

## CASE HISTORY

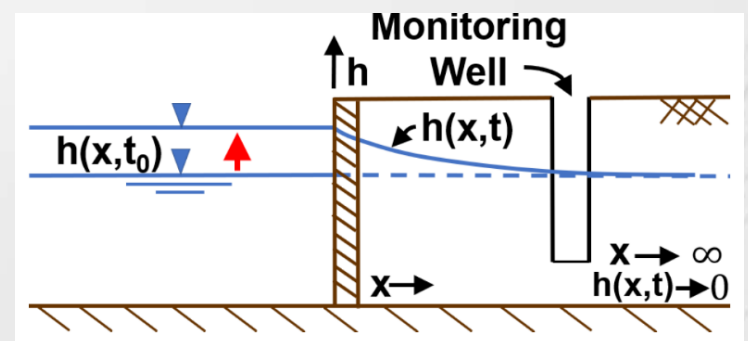
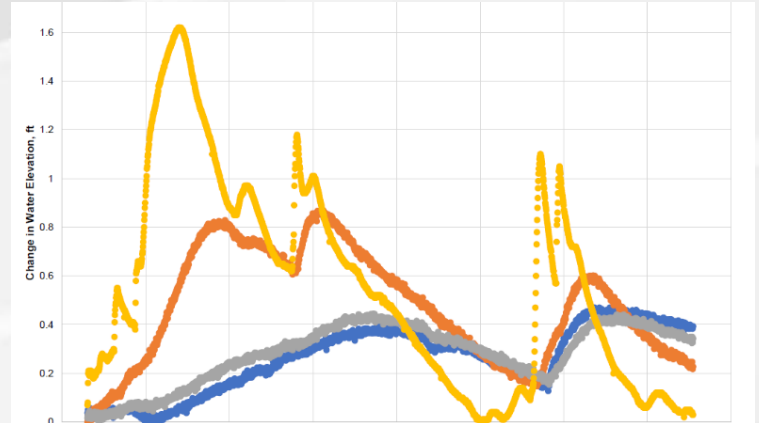
### Groundwater Modeling for a Proposed Facility in Indianapolis to Assess the Impact of River Flood Events on the Nearby Groundwater Elevations

#### Challenge:

The client proposed to build a large facility with the structure below ground surface at a Site directly east of the White River in Indianapolis, IN. Given the proximity to the river, flood events of the river would likely result in a significant rise in groundwater elevation. MUNDELL was asked to identify the maximum groundwater elevations at the Site during the 50-Year (2-percent-annual-chance) and 100-Year (1-percent-annual-chance) flood events of the White River. To complicate the groundwater assessment, a rock dam (about 10-feet in height) was located along the White River just north of the Site. Furthermore, the results of the assessment were to be used for foundation and/or dewatering design.

#### Action:

Recognizing the end-use of the groundwater assessment, MUNDELL used a three-phase modeling approach. Three classes of groundwater flow models were used, including a numerical model (finite difference (MODFLOW), an analytic element model (GFLOW), and a transient stream-aquifer analytical model. The transient stream-aquifer analytical model was developed by MUNDELL and based on a convolution analytical approach utilizing Python 3 programming language. To implement the transient model, MUNDELL analyzed the historical White River stage data to predict the expected length of a White River flood event (*i.e.*, determine the time it takes for the river to rise and fall during a flood event). The models were developed to capture the complex stream-aquifer dynamics and to account for the presence of a low-head dam situated upstream of the site. To calibrate and validate the models (*i.e.*, make sure they accurately modeled the conditions at the Site), MUNDELL used groundwater level transducer data collected in on-Site piezometers and referenced nearby White River stage data.



#### Results:

The models were successfully calibrated and validated using the Site-specific data. Considering the various modeling results, MUNDELL delivered the final report which outlined the expected range of groundwater elevations at the Site due to a severe White River flood event. In addition, MUNDELL provided design recommendations and a detailed description of the modeling process to help the Client understand the results.