New Braunfels Utilities Comprehensive Field Study

Espey Consultants, Inc.

Hill Country Environmental, Inc.

Introduction

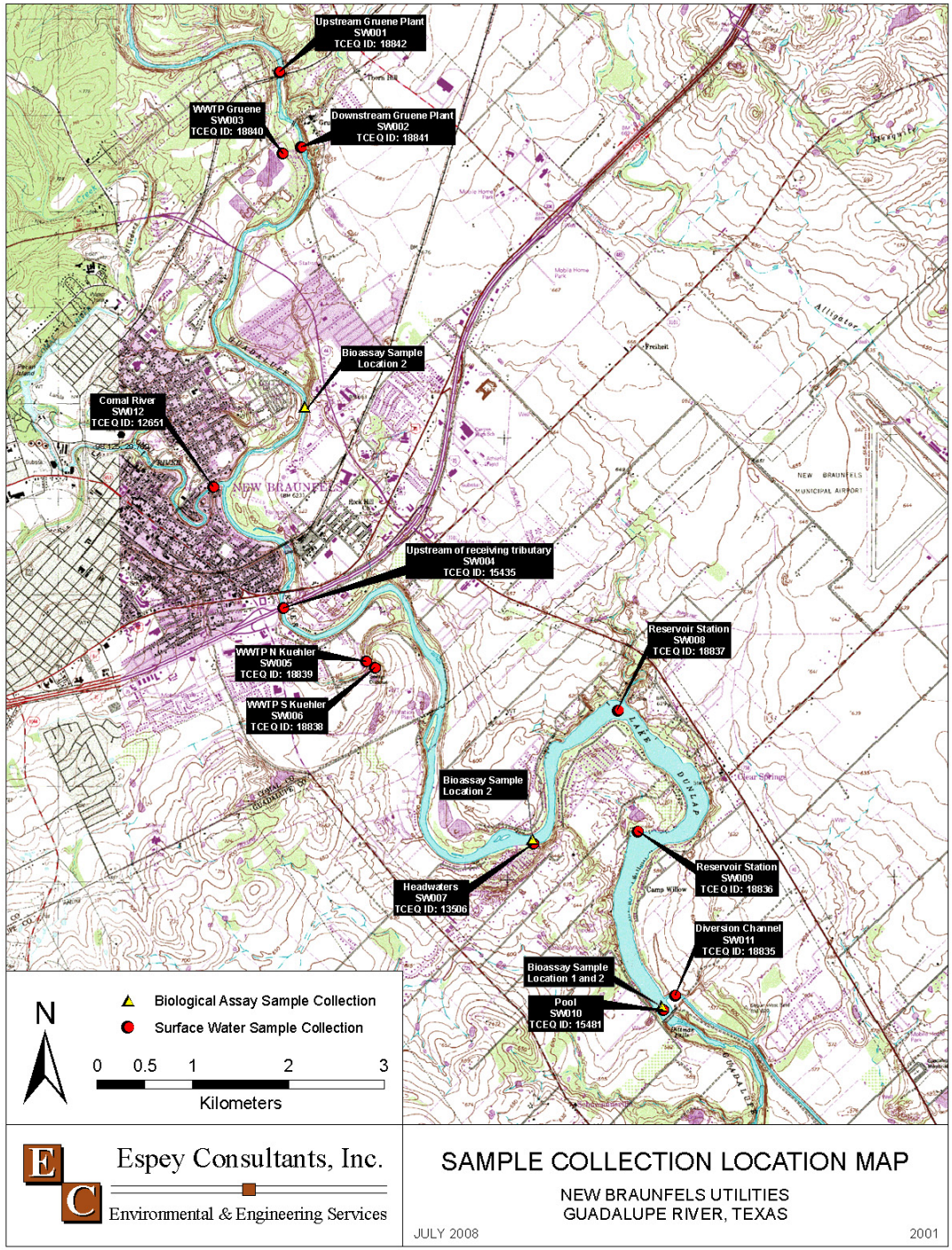
- Espey Consultants, Inc. (EC) and sub-consultant, Hill Country Environmental, Inc. (HCE) were retained by New Braunfels Utilities (NBU) to perform a Comprehensive Field Study (Study) to collect water quality data from the Guadalupe River, Comal River and Lake Dunlap.

- The purpose of the Study is to provide additional water quality data to assist in determining whether nutrient limitations on point source discharges from NBU's wastewater treatment plants (WWTPs) will prevent growth of excessive aquatic vegetation.

