Street
Langley, B.C.
V3A 3Z8

Attention: Mr. D.W. Randell, P. Eng.,
Manager, Engineering Services

Subject: Aldergrove Water Supply
Results of the Pumping Test of Well No. 7 and
Proposed Test-Production Well Sites

Dear Sirs:

This is further to our discussion (Randell, Nichol, Badry, Livingston) of April 27 at Langley Municipal Hall, about well interference in the vicinity of the Municipality's Well No. 7 located at the corner of 25th Avenue and 272nd Street, south of the City of Aldergrove. At that time, we proposed carrying out a pump test of Well No. 7 while measuring the drawdown in the two wells at Reid Collins Nurseries at 2396 - 272nd Street. This recommendation was based on the fact that the Nursery depends on wells for its water and because it is a major user of groundwater.

After our discussion at Municipal Hall on April 27, we visited the Reid Collins Nursery and discussed the proposed testing with Mr. Bruce McTavish of the Nursery Staff. Mr. McTavish agreed that the proposed pumping test was in everyone's interest and agreed to let us measure the drawdown in the Nursery Wells. He suggested doing the test on Sunday Morning, May 6, as the wells would not be in use between

Saturday evening and mid-day on Sunday.

At the time of our visit to the Nursery on April 27, we inspected the two wells at the Nursery:

1. The West Well (which is the older of the two) is completed with 250 mm (10") diameter casing. It is located in the main cluster of buildings about 100 m (330 ft) east of 272nd Street. The West Well is used for domestic purposes and also for some irrigation.
2. The East Well (which is the newer well) is located further east near the creek and about 100 m (330 ft) south of the projected centre line of 24th Avenue and about 400 m (1300 ft) east of 272nd Street. The East Well is used entirely for irrigation and is the main well for the Nursery operation. It is completed with 200 mm (8") diameter casing.

Mr. McTavish said that the Reid Collins Nursery is gradually changing over from raising standard variety nursery stock to raising trees of several types for the B.C. Forest Service. This will involve expansion and increased use of water from the wells in the near future. We were not able to obtain information on the quantity of water being used at the present time, but the expansion is expected to result in about a 50% increase in water consumption.

Following our meeting with Mr. McTavish and a telephone discussion with Mr. G. Kenwood of Reid Collins Nursery, we contacted Mr. ^{Nichol} Nichol and made arrangements for a pump test for Sunday Morning, May 6. It was agreed that the pump in Municipal Well No. 7 would be shut off at 4:00 AM on Sunday Morning in preparation for starting it up about 8:00 AM, with the intention of running it until 11:00 AM without interruption.

At 8:00 AM on Sunday, we met Mr. Isaac of the Municipal Staff at Well No. 7; the pump was turned on at

8:10. Water levels were measured in both Nursery Wells using electric water level indicators. Unfortunately, the pump in the West Nursery Well had not been turned off so it started automatically for about 5 minutes at 8:47 and for about 19 minutes at 10:40. The West Well drew down about $4\frac{1}{2}$ m due to the pumping, but recovered quickly when the pump stopped; therefore, the interruptions did not cause any serious problems in data interpretation.

Results of Pumping Test of Municipal Well No. 7

The drawdown data from both Nursery Wells have been plotted on the same semi-logarithmic sheet, with the drawdown scale for the West Well on the left side of the paper and the scale for the East Well on the right side of the sheet. The plots of these data show the following:

1. In both Nursery Wells, there is a delay before drawdown (caused by pumping Well No. 7) starts. The delay is about 4 minutes in the West Well and about 20 minutes in the East Well.
2. In both wells, there is a period of slow drawdown after which the drawdowns plot as straight lines (except for the interruptions caused by the automatic operation of the pump in the West Well).
3. In the three hour test period, the water levels in the Nursery Wells did not become stable. In other words, the cone of depression caused by pumping had not reached a recharge boundary.
4. If drawdown continues along the trends of the semi-log plots, the drawdown in the West Well after 24 hours of continuous pumping of Well No. 7 would be about 1.2 metres; the drawdown in the East Well would be about 0.35 metres.
5. From the drawdown data plots (for both wells) on log-log paper, we have attempted to calculate the transmissivity of the aquifer by the curve-matching method. The plotted curves fit type curves for a leaky artesian aquifer. The calculated transmissivity is in the range 500 to 900 m^2/day (40,000 to 72,000 USgal/day/ft width); this is a moderately

high transmissivity. We also calculated the coefficient of storage by the curve-matching technique. We obtained a coefficient in the range 3.6×10^{-4} to 6.2×10^{-4} . This seems to be too low for a leaky artesian type of aquifer; a coefficient of 10^{-3} seems more reasonable.

