TO: Las Colinas Road Site, Livermore Case File

FROM: Yan A. Nusinovich, P.E.
Water Resource Control Engineer
Enforcement Section

DATE: April 11, 2017

SUBJECT: **Wetland Loss Area Calculations for Assessor Parcel Numbers 902-0008-005-05 and 902-0008-005-09, Las Colinas Road, Livermore, Alameda County**

This memorandum documents my calculation of the reduction in wetland area from 2006 to 2016 at the subject properties (Site) due to the placement of fill. The calculation is based on wetland delineations conducted at the Site by LSA Associates, Inc. on December 5, 2006 (2006 Delineation), and on February 11, 2016 (2016 Delineation). There were approximately 0.6 acres of wetlands filled at the Site between the 2006 delineation and the 2016 delineation, which fill we allege is the result of earthmoving activities that Dr. Timothy (T.W.) Starkweather conducted between June 9, 2014, and June 7, 2015. See the Water Board's attached August 5, 2016, Notice of Violation for details.

Background on Delineations and Maps

I used Google Earth Pro to superimpose the following sets of maps:

1. Figure 1:
    a. Google Earth Pro satellite imagery of the Site from June 9, 2014 (2014 Satellite Map)
    b. LSA Associates, Inc., December 5, 2006, wetland delineation of the Site (2006 Delineation)
2. Figure 2:
    a. Google Earth Pro satellite imagery of the Site from June 7, 2015 (2015 Satellite Map)
    b. LSA Associates, Inc., February 11, 2016, wetland delineation of the Site (2016 Delineation)

Figure 1 and Figure 2 show the locations of the 2006 Delineation and the 2016 Delineation based on how they match the site features in the 2014 Satellite Map and the 2015 Satellite Map, respectively. After determining their locations, I superimposed the 2006 Delineation and the 2016 Delineation on the 2015 Satellite Map. See Figure 3.

Loss Area Calculations

Figure 4 shows the eight areas of wetland loss on the 2015 Satellite Map, numbered one to eight from West to East. According to the Google Earth Pro area calculator, these are the approximate acres of the wetland areas that were present in 2006 but not 2016:

Area	1	2	3	4	5	6	7	8	Total
Acres	0.02	0.06	0.03	0.17	0.09	0.03	0.02	0.17	0.59

Figure 1: 2014 Satellite Map and 2006 Delineation

Figure 2: 2015 Satellite Map and 2016 Delineation

Figure 3: 2015 Satellite Map with 2016 Delineation, 2006 Delineation, and Wetland Loss Areas
Loss areas are wetlands in the 2006 Delineation but not in the 2016 Delineation. They are marked in red.

Figure 4: 2015 Satellite Map with Numbered Wetland Loss Areas