Study Timeframe

- The study timeframe was designed to encompass two summer periods (June – September) and one winter period (October – May). Routine sampling was to be conducted weekly through the summer and monthly during the winter.
  - All scheduled 2006 weekly and monthly sampling events were completed.
  - Heavy rains in spring and early summer 2007 (April-June) caused very high flow events on the Guadalupe River.

Twelve Sample Locations



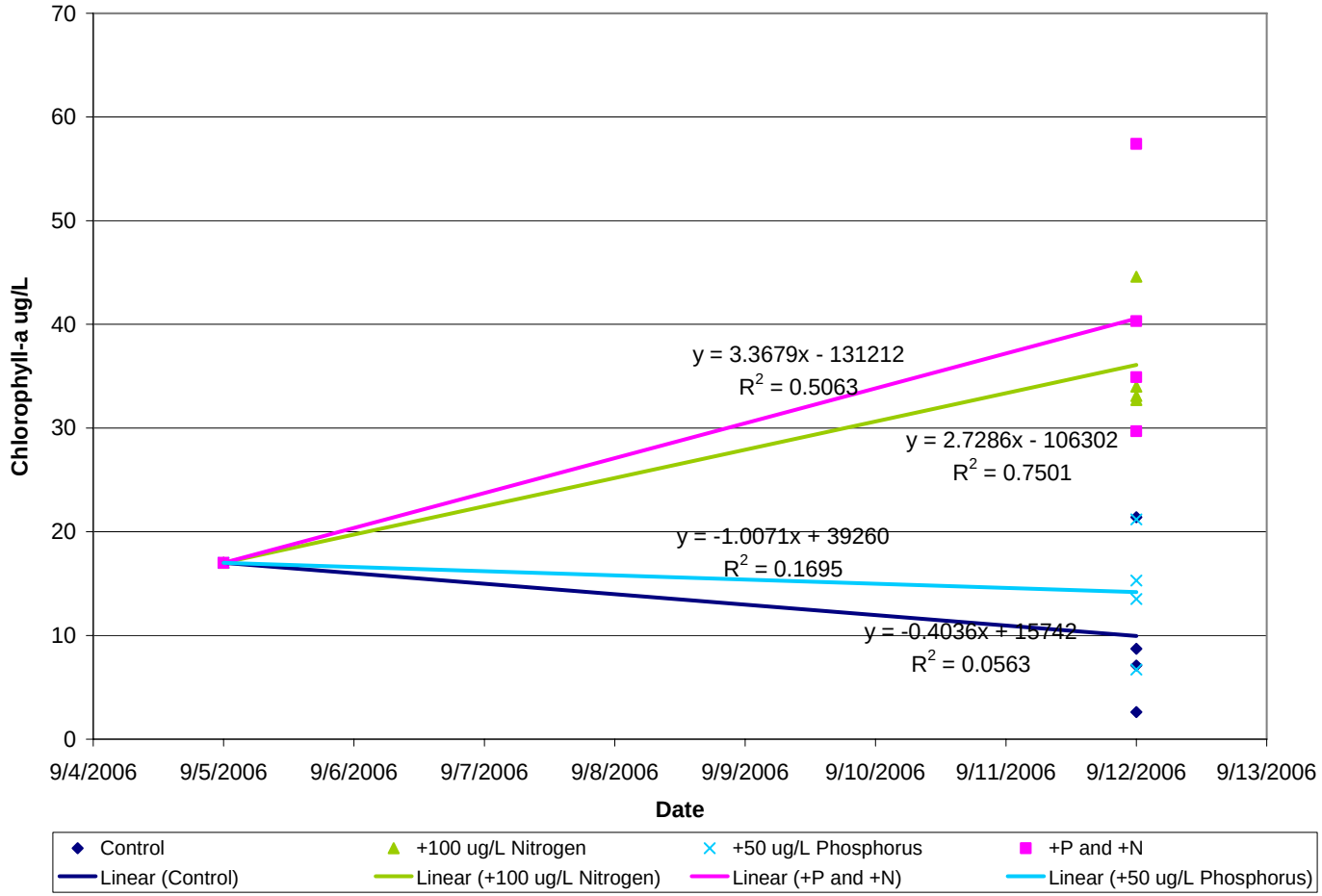
Analyses

- Routine field parameters (pH, DO, conductivity, temperature and secchi disk) were measured at each sampling station.
- Formal laboratory analysis included TSS, TVSS, TOC, Nitrogen Series (Total Kjeldhal-Nitrogen (TKN), Ammonia, Nitrate, and Nitrite), Phosphorus Series (total and orthophosphate (OP)) and Chlorophyll-a and Pheophytin-a.

