

## Appendix C

# Geographic Information System Base Map for the Greater Monterey County Planning Area

### Introduction

The purpose of this report is to summarize the efforts of the Central Coast Wetlands Group in assembling a GIS basemap and geodatabase that incorporates layers for hydrogeologic conditions, wetland habitats, critical and impaired habitats, land use, impervious surfaces, storm drain systems and other metrics that may be relevant for evaluating storm water capture and reuse projects. Approximately 90 different geospatial layers were initially assembled and assessed for their relevance to this study. Of these, we have chosen to include 70 layers that will be useful in modeling exercises that generate maps of priority infiltration and recharge opportunity areas, urban bio-retention areas, floodplain and open space enhancement areas, and disadvantaged community (DAC) project opportunity areas. With a few exceptions noted below, most of these layers exist within the public domain and are accessible through various online sources. Nearly all of the layers have been clipped to cover only the SWRP planning area, including the Salinas, Gabilan, Moro Cojo, and Elkhorn watersheds. ArcGIS Desktop v10.5 was used to assemble, clip, and manage all geospatial data and associated tables.

The geodatabase is more than 1 gigabyte in size and can be accessed at:

[https://drive.google.com/file/d/0BzmCv86D\\_4l4ZlhYeXYwMUFQZ3M/view](https://drive.google.com/file/d/0BzmCv86D_4l4ZlhYeXYwMUFQZ3M/view)

The geodatabase is frequently updated, so if there are any problems with access, please contact Kevin O'Connor of the Central Coast Wetlands Group (koconnor@mlml.calstate.edu).

### Description of Layers

The layers included in the geodatabase are grouped under the themes listed and described below, each of which corresponds to a feature dataset of the same, or similar, name. Feature datasets may only contain features classes and tables, while any raster datasets (e.g. NLCD land cover datasets) are saved under the root geodatabase directory. Refer to Table 1 for more information regarding each feature class or raster layer.

1. Points- Wells/dams/CRAM: This category includes individual point layers, such as features in the National Hydrography Dataset (NHD), USGS stream gauges, National Inventory of Dams (NID), and all CRAM sites visited within the study area since 2005.
2. Stream/Wetlands: With the exception of the USFWS National Wetlands Inventory (NWI) wetlands polygon layer (used for both current and historic wetland habitats), this category includes multiple layers from the NHDPlus Version 2 dataset, a geospatial, hydrologic framework dataset provided by the US EPA Office of Water with cooperation from USGS. NHD Plus is considered a medium resolution dataset which incorporates a 1:100,000-scale stream network. This differs from the NHD High dataset (also included) which incorporates a 1:24,000-scale

stream network. NHD Plus provides an abundance of associated data, known as “value-added” geospatial attributes (VAA’s) that can be linked to the NHD Plus stream network for supplemental information. We have joined additional tables to the NHD Plus stream layer to include attributes such as Strahler stream order (attribute column heading “StreamOrd”) and Vogel Flow (attribute column heading “MAFLOWV”). Vogel flow represents the mean annual flow (cfs) at the bottom of each flowline based on the Vogel method (Vogel et al., 1999).