Discussion

Additional prolonged pumping could have an effect on shallow dug wells that may be completed in the semi-permeable confining layer overlying the main aquifer. Owners of such wells could probably be connected to the municipal distribution system. If such interference has not been a problem in the case of Well No. 7, it may not be a problem with a new well in the same general area. However, as water consumption increases in the Aldergrove area, well interference will increase, especially if pumping periods increase to the point where wells are pumped continuously for periods of a week or more. The Municipality would be well advised to establish at least one observation well in the aquifer at a location south of Aldergrove in order to detect possible over-pumping of the aquifer. The Ministry of Environment operates a network of observation wells throughout the Province. It may be possible to get the Ministry to operate an observation well in the Aldergrove aquifer. Any decision on this should be delayed until completion of a new production well.

Possible Sites for Test-Production Drilling

From our inspection of water well records in the Aldergrove area, and from a discussion with Mr. E.C. Halstead of the Inland Waters Directorate of Environment Canada, the most favourable conditions for construction of a moderate

to high capacity well for the Municipality seem to be south and east of Well No. 7. From the test it is clear that well interference will be a problem if a new production well is located closer than about 300 m (1000 ft) to Well No. 7 or to either of the Reid Collins Wells, particularly if the Reid Collins Nursery operation is enlarged. We certainly would not rule out the area northwest of Well No. 7, although incomplete data seem to indicate that it is not as favourable. The approximate location of the Reid Collins Nursery Wells are shown on the location map attached, along with the areas around each well to be avoided for test-production well sites.

The next step is to assess the property and access situations in the area within what we believe to be the most favourable zone as discussed above; sites should not be closer than about 300 m (1000 ft) to the three wells involved in the test.

Test-Production Exploration Costs

As discussed in the April 27 meeting, we consider drilling under the conditions at Aldergrove to be test-production drilling. If a test well has sufficient capacity and if the water quality is satisfactory, the well can be used as a production well. In a situation where there is sufficient information to assure higher production, a larger diameter production can be constructed without first carrying out test-production drilling and testing.

Under the conditions that prevail south of Aldergrove, there is sufficient information in the vicinity of Well No. 7 so that a 250 mm (10") diameter test-production well can be justified. If drilling is carried out in a less

The Corporation of the Township of Langley
Aldergrove Water Supply
May 15, 1984 - Page 6

promising area, or where there is less subsurface information, a 200 mm (8") diameter test-production well should be drilled. The contract documents that we have prepared (and which are being sent under separate cover) include prices for both 200 and 250 mm drilling. It is not necessary to make a decision about the final size at this time.

We estimate that the costs to construct and test a 200 mm (8") diameter test-production well 70 metres deep will be as follows:

1. Move drilling equipment and crew to and from Aldergrove	300.
2. Cost to supply 250 mm drive shoe	350.
3. Cost to drill and case 250 mm hole to 15 m @ \$140/m	2100.
4. Cost to supply 200 mm drive shoe	250.
5. Cost to supply and install 15 m of 200 mm overlap casing @ \$50/m	750.
6. Cost to drill and case 200 mm from 15 m to 70 m; 55 m @ \$110/m	6050.
7. Cost to supply 7 m of 200 mm nominal stainless steel well screen @ \$450/m	3150.
8. Hourly work to install screen, develop well, etc.; 50 hours @ \$80/hr	4000.
9. Cost to carry out 40 hours of pump testing	2800.
	<hr/>
	\$ 19,750.

