

MEMORANDUM

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prior approval of
Director*

TO Dr. C. Foweraker, Head
Groundwater Section
Hydrology Division

FROM A. P. Kohut
Senior Geological Engineer
Groundwater Section

June 24, 1976

SUBJECT Gulf Land Corporation Limited,
Mayne Island

OUR FILE 0317588

YOUR FILE

The reports forwarded by the Comptroller of Water Rights in a memorandum dated April 7, 1976 on the above subject have been reviewed. For purposes of appraising the wells mentioned in the reports it has been assumed that the developer wishes to utilize the individual wells at the long-term yields as determined by the respective consultants as follows:

Well #3	- M.P.T. Engineering	10.68	gpm ✓
Well #6	- E. Livingston	2.5	Igpm
Well #7	- E. Livingston	3	Igpm
Well #9	- E. Livingston	6	Igpm
Well #10	- E. Livingston	4	Igpm ✓
Well #13	- E. Livingston	3.5	Igpm ✓
Well #15	- Piteau Gadsby Macleod Limited	40	Igpm ✓

These reports therefore suggest that the above wells should be capable of supplying a total of 67.9 to 69.68 Igpm depending on whether Well #3 has been rated in USgpm or Igpm.

For convenience of discussions the wells have been separated as follows into 4 groups according to the four reports prepared on the wells:

- (a) Well #3 - M.P.T. Engineering
- (b) Wells 6, 7, 9, 10 - E. Livingston
- (c) Well 13 - E. Livingston
- (d) Well 15 - Piteau Gadsby Mcleod Limited

Well #3 (M.P.T. Engineering)

Well #3 is a shallow 28-foot gravel-packed well utilizing a 6-inch diameter screen set in a 16-inch diameter bore. Pump setting is at the bottom of the well. A 24-hour test undertaken in July 1969 yielded 10.68 gpm with 17 feet of drawdown with apparent equilibrium conditions obtained at the end of the test. Static water level was 3 feet below ground surface at the time of testing. Specific capacity after 24 hours pumping was 0.63 gpm/ft. of drawdown.

The above yield utilized 68 percent of the available drawdown in the well leaving 8 feet for pump bowls and any variations in the seasonal static. Pump installation below or within the screen may be susceptible to sanding.

Handwritten initials

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In view of the facts that the surficial material in which the well is situated is probably of limit extent, may be subject to dewatering and that some seasonal variations in the static water level may be expected, a safety allowance of only 8 feet of the available drawdown may be marginal or inadequate. Seasonal water level fluctuations from 2 to 12 feet, for example, have been observed in observation wells on the island with lowest levels recorded in September and October. It is suggested that the seasonal fluctuations of the water level in the well should be documented and/or a more lengthy test of 2 to 3 days should be undertaken during the summer months to test for boundary and dewatering conditions. In the interim the well should not be rated as high as 10.68 gpm over the long-term, but would perhaps be rated best at 5 gpm or 50 percent of the suggested yield until such time seasonal fluctuations of the watertable are documented which suggest the higher yield may be attained throughout the dry season. A standard laboratory water analysis of the well is also suggested.

Wells 6, 7, 9, 10 (E. Livingston)

Yields of the above rock wells were calculated by the consultant utilizing a transmissivity of 100 gpd/ft. and storage coefficient of 10^{-5} on the assumption of 100 days continuous pumping. The transmissivity value represents only 20 percent of the value determined from the earlier part of pump tests conducted on wells, 7, 9 and 10 in October-November, 1970. Well 6 was not tested because of its small capacity and its yield was estimated on the ratio of the present capacity to former capacity of the other wells which had been previously tested in February-March, 1970. The combined long-term yield calculated for the wells by the above method is 15.5 Igpm. This figure represents an adequate appraisal of the wells and in accordance with the recommendations of the consultant it is suggested that careful records of production and drawdown of the wells be carried out should it be possible to revise the estimates based on long-term performance. Standard laboratory water quality analyses of the wells is also recommended.

