13th Annual Hydrogeology Symposium

CLEMSON UNIVERSITY

An Inexpensive Alternative Method of Measuring Hydraulic Conductivity, and its Use in Conceptual and Numerical Modeling

by:

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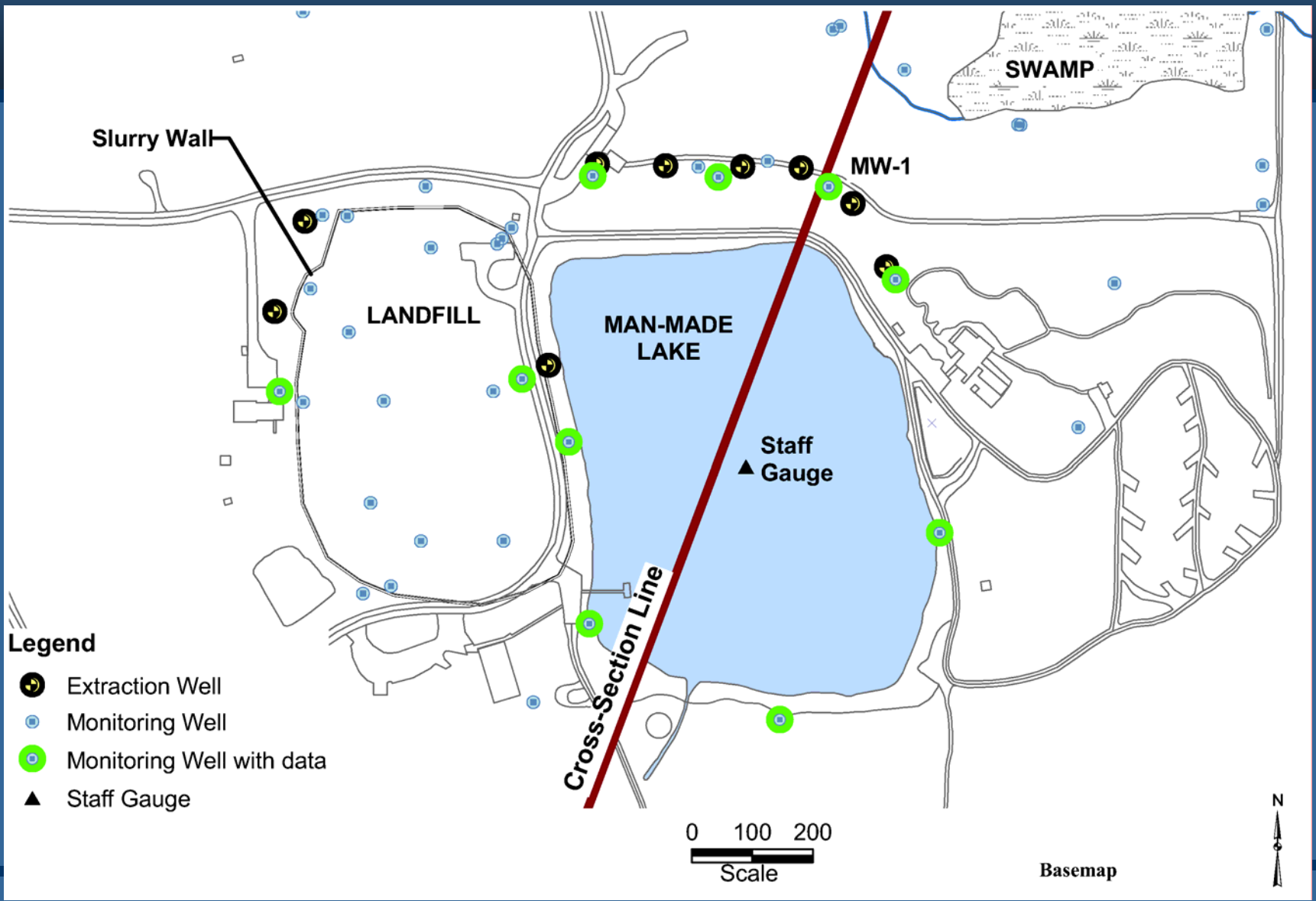
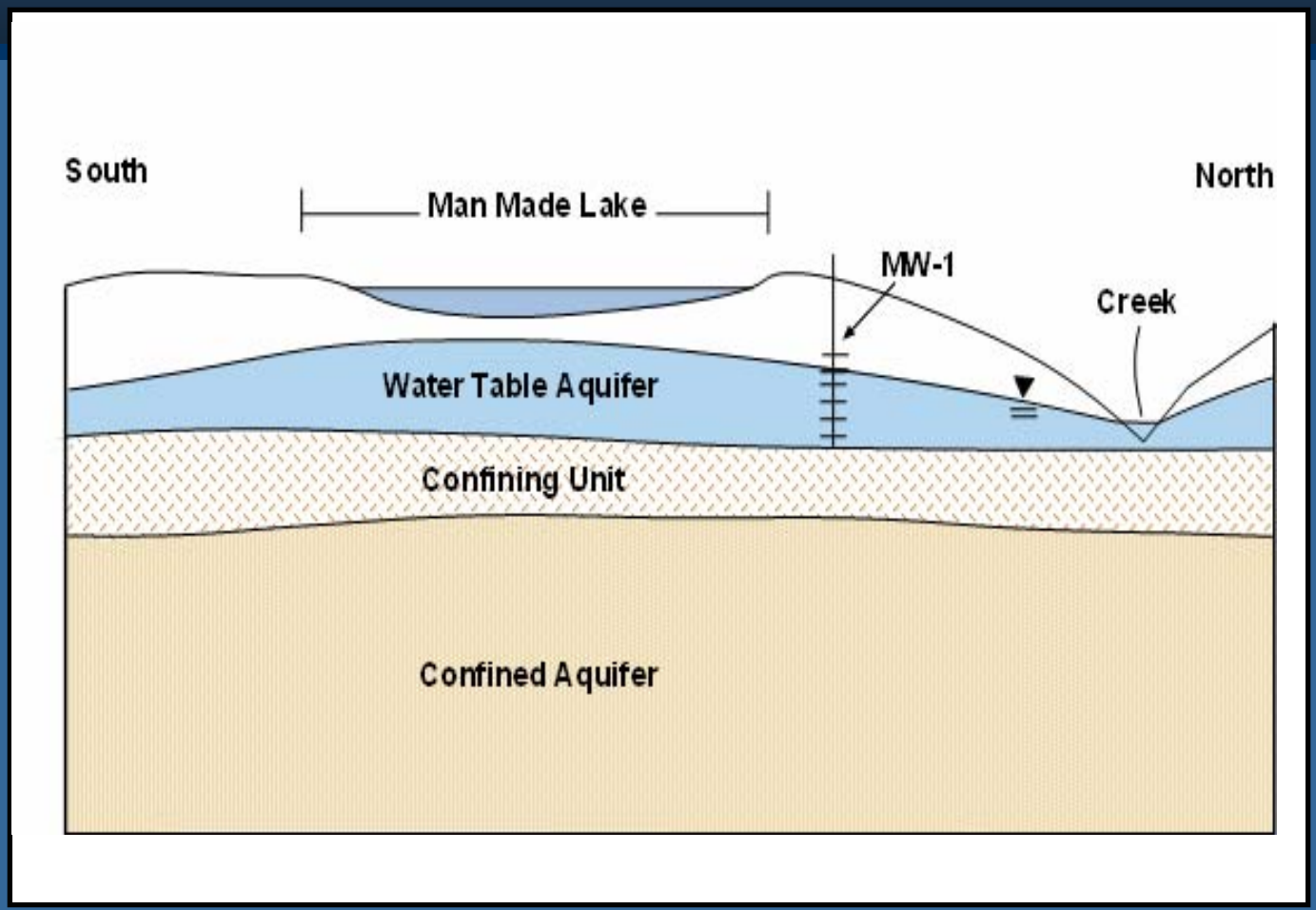
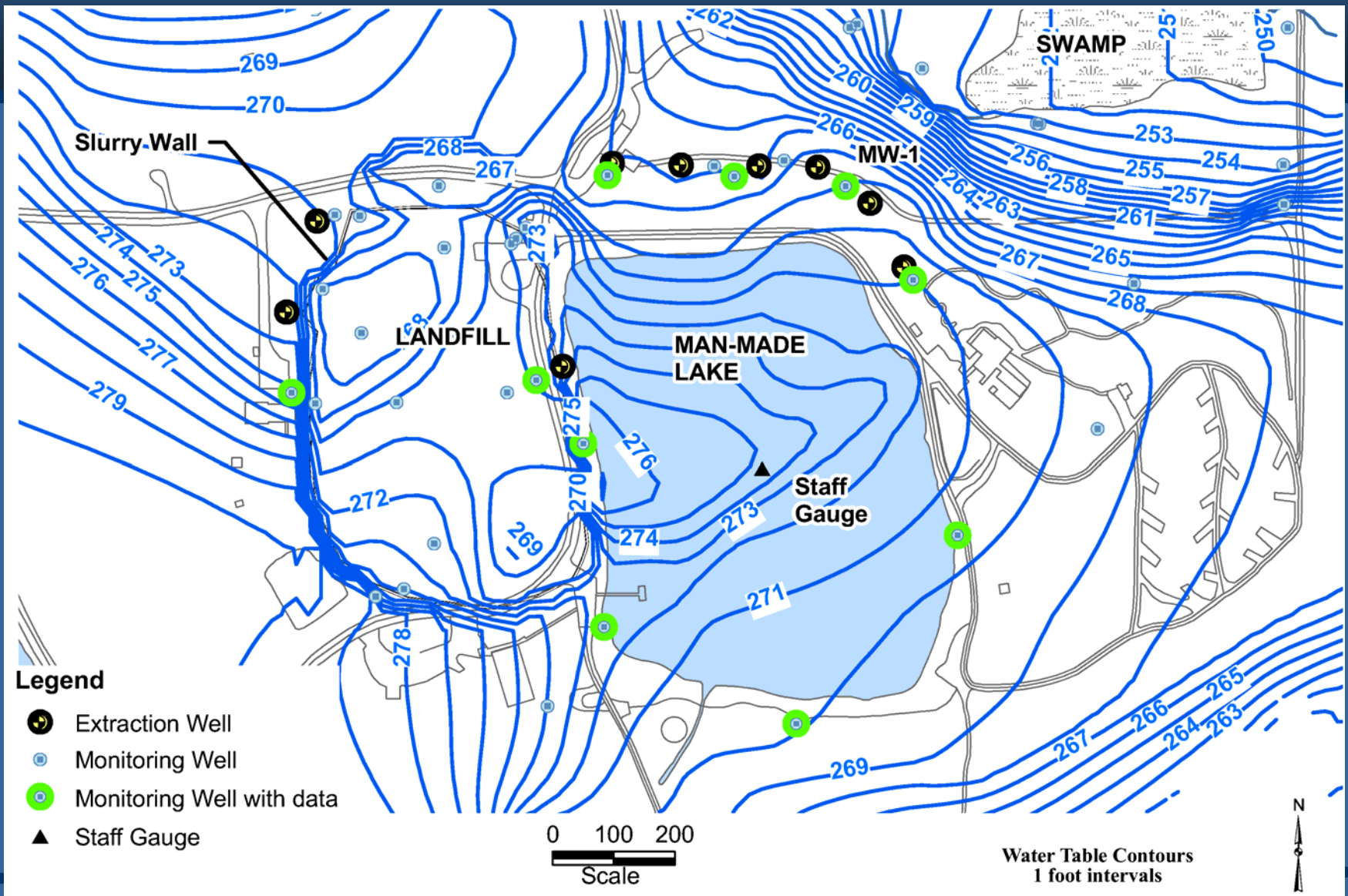
Site Map