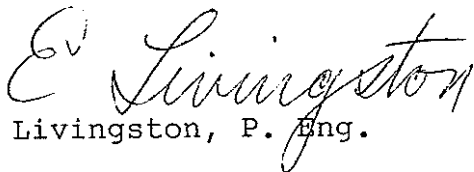
We estimate that the cost of a well constructed with 300 mm and 250 mm diameter casings will be about \$3000. more than the estimate given above.

The Corporation of the Township of Langley
Aldergrove Water Supply
May 15, 1984 - Page 7

Please call if you have any questions about any aspect of this letter-report. We are prepared to meet with you to further discuss the report and/or well sites that may be proposed.

Yours truly,

PACIFIC HYDROLOGY CONSULTANTS LTD.

A handwritten signature in cursive script that reads "E. Livingston". The signature is written in dark ink and is positioned above the typed name.

E. Livingston, P. Eng.

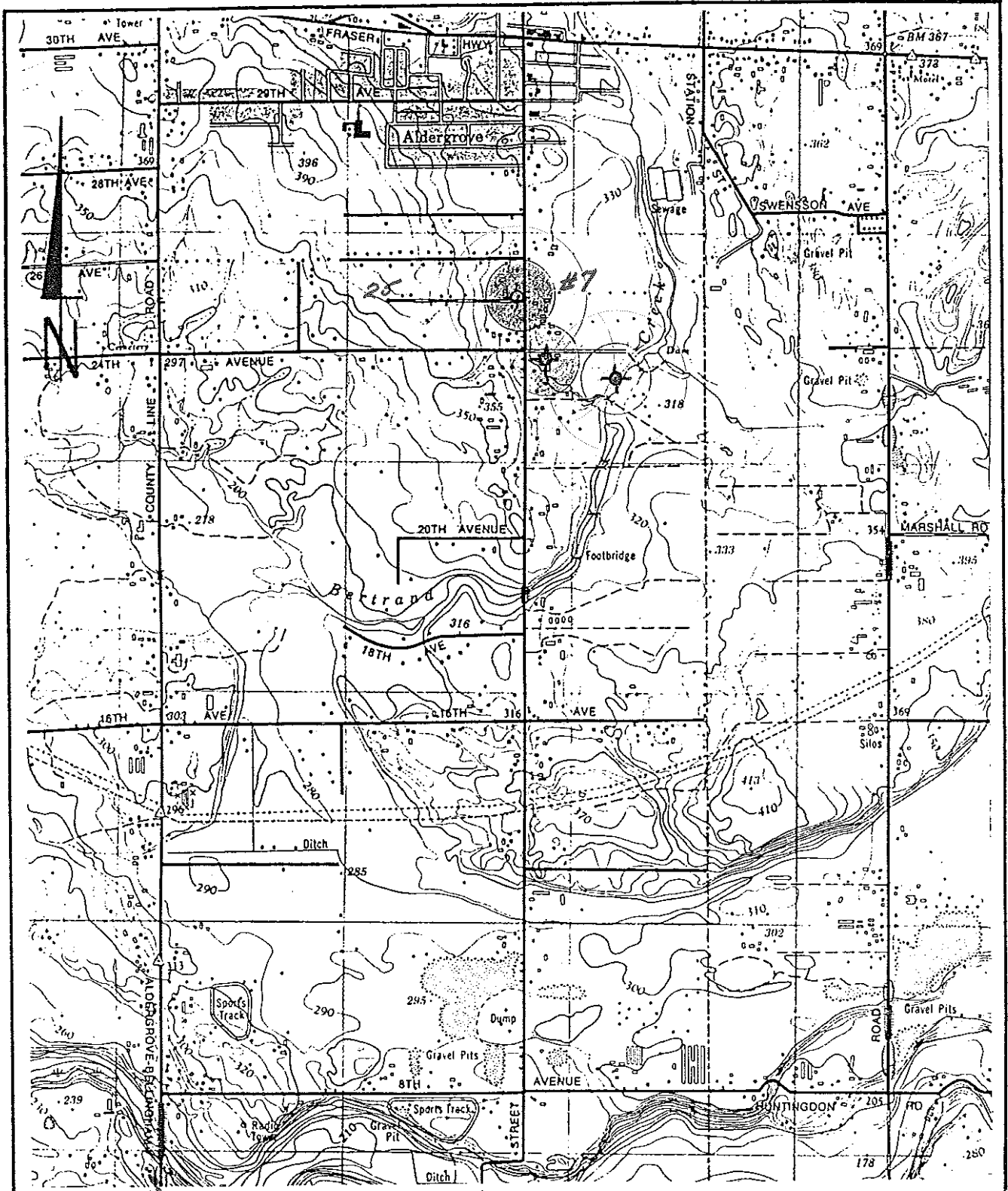
attachments

EL/amb




ATTACHMENTS

to Accompany
Letter-Report of May 15, 1984 to
The Corporation of the Township of Langley