3. SSURGO Soils: These data come from the Soil Survey Geographic Database (SSURGO) provided by the USDA Natural Resources Conservation Service. The geodatabase contains layers that represent the hydrologic groups of soils (e.g. well drained vs. poorly drained) as well as a layer that contains erodibility of soils, also known as the K-factor. A higher K-factor indicates a higher potential for erosion.
4. Geology: A comprehensive geologic layer that covers the entire Monterey County (Geology\_Monterey\_County) is derived from a compilation of published geologic maps and reports (noted in the attribute table). Also included is the Wagner et al. (2002) digital geologic database that covers the Monterey Bay region and northern Monterey County only. This database includes faults which can act as barriers to groundwater flow.
5. Conservation / Military Lands: The California Protected Areas Database (CPAD) provides two sets of conservation layers; the 2016 easements and 2017 fee-owned lands. CPAD includes national, state, and regional parks, forests, preserves, and wildlife areas as well as urban parks, open spaces, and land trusts. Additionally, we include a military layer that shows the jurisdictional boundaries of Fort Hunter Liggett and Camp Roberts.
6. Land Use: Several land use datasets are provided. CCAP Land Cover 2010 represents the latest layer of NOAA’s Coastal Change Analysis Program. CCOWS 2005 represents a local land cover dataset created by CSUMB’s Central Coast Watershed Studies group. Also included are the National Land Cover Dataset (NLCD) 2011, the NLCD Impervious layer, and NLCD Tree Canopy layer. Lastly, the Farmland Mapping and Monitoring Program (FMMP) provides land cover datasets for both Monterey and San Benito counties (2014).
7. Groundwater: Two layers are included from the USGS Groundwater Vulnerability Assessment (GWAVA) model that predicts contamination of groundwater, both shallow and deep, by nonpoint sources of nitrate. Additionally, we have included layers representing groundwater well depths from the California Statewide Groundwater Elevation Monitoring Program (CASGEM). Unable to find any groundwater level data in either contour or raster formats for the Salinas Valley, we performed a Spline interpolation from the groundwater wells point dataset. The resulting raster (GW\_DBGS\_Spl05\_CASGEM) values represent depth below ground surface. Also included here is a layer showing the groundwater basin Detailed Analysis Units (DAUs) for the Salinas Valley.
8. Critical Habitat: The ‘SCCC\_Steelhead\_CH\_06\_2005’ polyline layer represents streams designated for Steelhead Critical Habitat as well as habitat type and quality in the South-central California Coast Evolutionary Significant Unit (ESU). ‘CRITHAB\_poly\_Salinas’ polygon layer comes from USFWS and represents critical habitat for threatened and endangered species within the study area. The California Natural Diversity Database (‘CNDDDB\_2017’) layer, however, contains

significantly more records of threatened species in the study area than the USFWS layer. Lastly, 'MPAs\_Elkhorn\_160301' delineates the MPA boundaries in the Elkhorn Slough.

9. Impaired Habitat: The '303(d) Listed Impaired Waters\_2015' layer, issued by the EPA in 2015, lists all of the state's impaired and threatened waters. Included here is a polyline and polygon dataset clipped to the study area that contain all of the attributes to describe the impairments and threats.
10. Census - DAC: Based on the 2010 Census blocks, this layer was created to represent disadvantaged communities within the study area. The attribute column "HD01\_VD011 represents the median household income in the past 12 months (in 2014 Inflation-adjusted dollars).
11. Rain 1980-2010: Precipitation data averaged in the time period 1980 - 2010 is represented by the layer 'PPT\_1981\_2010\_avg\_BCM' which comes from the 2014 California Basin Characterization Model (BCM). Raster values represent total annual precipitation (mm).
12. DEMS: The 10 meter resolution National Elevation Dataset (NED) is provided here as well as a reclassified slope raster that includes 4 categories of slope (0.5%, 1%, 2%, and 5%) for identifying low slope areas for groundwater infiltration.
13. Boundaries - Watershed - IRWM: This category of layers includes the IRWM boundary as well as the HUC 8, HUC 10, and HUC 12 watershed boundaries provided by the NHD dataset. The NHD dataset includes "catchments" which are basically sub-watersheds that contribute to individual stream reaches in the NHD Plus dataset. We have also included a custom watershed boundary dataset, created by the Elkhorn Slough National Estuarine Research Reserve that was derived from 3 meter and 10 meter DEMs which provides significantly greater resolution than the NHD watershed boundaries.
14. City Salinas Layers: Upon request, a geodatabase containing 9 feature classes was provided to us by the City of Salinas. All layers are limited to the city limits and include catch basins, manholes, outfalls, pump stations, watershed flowlines, storm water gravity mains, waterbodies, storm water detention areas, and subwatersheds.
15. County - AMBAG Layers: AMBAG has provided layers associated with planned and existing bicycle routes for Monterey County and the City of Salinas. All other Monterey County data was downloaded from the county GIS website. These layers include drainage reports, catch basins and culverts, rainfall, flood hazard areas, important farmlands, storm drains, and groundwater recharge areas.