Slurry Wall
SWAMP
MW-1
LANDFILL
MAN-MADE LAKE
Staff Gauge
Cross-Section Line
Legend
Extraction Well
Monitoring Well
Monitoring Well with data
Staff Gauge
0 100 200
Scale
N
Basemap

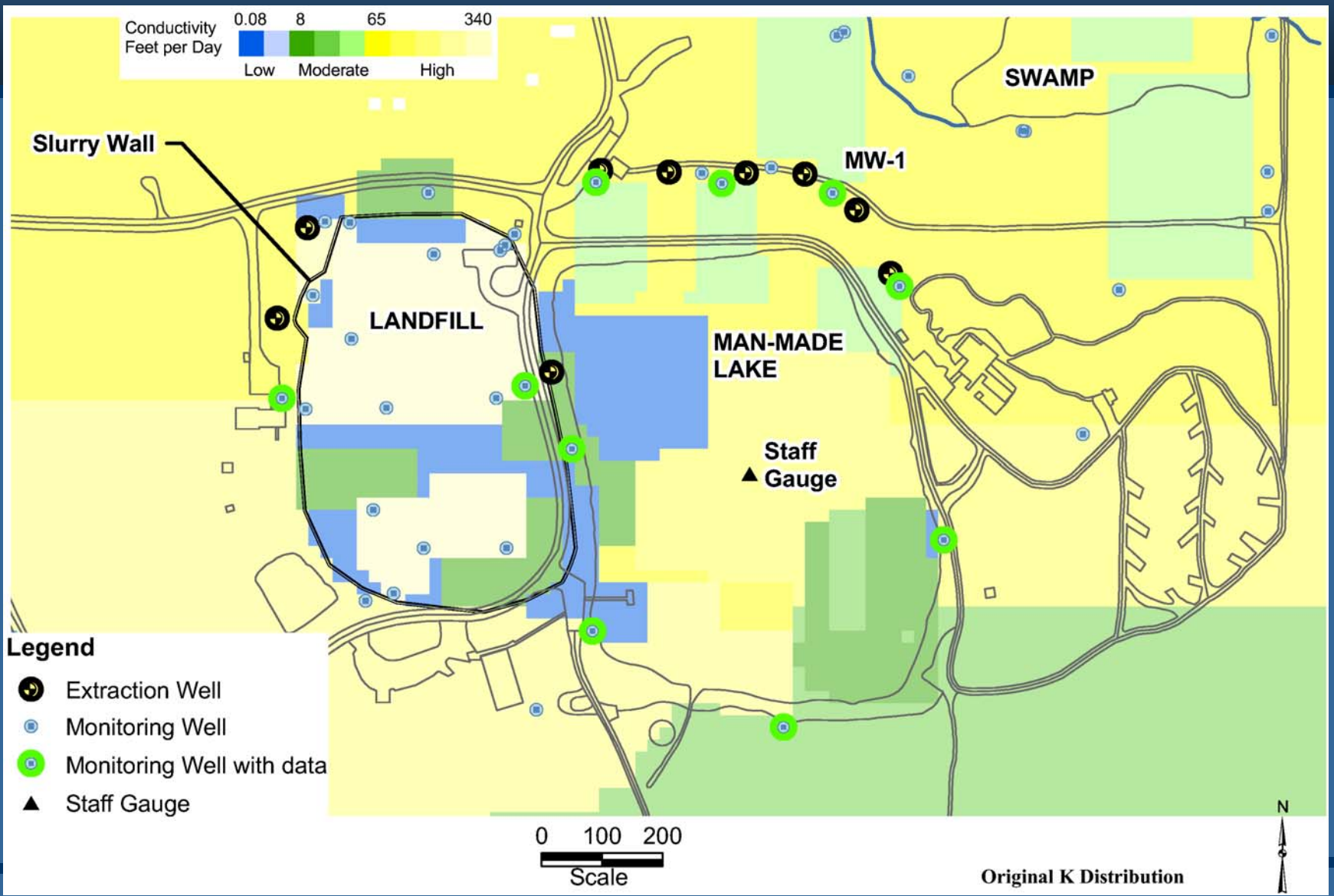
Simplified Cross Section



Water Table Map



Original K Distribution



Uncertainties in the Existing Model

Uncertainty:

- The calibrated model could not reproduce the observed extraction well yields

Actions Taken:

- Re-evaluate model assumptions and conceptualization, especially regarding the distribution of K in the water table aquifer

Uncertainties in the Existing Model

Uncertainty:

- The nature of the hydraulic connection between the lake and water table was not known

Actions Taken:

- Develop a lake water budget by monitoring lake levels, precipitation, evaporation, and local GW levels to evaluate leakage through lake bottom to water table