Two Nutrient Bioassays

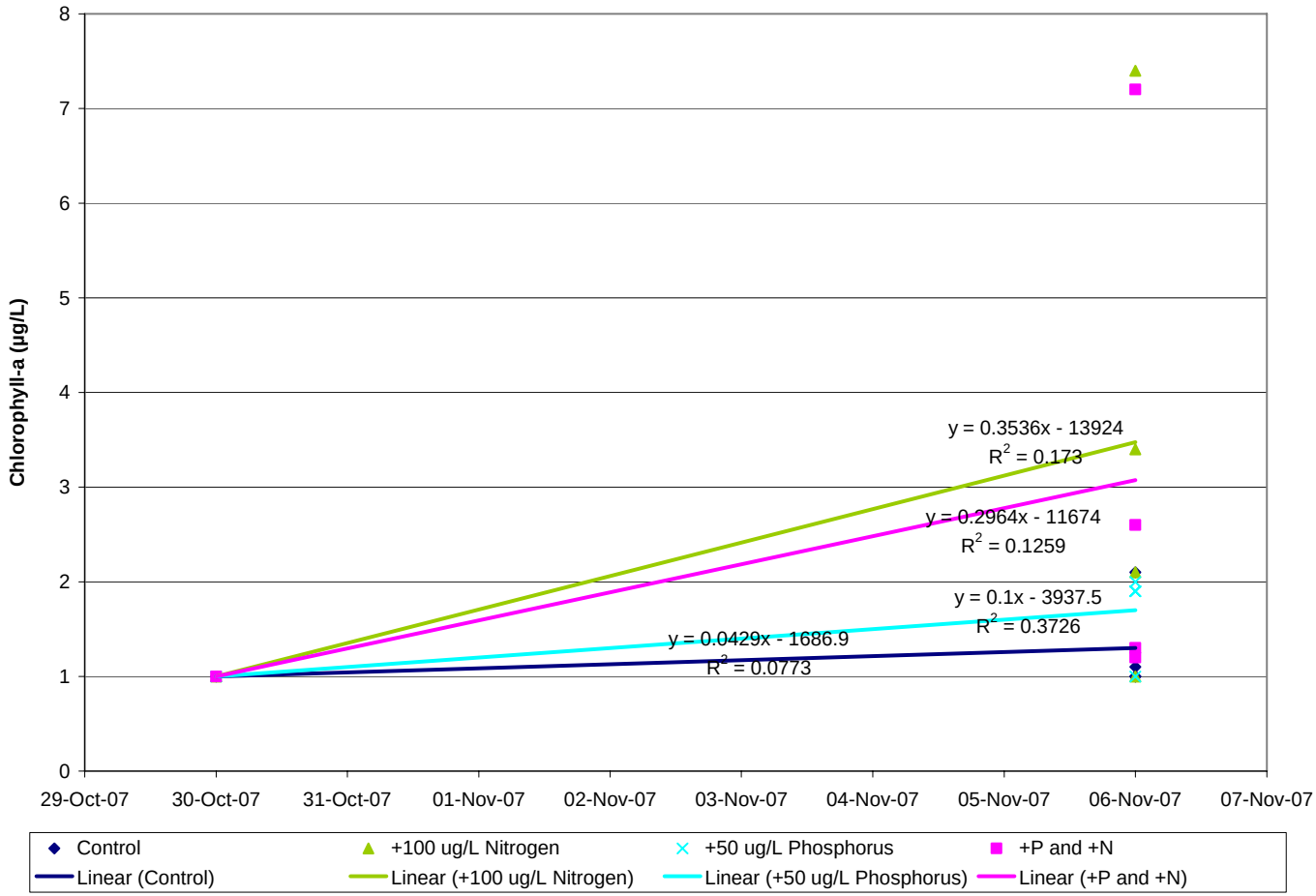
- Two nutrient bioassays were conducted during the study period.
  - Control, no nutrients added,
  - +Nitrogen, 100 micrograms /L (µg/L) N added,
  - +Phosphorus, 50 µg/L P added,
  - +Nitrogen and + Phosphorus, 100 µg/L N added and 50 µg/L P added.
- The first bioassay was conducted September 5, 2006 from one location.
- A second bioassay was performed on October 30, 2007, from three locations.