## Summary

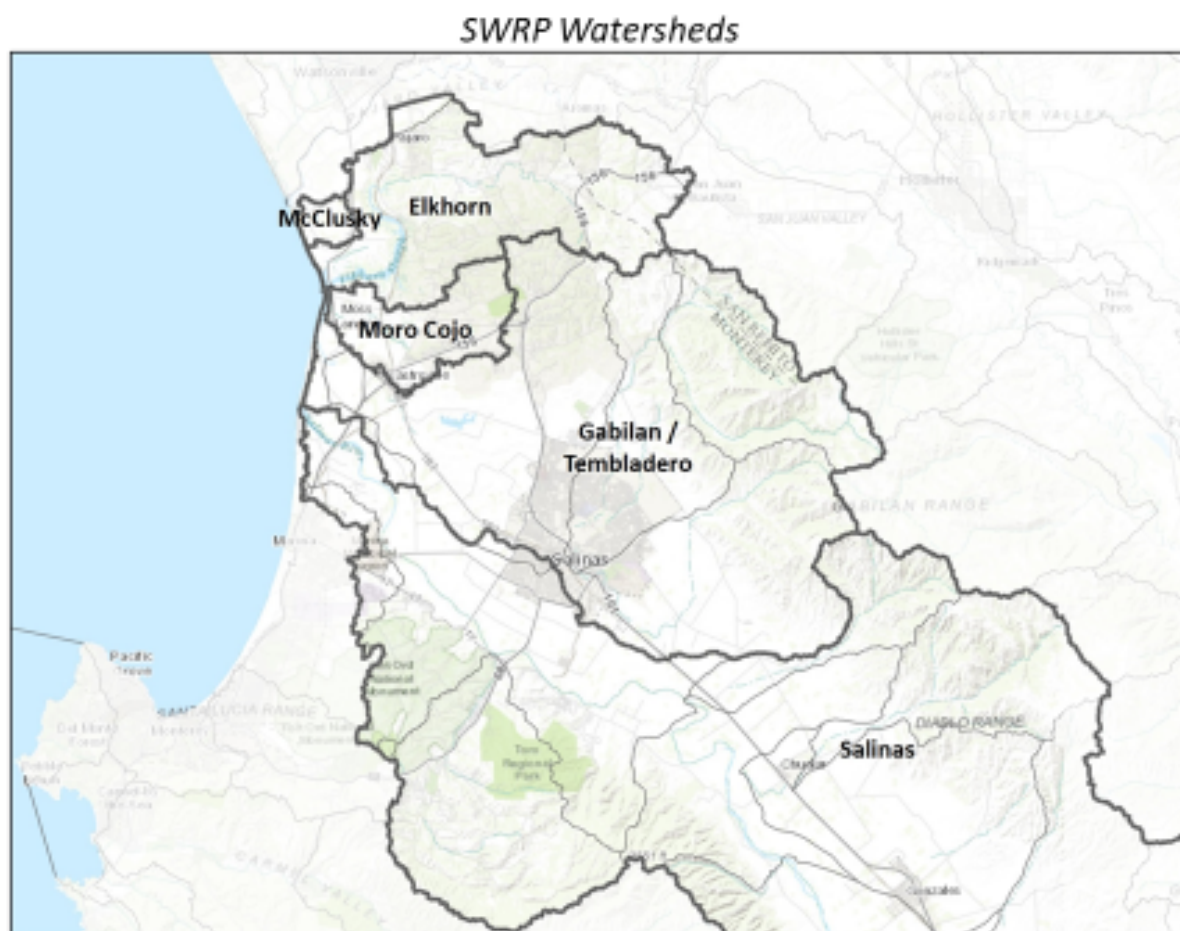
The GIS geodatabase layers presented here are currently being used to identify opportunity areas where storm water management efforts may be targeted to achieve program goals, such as improved water quality, water supply, flood management, habitat restoration and community benefits. We plan to continually update the geodatabase by adding any new layers acquired or created that will assist in our identification process of opportunity areas. At this time, GIS data that are of specific interest for acquisition include city layers for Gonzales, Soledad, and King City where catch basins and culverts may be used to evaluate potential groundwater recharge areas. Since most of the layers in the geodatabase

