GORDON SERVICES – KEENE PIT
BRW-12 SLUG TEST DATA & RESULTS

57 Route 9, Keene, New Hampshire
City of Keene Tax Map 215 Block 7
Town of Sullivan Tax Map 583 Lot 46 & 46-1

Prepared For:

Gordon Services
250 North Street
Jaffrey, New Hampshire 03452

Prepared By:

FRONTIER GEOSERVICES
127 OLD WARNER ROAD
BRADFORD, NEW HAMPSHIRE 03221

Joel Banaszak, P.G.
(603) 748-3715
Jbanaszak@frontiergeoservices.com

August 21, 2025
Frontier Project No. 2024012

TABLE OF CONTENTS
GORDON SERVICES – KEENE PIT
BRW-12 SLUG TEST DATA & RESULTS
KEENE, NEW HAMPSHIRE

SECTION **PAGE**

1.0 INTRODUCTION

A slug test was performed in monitoring well BRW-12 (2-inch diameter PVC in a 3-inch borehole). The well is 90 ft deep, screened from 30–90 ft bgs. The producing interval extends from 30–78 ft bgs. At the time of testing, static water level was measured at 59.4 ft bgs, yielding an effective saturated thickness of ~18.6 ft. The well screen below the water table therefore fully penetrated the saturated thickness during the test.

2.0 METHODS

Head displacement, H(t), was defined as the instantaneous change in water level relative to the static condition. The maximum displacement, H_0, was identified at the start of recovery, and subsequent measurements ($t \geq t_0$) were normalized as the ratio H/H_0. Recovery data were then plotted as $\ln(H/H_0)$ versus elapsed time (t*rel*), and a straight-line fit was applied over the intermediate range of normalized displacement ($0.2 \leq H/H_0 \leq 0.8$). This mid-range window is standard practice, as it minimizes the influence of early-time turbulence and late-time storage or boundary effects, producing the most reliable estimate of the aquifer response.

Bouwer & Rice Equation

For a fully penetrating well in an unconfined aquifer, Bouwer & Rice (1976, 1989) give:

$$K = (\alpha \cdot r\_c^2 \cdot \ln(R_e/r\_w)) \; / \; (2L)$$

where:

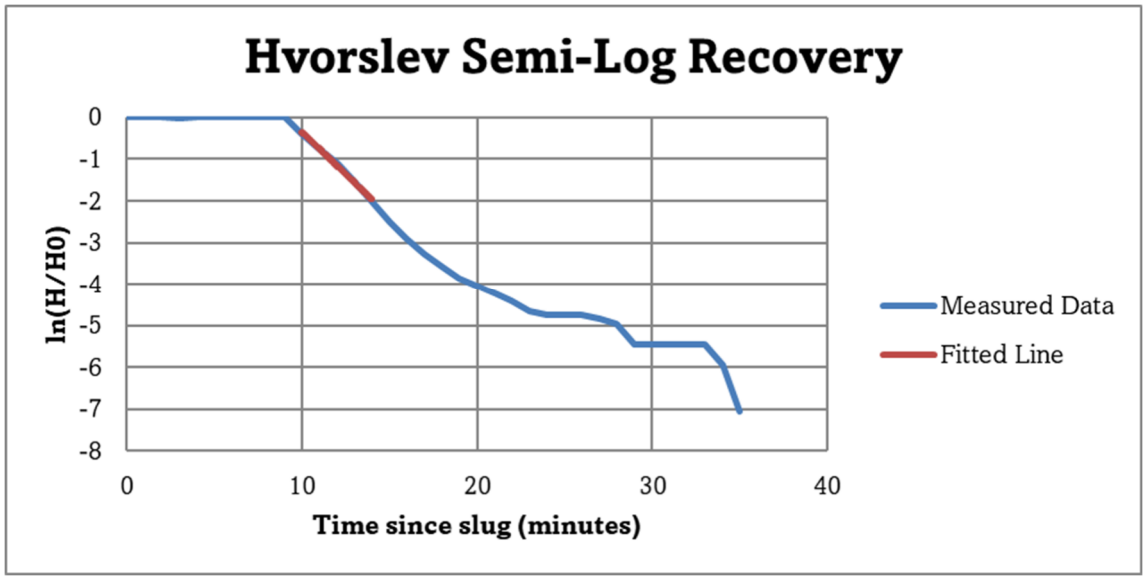
- α = slope of semilog fit (1/min)
- r_c = casing radius (ft)
- r_w = well radius (ft)
- R_e = effective radius of influence (ft)
- L = submerged screen length (ft)

For this test:

- r_c = 0.0833 ft
- r_w = 0.125 ft;
- R_e = 1.5 x b_eff = 27.9 ft.
- L = b_eff = 18.6 ft;

The regression yielded a decay constant $\alpha \approx 0.4046$ min^{-1} with $R^2 = 0.995$. Substituting into the Bouwer & Rice equation with $\ln(R_e/r\_w) = 5.814$, the calculated hydraulic conductivity is:

$$K \approx 0.633 \text{ ft/day} \quad (\approx 0.316 \text{ in/hr})$$



3.0 CONCLUSION

The slug test at BRW-12 indicates an upper-bound hydraulic conductivity of ~0.63 ft/day, equivalent to an infiltration capacity of ~0.32 in/hr.

4.0 REFERENCES

Bouwer, H., and R.C. Rice (1976). A slug test for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells. Water Resources Research, 12(3), 423–428.

Bouwer, H. (1989). The Bouwer and Rice slug test—an update. Ground Water, 27(3), 304–309.

Butler, J.J., Jr. (1998). The Design, Performance, and Analysis of Slug Tests. Lewis Publishers.

Hvorslev, M.J. (1951). Time Lag and Soil Permeability in Ground-Water Observations. U.S. Army Corps of Engineers, Waterways Experiment Station Bulletin 36.