September 2006 Bioassay



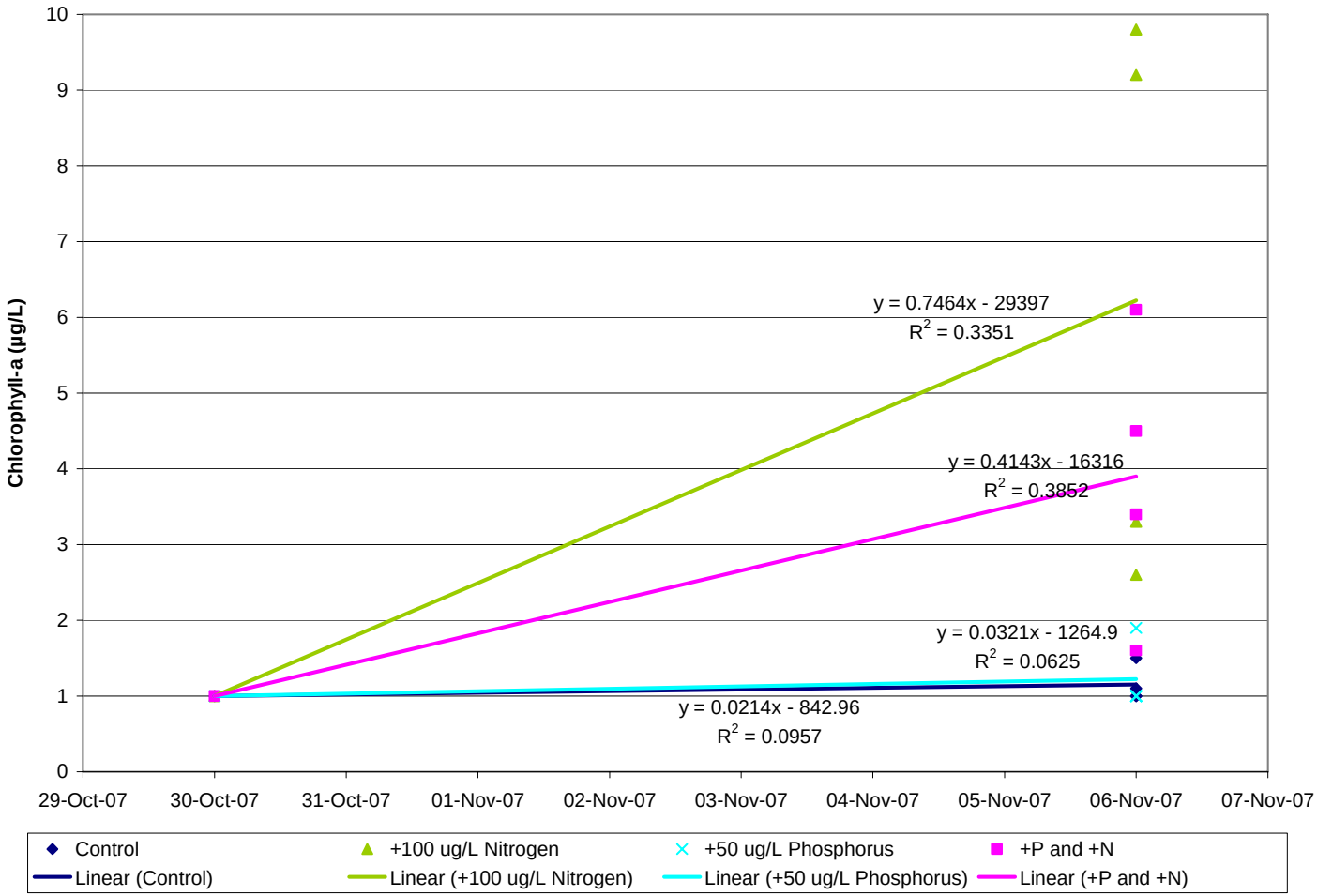
Bioassay Analysis SW010

October 2007 Bioassay



Bioassay Analysis SW007

October 2007 Bioassay Cont.