ALDERGROVE WATER SUPPLY



[A portion of NTS 92G/1d,
Aldergrove.]

-  Area around West Nursery Well to Avoid.
-  Area around East Nursery Well to Avoid.
-  Area around Well No. 7 to Avoid.

TOWNSHIP OF LANGLEY

FIGURE 1
AREA AND WELL
LOCATION - ALDERGROVE
EXPLORATION PROGRAM

SCALE 1:25,000

PUMP TEST – DRAWDOWN DATA

CONTRACTOR _____

6	MAY	1984
DAY	MONTH	YEAR

PROJECT LANGLEY TOWNSHIP - ALDERGROVE

Location Reid Collins Nursey (272nd St.)

Well Nursery Wells Pumping Rate (Q) LANGLEY WELL No. 7 @ 39.12 l/sec (620 USgpm)

Datum Point Tops of Well Casings Elevation of Datum Point _____

Static Water Level (see below) _____ Screen Location _____
 WEST WELL EAST WELL

TIME		ELAPSED TIME	DISTANCE TO WATER	DRAWDOWN (metres)	DISTANCE TO WATER	DRAWDOWN (metres)	PUMPING RATE	REMARKS
HR.	MIN.	t (MIN.)						
07	55		6.970		3.516			Probably influenced by operation of West Well
08	10						Approx. 620 USgpm	Start
08	11	1	6.955		3.505			Static levels
08	12	2	6.957					
08	13	3	6.955		3.505			
08	14	4	6.957	.002				
08	15	5	6.966	.011	3.505			
08	16	6	6.972	.017				
08	17	7	6.981	.026				
08	19	9	6.988	.033				
08	20	10			3.505			
08	21	11	7.000	.045				
08	23	13	7.025	.070				
08	25	15	7.046	.091	3.505			
08	30	20			3.510	.005		
08	31	21	7.104	.149				
08	36	26	7.148	.203				
08	40	30	7.182	.227	3.520	.015		
08	45	35	7.221	.266				
08	47	37						West pump on.
08	50	40			3.535	.030		
08	53	43						West pump off.
08	57	47	7.385					
09	00	50	7.370	.415	3.553	.048		
09	05	55	7.374	.419				
09	10	60			3.566	.061		
09	16	66	7.404	.449				
09	25	75	7.429	.474				
09	30	80			3.589	.084		

PUMP TEST - DRAWDOWN DATA

CONTRACTOR _____

6	MAY	1984
DAY	MONTH	YEAR

PROJECT LANGLEY TOWNSHIP - ALDERGROVE

Location Reid Collins Nursery (272nd St.)