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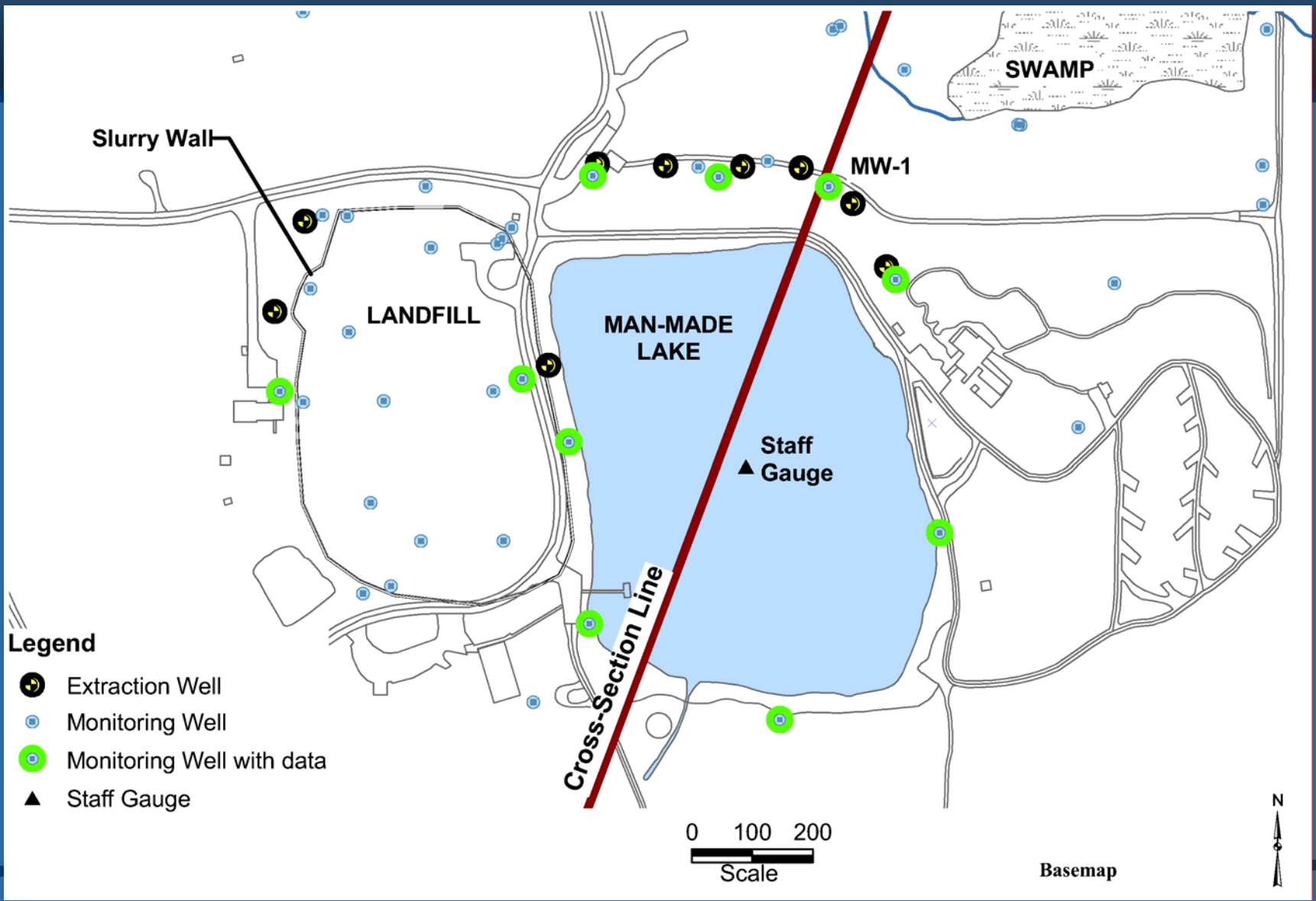
