

GIS Project Proposal

Hornsby Bend Biosolids Management Facility in Austin, Texas processes municipal biosolids by inoculating pathogenic material, decreasing biological oxygen demand and raising percent solids. The resultant material is then beneficially reused via direct land application or further composted and sold to local vendors. Water extracted in the process is diverted to a clarification unit before being channeled through a series of treatment lagoons. Hornsby Bend is concerned about the leaching of contaminants into proximal groundwater due to land application or lagoon treatment practices. As a result, the facility constructed 21 monitoring wells on-site in the 1990s and began annual sampling and analysis of several chemical parameters.

Since 2005, one such parameter - ammonia has been detected in elevated levels in one particular well near a lagoon. Accepting data constraints, it is difficult to isolate and determine the source of these elevated levels. While explanations can range from anoxic conditions to biologically mediated reaction, Hornsby Bend is concerned that a breach may exist in the lagoon. While ultimately a tracer study may be needed to evaluate the conditions of the pond, Hornsby Bend is interested in characterizing the spatial chemical composition and groundwater depths on-site. This analysis may be able to provide insight as to source of contamination. For instance, greater groundwater depths near the elevated ammonia levels may add weight a lagoon breach hypothesis and help justify a full tracer study.

The objective of this project will be to add monitoring wells as feature class points to a satellite imagery basemap. These monitoring wells will have integer values and be tied to chemical and groundwater depth data for sampling iterations beyond 2005. Unfortunately, data prior to 2005 did not monitor ammonia levels; therefore, a baseline for the data will not be available. Rather, the approach will be to visualize the data as a function of position and evaluate whether there is any trending in the time series. Raster images can be generated from data in the monitoring wells and then interpolated to give parameter-specific area maps. These can be generated for each sampling iteration to develop a time series. Other data that may be useful is the minor aquifer flows for the region as well as horizontal and vertical coordinates for the lagoon systems. Availability of this additional data is unknown. While this data will make the map more comprehensive, it is not essential for the analysis because 1) aquifer flows are in the direction of the river and 2) satellite imagery will provide a qualitative measure for lagoon proximity. Surface water impacts from sludge application are not considered in this proposal because survey data and nutrient management plans have indicated nearly zero slope on applied areas. Thus, potential contamination from land applied solids is assumed to occur primarily through infiltration into groundwater. However, if elevation data exists for the facility, this notion can be reexamined and potential impacts from runoff can be assessed.