are derived from city, county, state, or federal agencies, they were generated with a high degree of quality assurance and control. Metadata for each layer, when available, is included in the geodatabase, or the URL link may be used to acquire more information (refer to Table 1).

### **Maps with Examples of Layers for Storm Water Management Analysis**

The following maps (Figures 1 – 10) are graphical representations of information contained in the project geodatabase, which is used to identify and evaluate opportunities for storm water management projects in the GMC SWRP area.

**Figure 1. Map of watershed delineations in the GMC SWRP planning area.**



**Figure 2. Map of the City of Salinas created with layers for storm drain system, streams, urban roadways and land cover.**

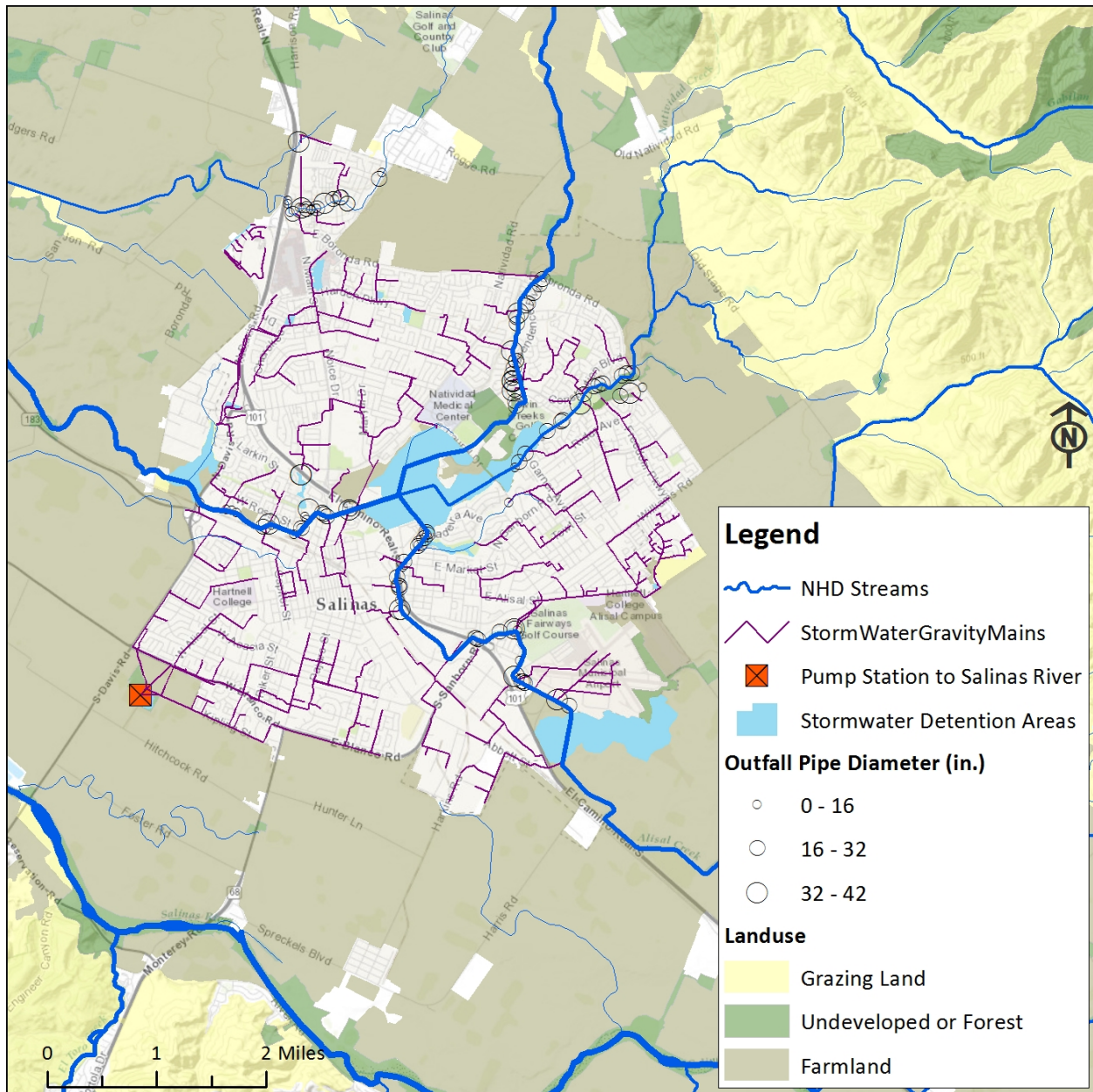




Figure 3. Map of the lower planning area created with layers for streams, riparian buffers, agricultural lands and conservation areas.