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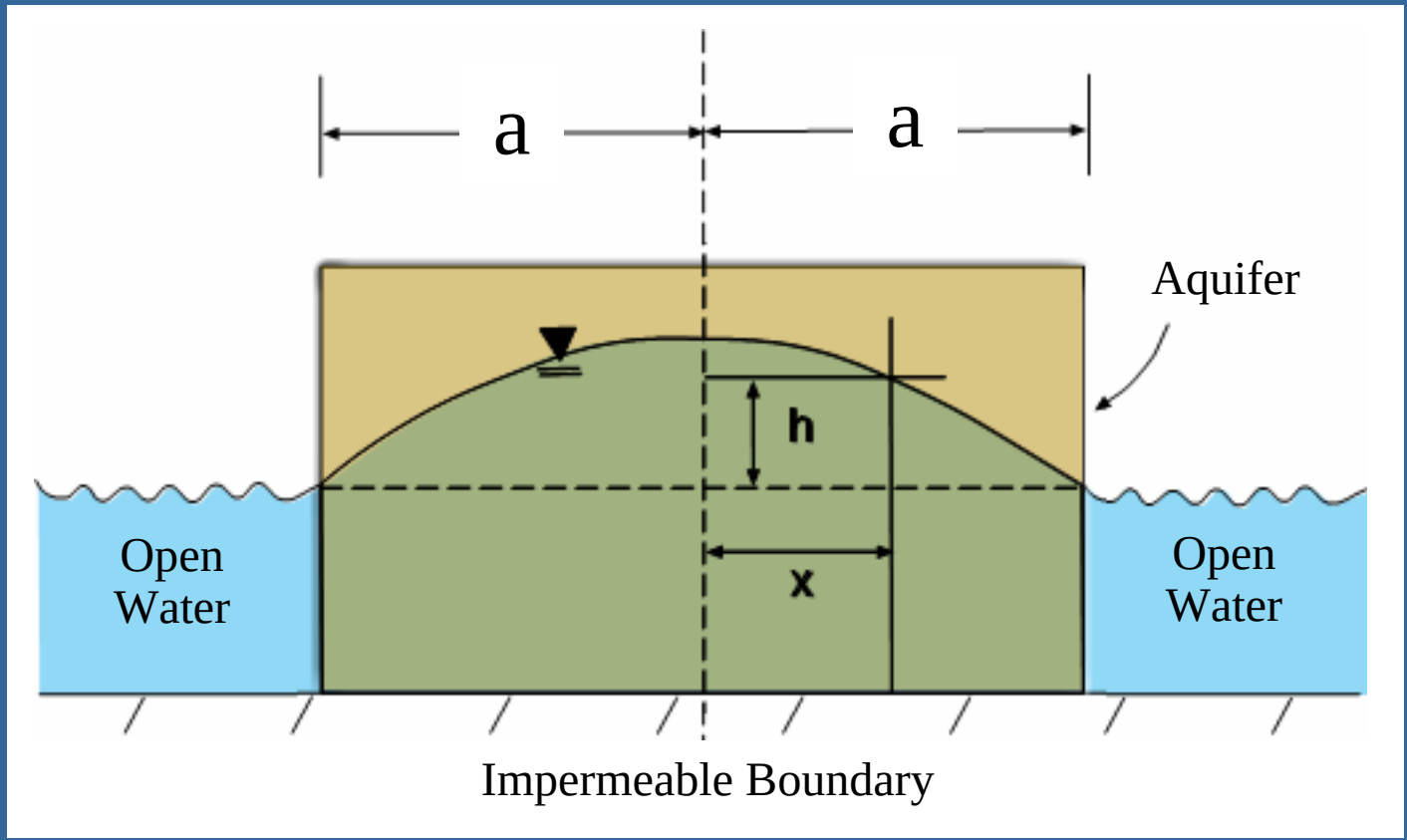