Well 13 (E. Livingston)

The 330-foot bedrock well was pump tested in June 1971 for 3 days at a final pumping rate of 3.5 Igpm. Drawdown reached 168 feet indicating a specific capacity of 0.021 Igpm/ft. of drawdown for 3 days pumping with 76 percent of the available drawdown utilized.

Allowing for any seasonal drop of the water level after June would suggest that the well will probably utilize more than 76 percent of the available drawdown during the summer months at a pumping rate of 3.5 Igpm. A reduction in the specific capacity of the well during the summer months could also be expected as it is known from a comparison of summer and winter tests of other bedrock wells on the island that this can occur.

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The long-term yield of the well should be considered somewhat less than 3.5 Igpm and it is recommended that the well should be retested during late summer. For the interim the well could be tentatively rated at 1.5 to 2 Igpm. A standard laboratory water quality analysis of the well is also recommended.

Well #15 (Piteau Gadsby Mcleod Limited)

The bedrock well 400 feet deep was pump tested in February 1976 at an average pumping rate of 38.5 Igpm for 9 days. Drawdown was 53 feet with the water level stabilizing near 100 feet below ground surface with utilization of 15 percent of the available drawdown. On the basis of theoretical extrapolation to 100 days pumping without recharge utilizing representative aquifer transmissivity values and a pumping rate of 40 Igpm suggests the water level would be 230 to 294 feet below ground surface. These levels represent 50 to 70 percent of the available drawdown in the well respectively.

However, to avoid dewatering of the major fracture zone at 335 feet will reduce the available drawdown in the well suggesting as much as 62 to 84 percent of the revised available drawdown would be utilized at the above pumping rate.

Allowing for the fact that the seasonal water levels will drop during the summer months to a low sometime in September or October suggests drawdown in the well will probably exceed the range of 62 to 84 percent of the available drawdown. Hydrograph records from observation wells on the island indicate an almost immediate response to rainfall during the winter months. During January and February of 1976 over eleven inches of rain were recorded on Mayne Island. The well therefore was pumped immediately after a period in which substantial recharge to the aquifer had probably taken place. Hydraulic parameters such as transmissivity and storage coefficient during the test, therefore may be representative of the aquifer under recharge conditions only. Moreover, it is known from a comparison of summer and winter tests for other bedrock wells on the island that the specific capacity of bedrock wells commonly drops during the summer months.

It is therefore recommended that the well should be retested during the late summer months preferably in August or September when rainfall has been at a minimum. Since the well was tested during a period following significant recharge it is difficult to assign any interim safe perennial yield at this time on the basis of the February pump test. The well should however sustain a yield of at least 10 Igpm over the long-term.

In summary 15.5 Igpm may be obtained from wells 6, 7, 9 and 10. Wells 3, 13 and 15 are tentatively estimated to be capable of sustaining a minimum additional total of 16.5 Igpm. The present proven yield of the well field is therefore estimated to be only 32 Igpm.

15.5	6/10
5.0	22.5
2.0	<u>38.5</u>
	4
22.5	

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It is recommended that wells 3, 13 and 15 should be retested during the late summer. In conjunction with the test all neighbouring wells should also be monitored to determine the extent of well interference. Standard laboratory chemical analyses of water samples from wells 3 and 13 are also recommended.

The respective consultants have been contacted with regards to the above conclusions and recommendations. In the case of well #3, Mr. H. G. Topliss has pointed out that the well has been utilized in the past and that there may be some recorded data documenting its performance. Mr. Topliss will be checking into the availability of this data and it may therefore be necessary to re-appraise our yield of the well based on this additional information and subsequently the need for retesting. Mr. A. Dakin has requested a copy of the October-November 1970 report by E. Livingston on the pump testing of the six wells at Village Bay. This information would be helpful to their firm in assessing the variability between winter and summer pump tests which has been documented on Mayne Island.

Mr. E. Livingston thought perhaps well #13 may have been equipped with a pump following the 1971 test and pump records may be available from the developer. This performance data if available should be appraised and subsequently the need for retesting could be reconsidered in light of this additional information.

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