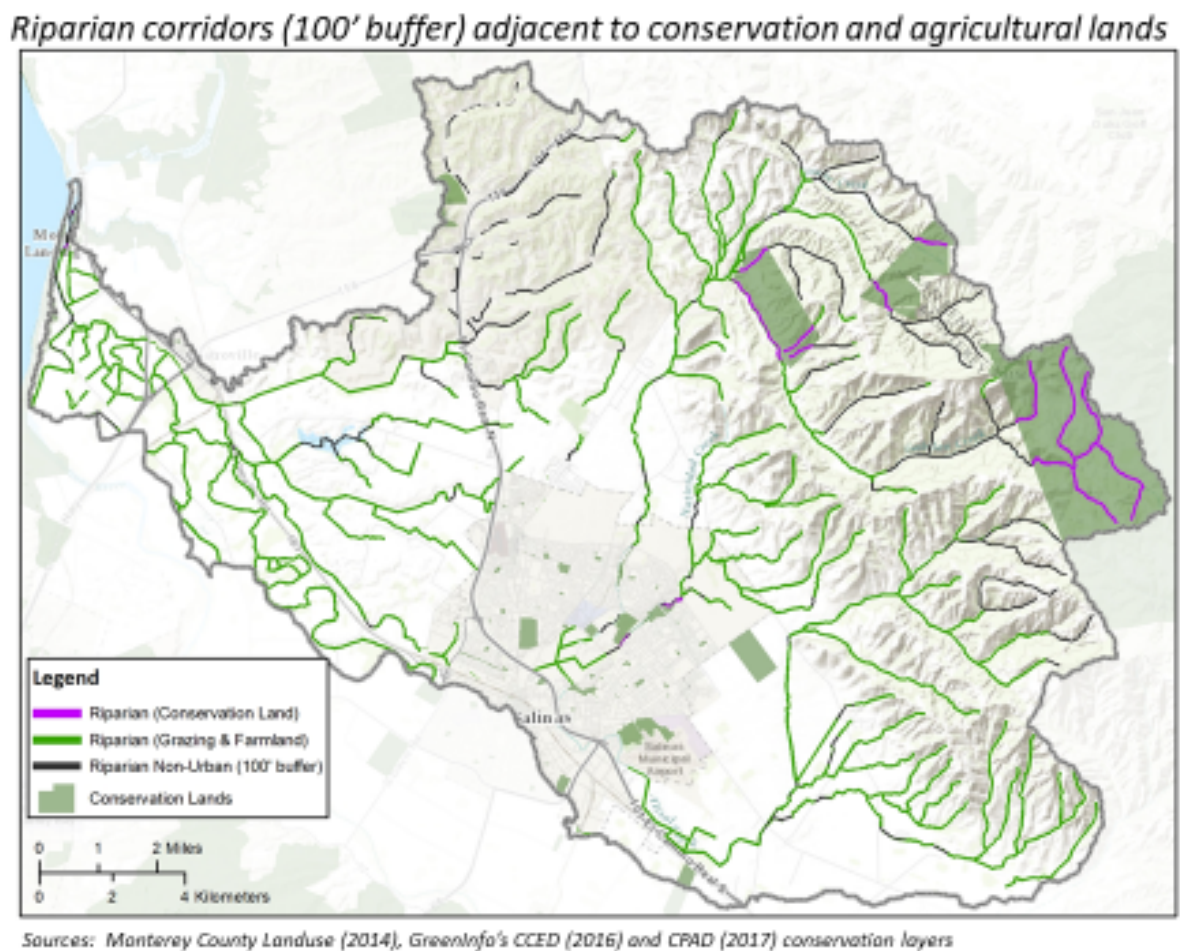


Figure 4. Map of the lower planning area created with layers for well-drained soils potentially suitable for groundwater recharge.