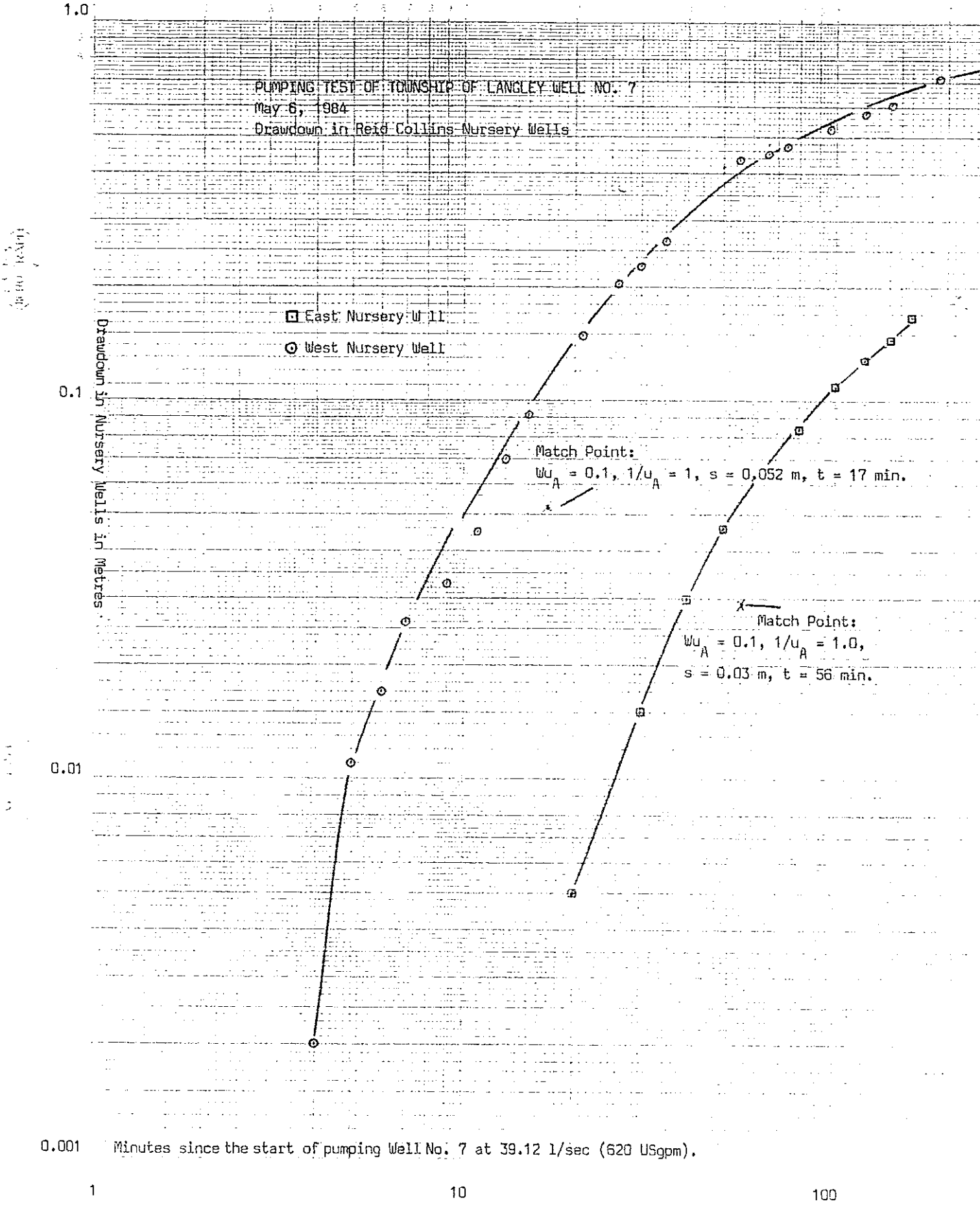
Well Nursery Wells Pumping Rate (Q) LANGLEY WELL No. 7 @ 39.12 l/sec (620 USgpm)

Datum Point Tops of Well Casings Elevation of Datum Point _____

Static Water Level (see below) Screen Location _____

TIME		ELAPSED TIME t (MIN.)	WEST WELL		EAST WELL		PUMPING RATE	REMARKS
			DISTANCE TO WATER	DRAWDOWN (metres)	DISTANCE TO WATER	DRAWDOWN (metres)		
09	46	96	7.480	.525				
09	50	100			3.614	.109		
10	10	120	7.535	.580	3.634	.129		
10	30	140	7.565	.610	3.651	.146		
10	40	150						West pump on.
10	43	153	12.065	5.110				
10	50	160			3.672	.167		
10	59	169						West pump off.
11	00	170	8.390					
11	01	171	7.950					
11	10	180	7.700	.745	3.701	.197		
11	19	189	7.675	.720				

PUMPING TEST OF TOWNSHIP OF LANGLEY WELL NO. 7
 May 6, 1984
 Drawdown in Reid Collins Nursery Wells



0.001 Minutes since the start of pumping Well No. 7 at 39.12 l/sec (620 USgpm).

1

10

100