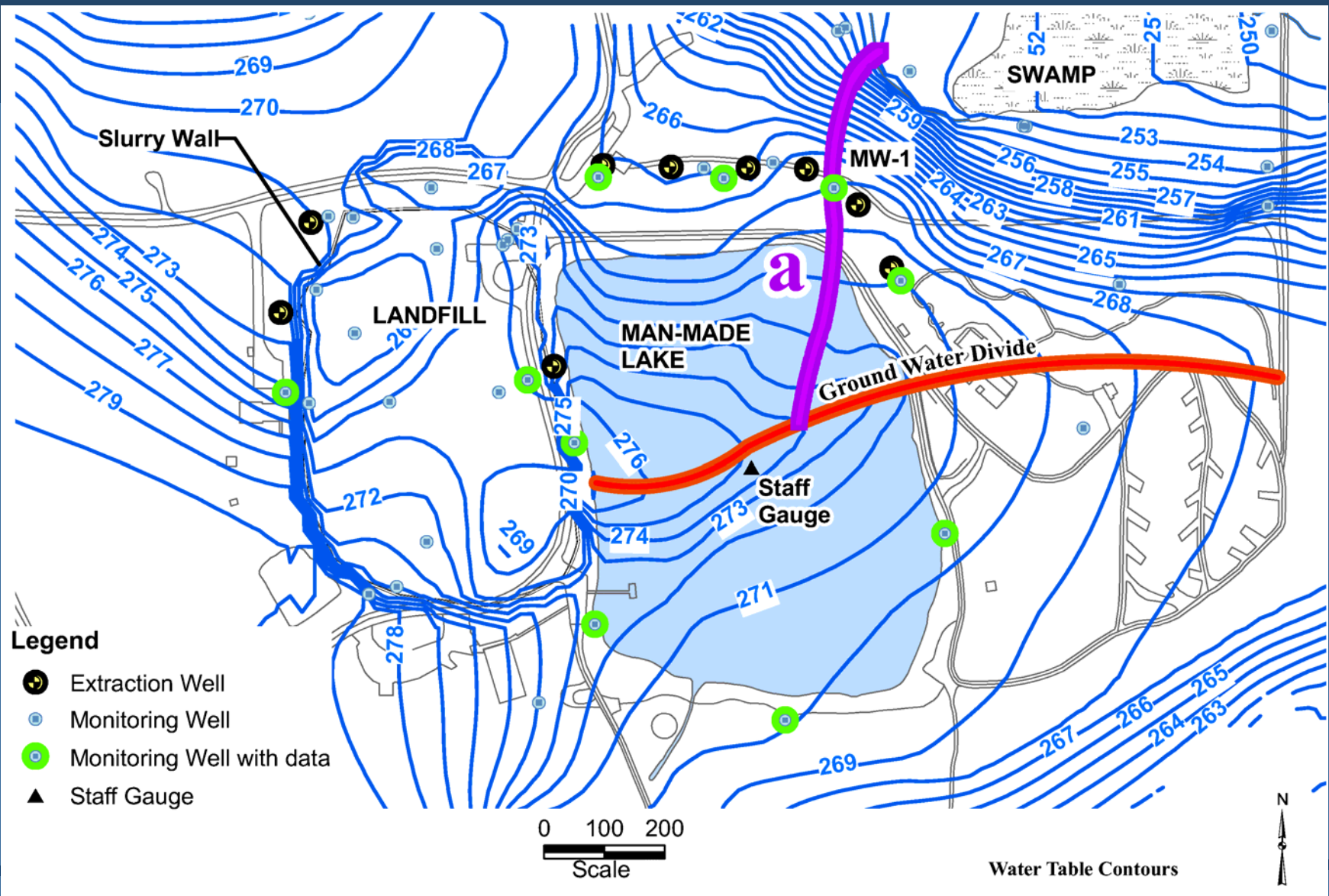
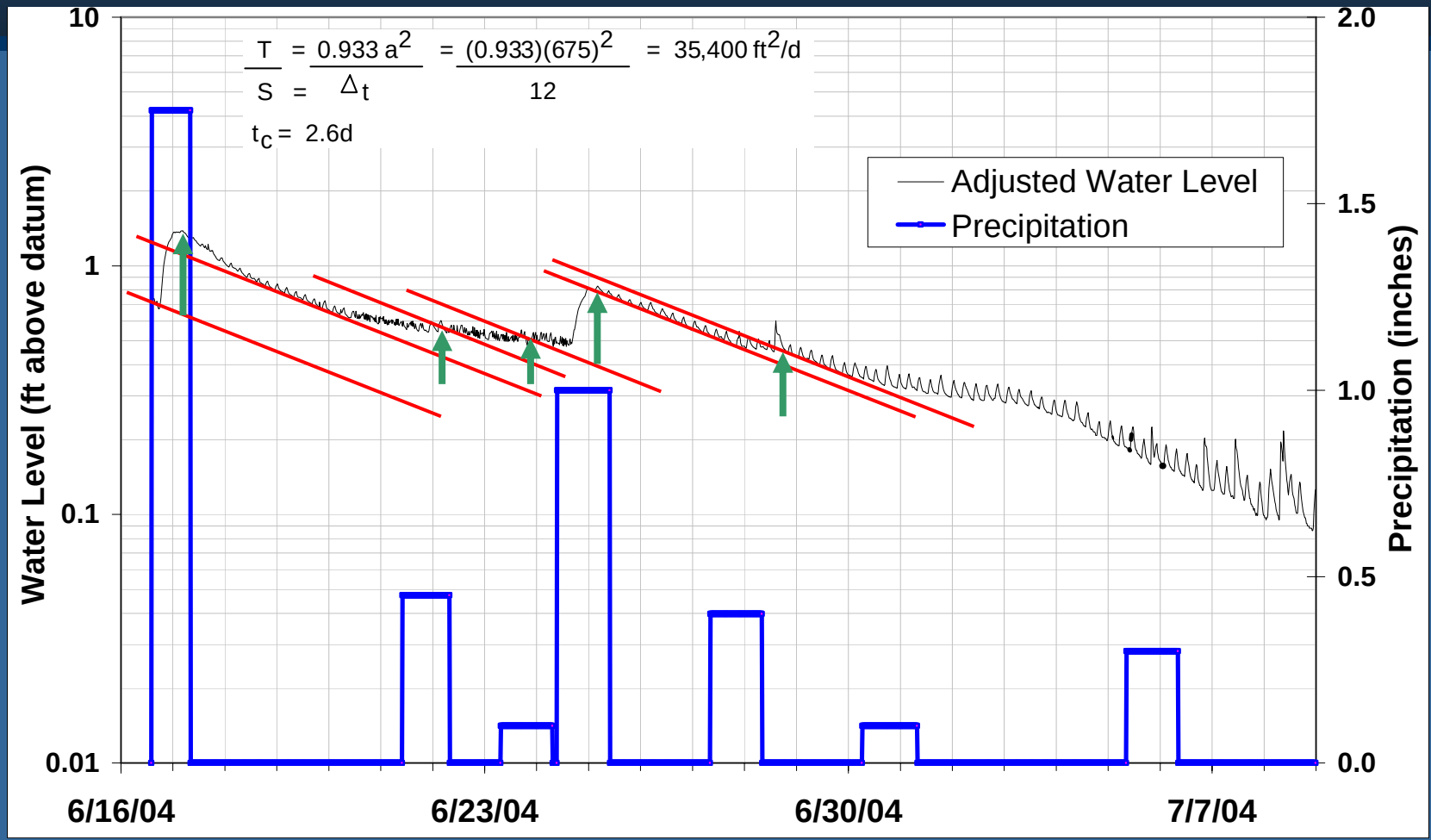
Rorabaugh's Model