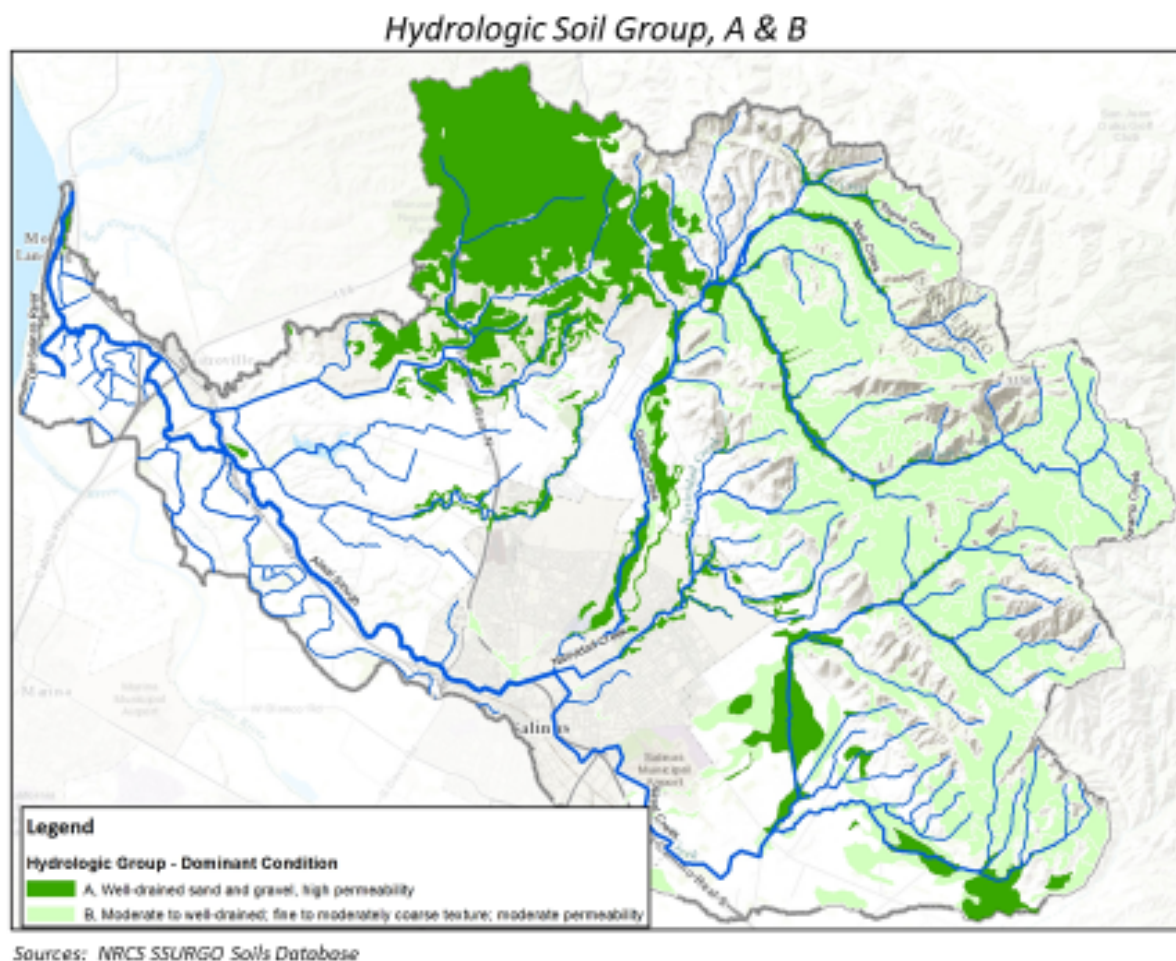
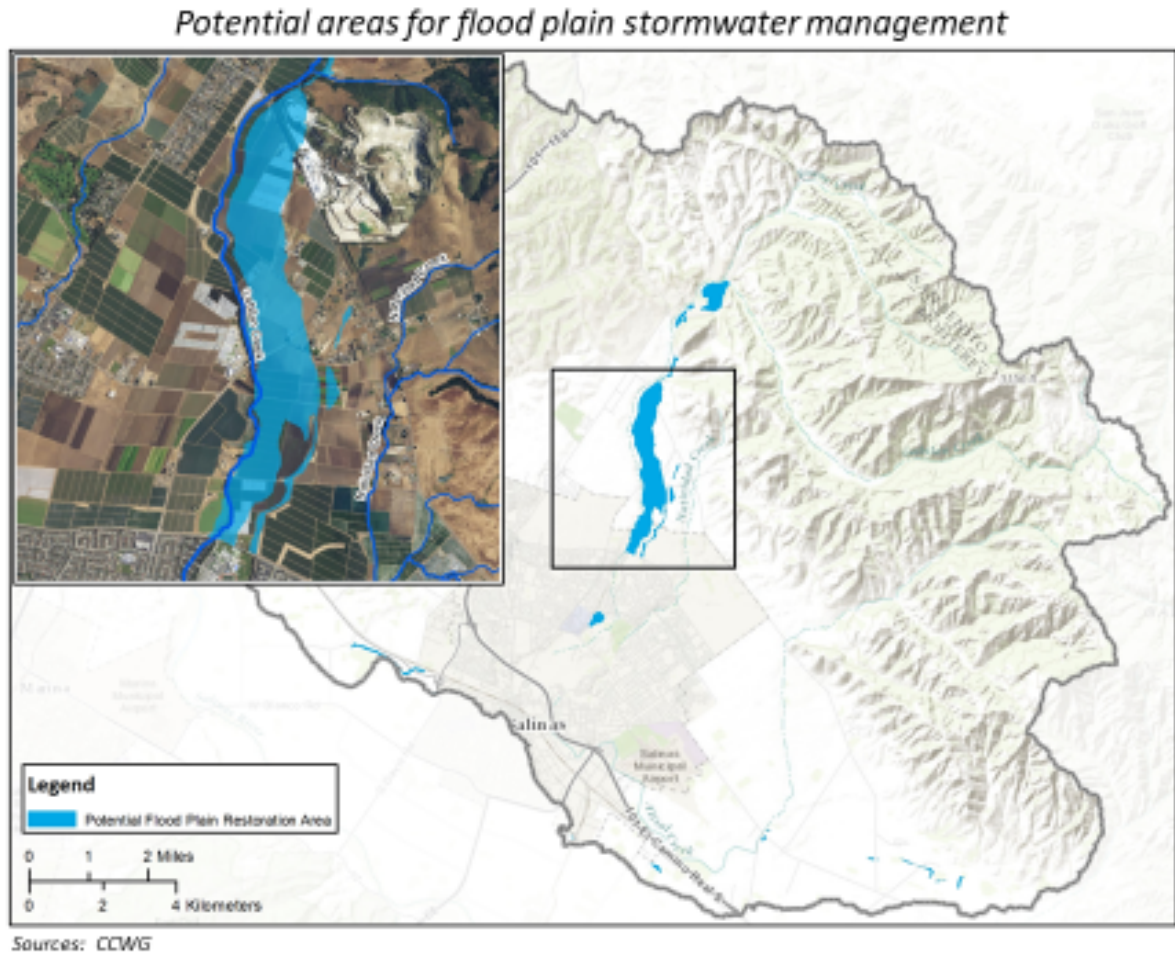
