

Bay Park Groundwater Project
Town of Topsham
Executive Summary
October 22, 2009

Project Goal

The Bay Park Subdivision project was developed in order to assist the homeowners in the area with groundwater issues that negatively impacted their homes.

Project Outcome

The project initiated with a public hearing, topographical survey and a mailed survey of the entire Bay Park Subdivision between Teal Street and Hunter Lane. The public hearing was set in August 2009 and was used to listen to the concerns and issues of the residents living in the target site. The topographical survey, also completed in August, located all streets, storm drain facilities, residences, and other miscellaneous data to enable Snowden Consulting Engineers to develop a plan for the neighborhood. The mailed survey was sent to those within the target area, as well as other residents outside the target area in Home Place and the remainder of Bay Park Subdivision. The survey was used to determine the extent of groundwater issues within the park. A total of 200 surveys were sent out, 95 of which were sent to residents in the target area. Our office received 40 responses from the 95 within the target area, 29 of which responded to having groundwater issues. In the surveys and at the public hearing, one consistent theme was mentioned; that the groundwater issues seemed to be getting worse since 2005. Site inspections of a number of resident homes in the area substantiated the resident's concerns, and also provided evidence that a number of the basement elevations were below existing groundwater table elevations.

Test Borings were developed on the site to determine ledge depths and to measure groundwater levels within the park. This information, along with the topographical data, was provided to Michael Abbott, the hydrogeologist hired to develop the groundwater model for the park. Since Bay Park is located on a sand and gravel aquifer, the model would aid our office in predicting the final groundwater water table with the proposed improvements. The groundwater model used the survey data, as well as previous data from a 1981 study by Robert Gerber.

Initial indication from the groundwater model was that the high point of the aquifer was located to the south east of the target site. The model also suggested that the water levels of the ponds at the transfer station had an impact on the groundwater elevations in the park. A survey of the transfer pond(s) and the Pelletier Pond elevations indicated that the transfer pond elevations were approximately 66-67 feet and 60.7 feet, respectively. Insertion of these elevations into the model indicated that lowering the transfer station ponds by 4 feet would provide a significant positive result for the residents in the target area.

Inspection of the storm water facilities also provided an indication of a failure in at least one part of the system, along Loon Drive. The storm water system on Loon Drive extended from Hunter Lane to Coot Lane. The system within this roadway was lacking the ability to drain properly. The

groundwater level was in many cases over the top of the pipes within the catch basins, an indication that the existing under drain pipe was not removing the groundwater in an efficient manner. It was determined that Loon Drive should be rerouted and replaced, to take some of the load off the line from Teal Road to Coot Lane, and to better drain the groundwater in the area.

The result of the groundwater model and inspection of the facilities was a three part approach to dealing with the issue. The approach included:

1. Lowering of the water elevation in the transfer station ponds by 4 feet to lower the groundwater table by 1' – 2' in the target area.
2. Replacement of the Hunter Lane under drain and outlet for this roadway to lower the under drain system and provide a larger pipe to remove the groundwater and surface water runoff from the area. The total elevation drop by relocating the outlet was 1.57 feet.
3. Replacement of Loon Drive under drain section to redirect much of Loon Drive (between Teal and Hunter) groundwater flows and storm water flows toward Hunter Lane and the new outlet.

According to the model, the anticipated time frame for improvement to the groundwater elevations once the three improvements are complete is approximately 1 to 2 years. However, based upon the test trial run during the project, the hydrogeologist suggested that the actual time frame may be less than those predicted by the model. The test trial was developed to ensure a hydraulic link between the ponds and the aquifer under Bay Park. In the trial, the Topsham Public Works Department lowered the water level in one of the transfer station ponds by 1.75 feet, while the groundwater table elevations were monitored in the target area. Based upon the data collected, it was determined that the ponds and the aquifer were hydraulically connected.

It has been determined that the three part approach must be completed in its entirety for the groundwater levels to be lowered to the projected groundwater elevations, thereby alleviating a majority of the groundwater issues within the park. Even with the design options described above, the Town should be aware that there may be periods of intermittent flooding and elevated groundwater levels after some storm events. Bay Park has been constructed without adequate surface runoff facilities, such as ditching or curbing to direct runoff directly to the catch basins. The result of construction, and the fact that the site is so flat, is that surface water in some cases does not drain to the drainage structures, but instead ponds on the ground surface and infiltrates into the aquifer. This creates localized mounding of the aquifer, which is alleviated over time by the under drain system within Bay Park.

The periods of elevated groundwater levels due to this localized mounding would be short in duration, but will depend on the timeframe it takes the infiltrated surface water to flow laterally to the under drain system within the aquifer. This timeframe is significantly greater than the time frame it would take to direct the surface drainage using ditching or curbing to the catch basins. With the improvements suggested above, the overall groundwater table will be lowered, thereby creating a condition where these elevated groundwater levels would be intermittent, instead of continuous as currently found at the site. The lowering of the overall groundwater table would also ensure that the elevation prior to mounding would be lower than that which currently exists, thereby lessening the impact of the intermittent localized mounding.