Memorandum

Date: 11 August 2015 Project: Plunge Creek Conservation Project

To: Brendan Belby, ICF Project Number: 6000208

From: Ed Wallace and Jonathan Frame

Subject: Percolation tests at Plunge Creek, Redlands, CA

Purpose

NHC measured percolation rates in four locations along Plunge Creek using a constant head permeameter (CHP). These measurements were compared with 3 surface infiltrometer measurements by Geoscience and reported in the Stormwater Flow and Capture Analysis - Active Recharge Project for the Tributaries of the Santa Ana River, San Bernardino Valley, California (2012). This memo includes a description of NHC's methods used to measure percolation rates and location of measurements in Plunge Creek.

Measurement Locations

NHC measured percolation at four locations along Plunge Creek (See Figure 1):

- NHC 2 is located on the left bank of Plunge Creek about 2000 feet downstream of Greenspot Road. This location corresponds to Geoscience's measurement location labeled "Plunge Creek #2."
- NHC 3a, 3b, and 3c are located on the right bank of Plunge Creek along a secondary channel about 3500 feet downstream of Greenspot Road. The cross section in Figure 1 shows the relative elevations of the measurements.
    - NHC 3a is on the left bank of the channel. This location appears to be a relatively recently disturbed flood surface. The substrate at this location is fine to coarse sand with some gravel, and vegetation is sparse.
    - NHC 3b is in the secondary channel bed. The substrate at this location consists of coarse sand and gravel with some boulders, and vegetation is nearly absent.
    - NHC 3c is on a terrace along the right bank of the channel. The substrate at this location consists of mostly fine sand, and vegetation includes shrubs and grass cover.

Methodology

A constant head permeameter (CHP) designed by the Natural Resources Conservation Service was used to measure percolation (Figures 2 and 3) in the surface layer of the soils. The CHP was inserted into the ground with a 1-inch diameter bore hole about 6-inches deep. As water begins flowing by gravity from the CHP into the bore hole and percolates down into the soil air bubbles replace the fluid volume in the CHP reservoir. Measurements were made only after the soil around the bore hole was sufficiently saturated and the percolation reached a steady state. Water levels in the CHP reservoir were read at every minute for at least 7 consecutive minutes to confirm a steady state percolation rate. The percolation rate was then converted to units of feet per day for consistency with the Geoscience infiltrometer measurements.

Results

The results of the NHC and Geoscience measurements are shown in Figure 1. While the approximate locations of the Geoscience measurements are known, specific information on the geomorphic surfaces represented by the measurements is unavailable. The results from the NHC tests indicate that percolation rates are higher in areas that are more frequently inundated with flowing water from Plunge Creek (i.e. more disturbance, coarse substrate, and sparse vegetative cover).

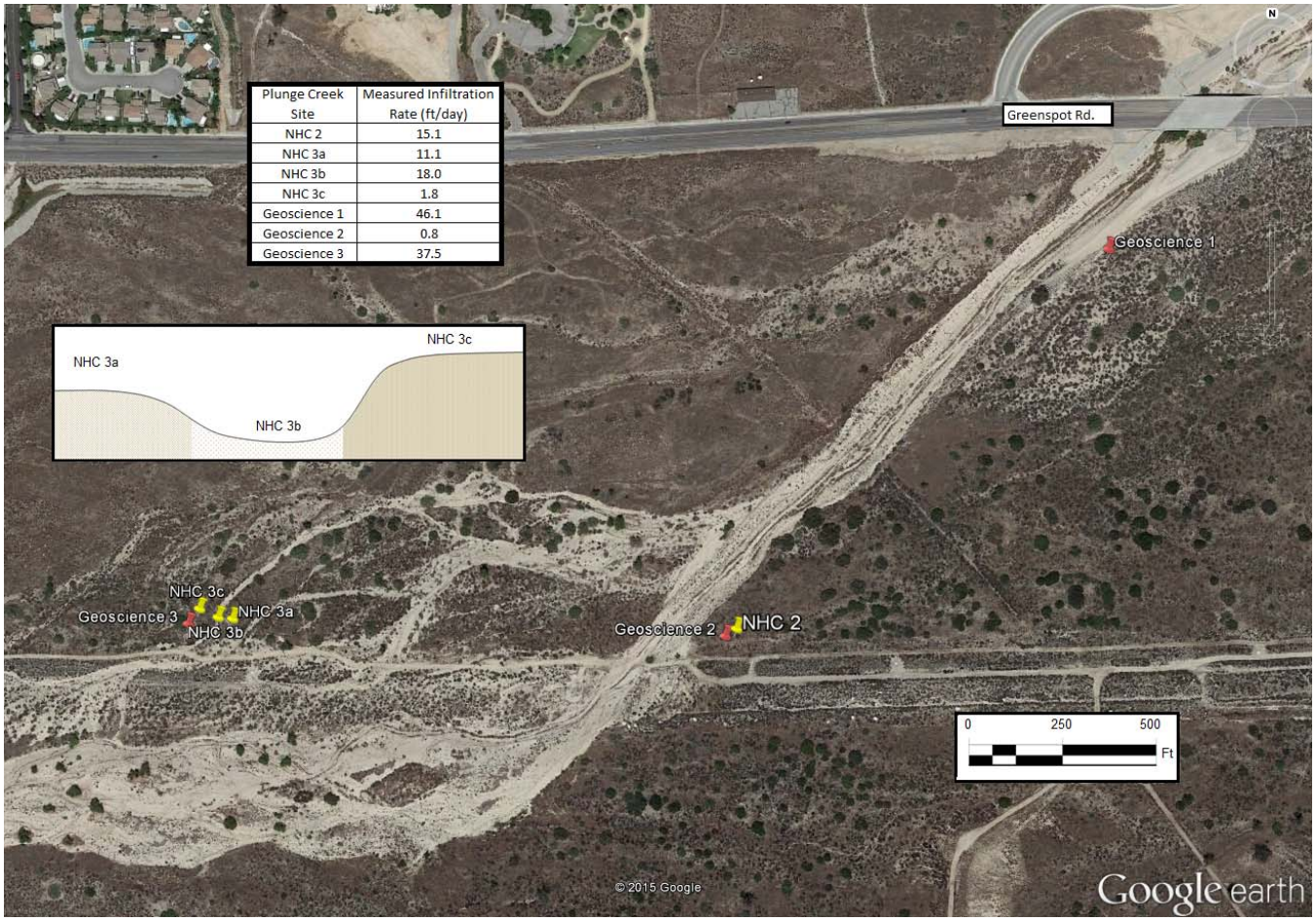

Figure 1. Location map and table of percolation measurements

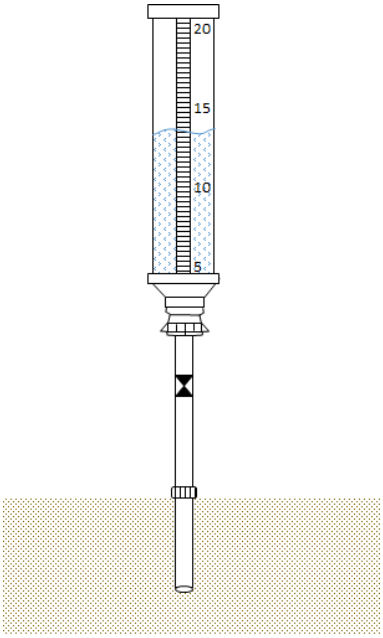

Figure 2. Schematic of Constant Head Permeameter

Figure 3. NHC and SBVWCD personnel preparing Constant Head Permeameter for percolation measurement