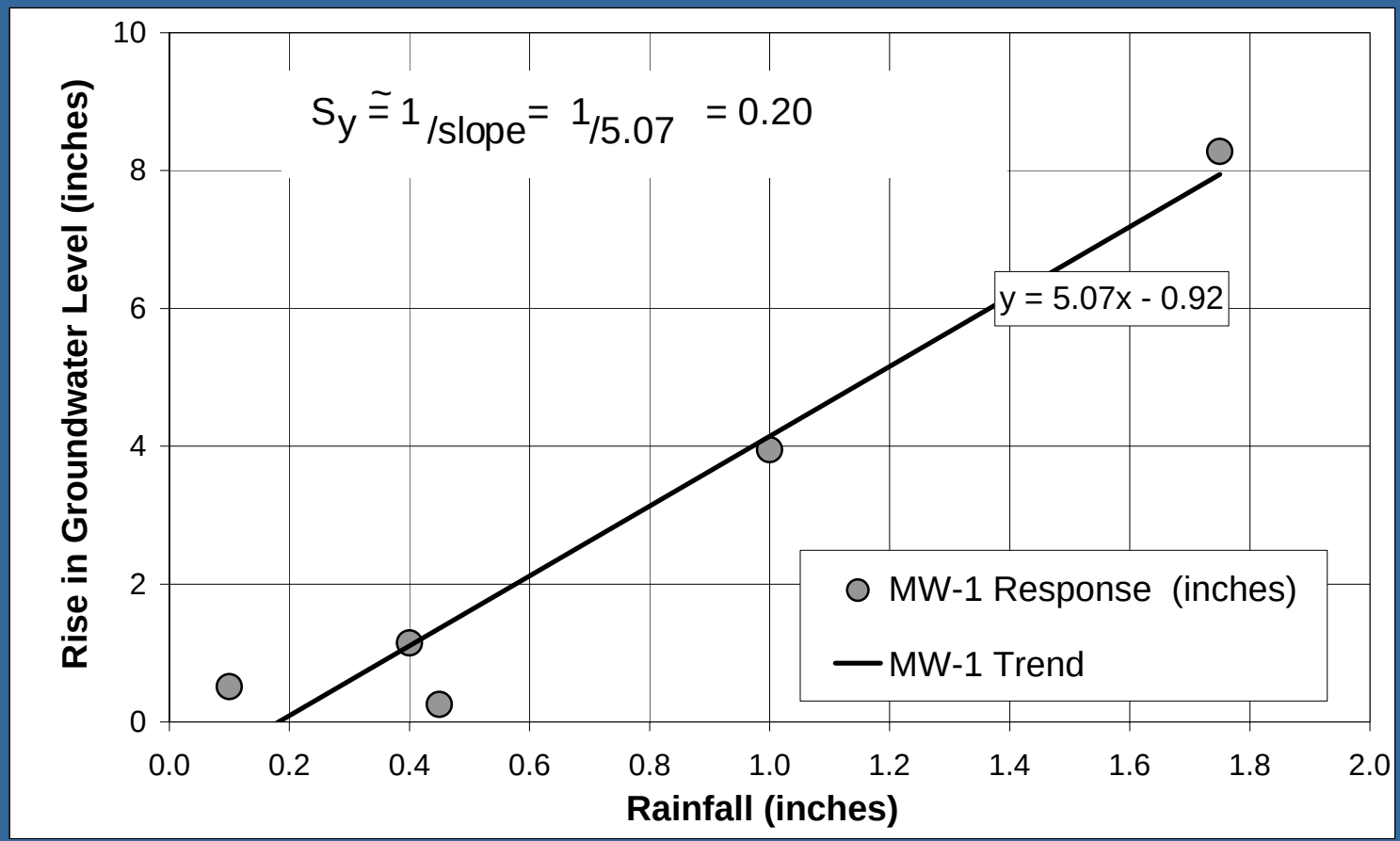
Water Table Map



Ground Water Recession Curves for MW-1



Ground Water Response to Rainfall at MW-1



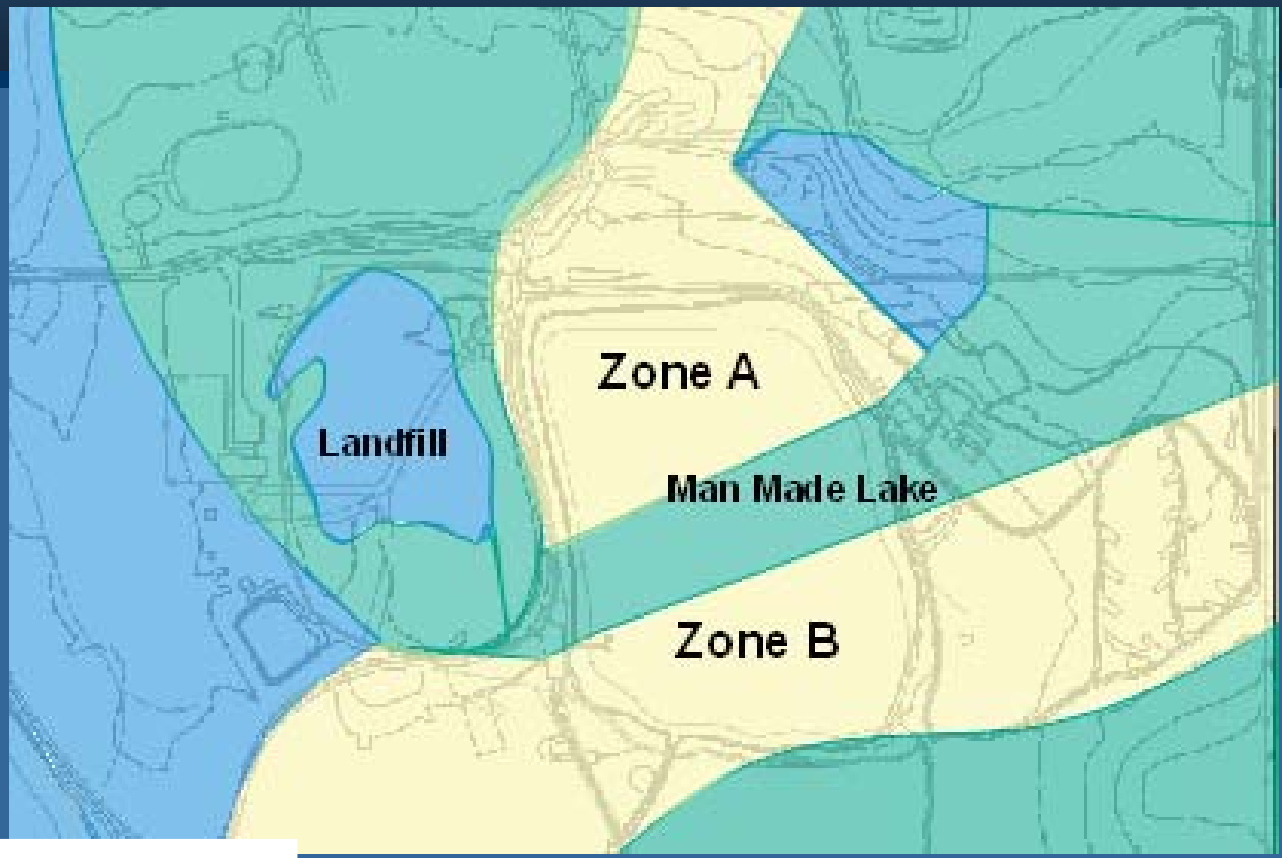
Comparison with Slug Test Results

These estimates for K from the Rorabaugh analysis are generally more than an order of magnitude higher than the estimates derived from earlier slug tests.

Range of values from slug test analyses:
1 to 16 ft/day

Range of values from the Rorabaugh analysis:
66 to 285 ft/day

Revised Conceptual K Distribution



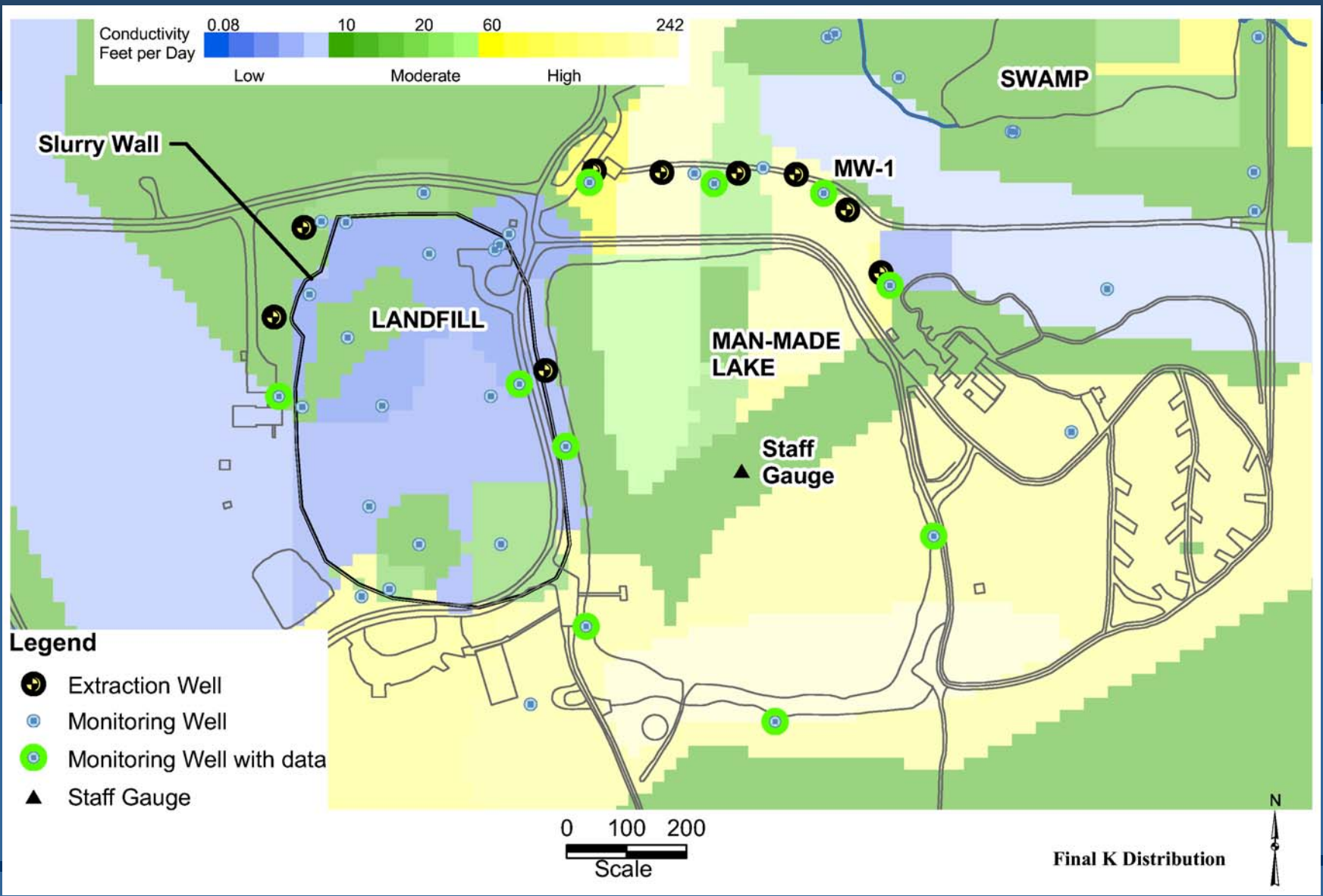
pproximate Hydraulic Conductivity Values

High 40 to 300 ft/day

Moderate 4 to 20 ft/day

Low Less than 4 ft/day

Final K Distribution



Conclusions

The conductivity estimates provided by the Rorabaugh analysis allowed us to clear up some of the uncertainties present in the local groundwater model, specifically:

1. a reliable model calibration was developed, and
2. the observed pumping rates for the extraction wells were accurately simulated.

The method is

1. cheap to run,
2. uses standard technology (transducers, recording rain gages, and data plotting software), and
3. generates no IDW.

Questions and Answers

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