

CANADA'S
**MUSICAL
Coast**
Inverness County



Project Update

Judique Wellfield

Circumstance and Objective of the Wellfield Program:

Find a ground water supply to meet the current and projected future service population of the community of Judique.

Work Completed

- Three exploratory wells have been drilled by Island Well Drillers Ltd. (IWD) to investigate the potential for developing a potable groundwater supply for the community of Judique.
- One well (PW1) was drilled at the water tank. Another well (PW2) was drilled 250m to the northwest of PW1, along Doctor's Road. The third well was a test well.
- PW1 and PW2 were hydraulically tested, indicating individual operational production yields of 72 Lpm (19 USgpm) and 159 Lpm (42 USgpm), respectively. Maximum 3-day yields were calculated at 129 Lpm (34 USgpm) and 227 Lpm (60 USgpm), respectively with 1-day of recovery. It is recommended that these rates be refined after 1 year of operation.
- The water quality met the Health Canada Guidelines for Canadian Drinking Water Quality (GCDWQ) except for manganese in PW1, which will require treatment.



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|---|---|--|--|---|-------------------------|
|  | Existing Test Well |  | Approximate Property Boundaries |  | Old Trail |
|  | Proposed Well |  | Assumed Groundwater Flow Direction |  | Approximate Distance, m |
|  | Approximate Most Steep Portion of Depression Cone |  | Power Line Overhead and Water Line Underground | | |

Budget To Date

- * *Expected additional costs are costs not yet billed.*

Wellfield Development Budget - Judique

Task	Planned
EXP Investigation	\$4,979.35
Disbursements & Expenses	\$178.26
EXP Drilling (PW1)	\$8,947.46
Disbursements & Expenses	\$530.44
Water Analysis	\$1,361.59
Island Well Drillers	\$42,316.26
EXP Drilling	\$1,892.10
EXP Disbursements & Expenses	\$300.00
Water Analysis	\$6,190.00
Island Well Drillers	\$29,032.61
72 Hour Pump Test	\$14,580.00
Disbursements & Expenses	\$2,113.00
Water Analysis	\$668.00
Island Well Drillers	\$24,486.00
Totals	\$121,577.97
Actual Spent to Date	\$121,577.97
Expected Additional Cost	\$17,000.00
Subtotal	\$138,577.97
HST	\$20,786.70
MOCI HST	\$5,939.44
Net Total	\$144,517.41

Possibilities to Increase Yield

- EXP was requested by the Municipality to determine the possibility of increasing operational and maximum yields from the Judique Wellfield to accommodate additional future growth of the Judique community.
- Two options were reviewed by EXP in order to achieve a significant increase in operational yield by 50% or 113 Lpm (30USgpm)
 - Deepening of PW2
 - Construction and drilling of a new production well

Deepening of PW2 – Option 1

- This option would include mobilization of the drill rig, deepening of the well with an 8-inch drill bit, supervision, and a new pump test.
- Deepening of PW2 is expected to result in an increase in yield. It is not possible to predict to what degree, nor the change in static level, as both depend upon where fractures are encountered and their yield.
- An approximation was made based on the drilling data from the deeper PW1. The approximation suggests that flow rate increases with the depth. A solution for additional water availability at PW2 resulted in a possibility to achieve an addition of 113 Lpm (30 USgpm) at blow depth of approximately 79 m, i.e., at 30 m of deepening.
- The possible risks could include:
 - Loss of the achieved yield due to flow inside the well into a dewatered formation below. This risk seems unrealistic, drilling deeper may (or may not) result in a lower static water level in the well, which has the potential for requiring a larger pump to meet the additional head loss.
 - Loss of the water quality due to marine water intrusion. This opportunity is highly unrealistic due to the distance to the sea and high freshwater pressure heads at Judique Wellfield, which do not allow for the intrusion.

Construction of a New Production Well – Option 2

- This option would include continuation of the gravel access road and the construction of a new drill pad in the far corner of the Municipal property.
- A new well would be constructed to depths of 79m to 91m, cased to 36m, followed by pump testing under EXP's supervision, reporting and surveying.
- If successful, additional costs would be incurred for engineering to bring the water to the Tower site.
- The new well would be expected to have similar characteristics to the existing PW1 and PW2 of relatively low yield and relatively high-pressure heads with acceptable to good water quality.
- The risk includes a possibility of encountering a non-fractured or poorly fractured formation with very low yields. This is thought to be a relatively low risk, considering two production wells installed and tested in the area within the same geological settings.

Option Cost Estimates

Option 1 – Deepening the well

Well deepening, 30 m (to 79 m depth) (IWD) \$6,200.00

Pump test 72 Hour (IWD) \$24,500.00

Supervision, reporting (EXP) \$5,900.00

Analytical Laboratory \$900.00

Expenses, travel, dataloggers (EXP) \$1,300.00

Total, excluding HST \$38,800.00

Option 2 – Construction of a new well

Well drilling including 72-hour pump test, 91 m drilling, 36 m casing (IWD) \$49,200.00

Supervision, survey and reporting (EXP) \$12,000.00

Analytical Laboratory \$900.00

Expenses (EXP) \$2,000.00

Total, excluding HST \$64,100.00

*Not inclusive of costs to extend road and tree removal.

Recap & Usage

- To date PW1 and PW2 have a combined operational production yield of 61 USgpm, and maximum 3-day yield of 94USgpm with 1 day of recovery.
- This equates to an operational production yield of 87,840 USg/day (332,640 L/d) and a maximum 3-day yield of 132,480 USg/day (501,120 L/d)

- **2019**

Average Flow:	141,177 L/d
Maximum Flow:	347,630 L/d

- **2018**

Average Flow:	136,766 L/d
Maximum Flow:	269,098 L/d

- **2017**

Average Flow:	128,000 L/d
Maximum Flow:	253,000 L/d

Staff Recommendation

In summary the Municipality in partnership with various consultants have achieved enough yield to provide a ground water source to the current service population of the community of Judique however, there is limited room for community growth. While establishing PW2 is the cheapest short term option, deepening PW2 in an attempt to achieve an increased operational yield could allow for community growth. Due to the increased costs and a limited ownership footprint the construction of a new production well is not recommended at this time because of possible pumping interferences in the wellfield due to the proximity of production wells. Staff recommendation is for Municipal Council to consider funding \$38,800.00 plus HST from Gas Tax Funds to deepen PW2 in Judique in hopes of achieving increased yield.