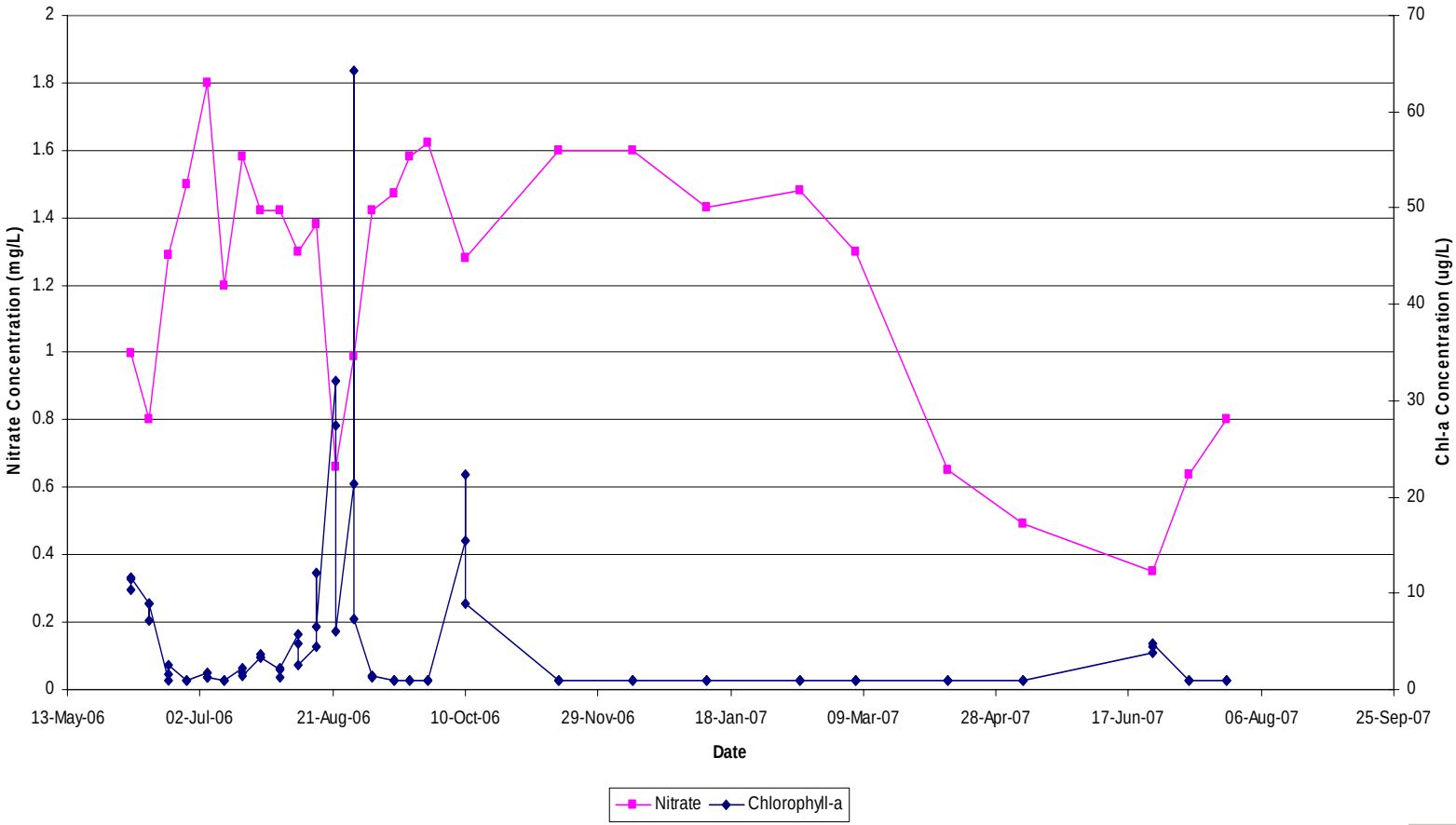


Bioassay Analysis SW010

Effect of Flows

- The flow as contributed by either the Comal or Guadalupe Rivers directly affects the water quality of the river and lake system.
- The Comal River dictated the flow in the river from June 2006 to March 2007.
- From March 2007 to November 2007, during heavy rainfall periods, the Guadalupe River dictated the flow.
- The maximum percent of flow from the Gruene Plant is approximately 1.6% and occurs during low river flow periods.
- The maximum flows from the two Kuehler plants contribute approximately 2.1% of the total flow during low river flow periods.

Routine Data Support



Nitrogen Limited

- Based on the results from the sampling events and the bioassay investigations, the river system upstream of the Kuehler Plants and downstream of the Comal River, appears to be nitrogen limited.
- Based on the water quality study and analysis, the OP concentration does not dictate the algal growth in the river system.

Phosphorous Limit

- Based on the results of this comprehensive study, there does not appear to be an OP limit that is appropriate when imposed on any or all of the NBU WWTPs that would prevent excessive growth of aquatic vegetation.
- Based on the numerous sources of water and varying nutrient loads, it is not appropriate or feasible to relate an OP limit to a measureable difference in algal biomass within the lake system.

Questions?