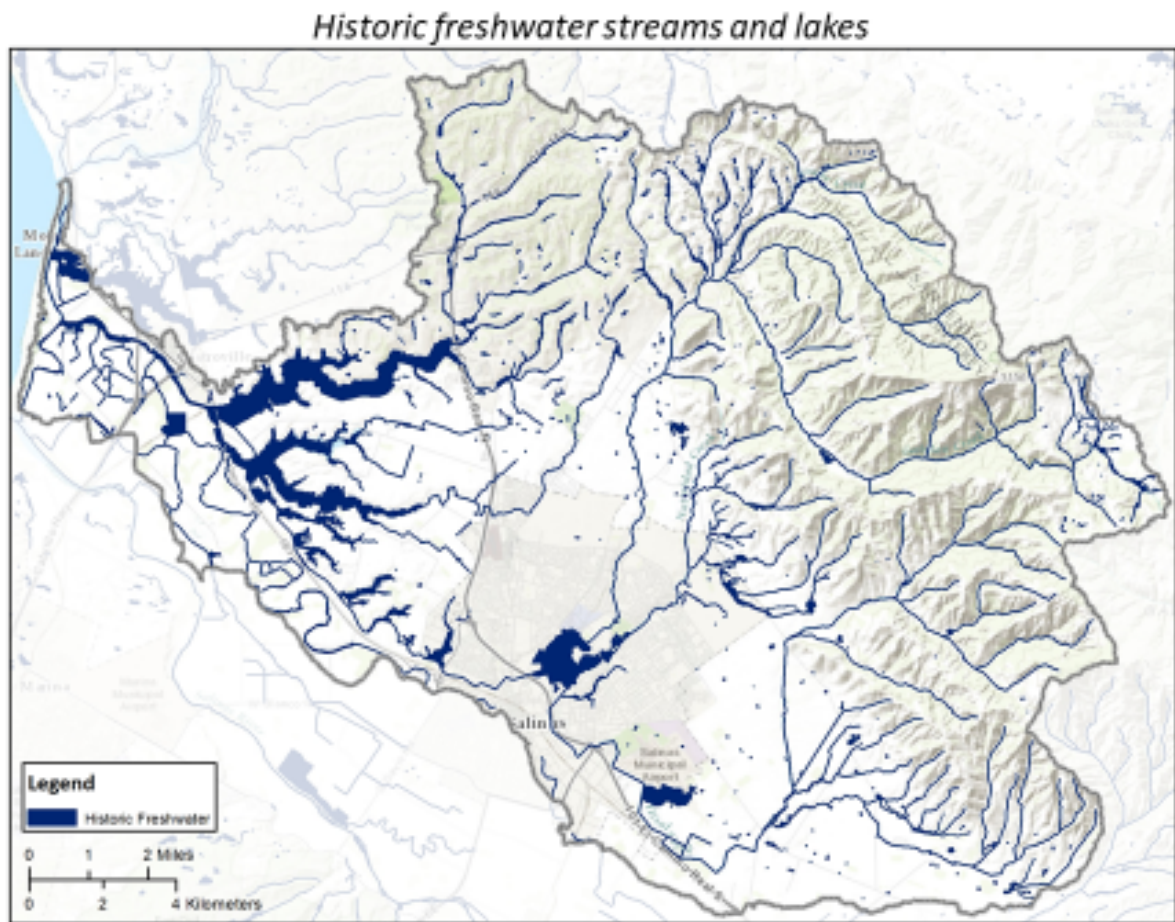




Figure 5. Map of a project opportunity area based on layers for topography, floodplain connectivity, land cover and parcel ownership, with Google Earth image of project area.

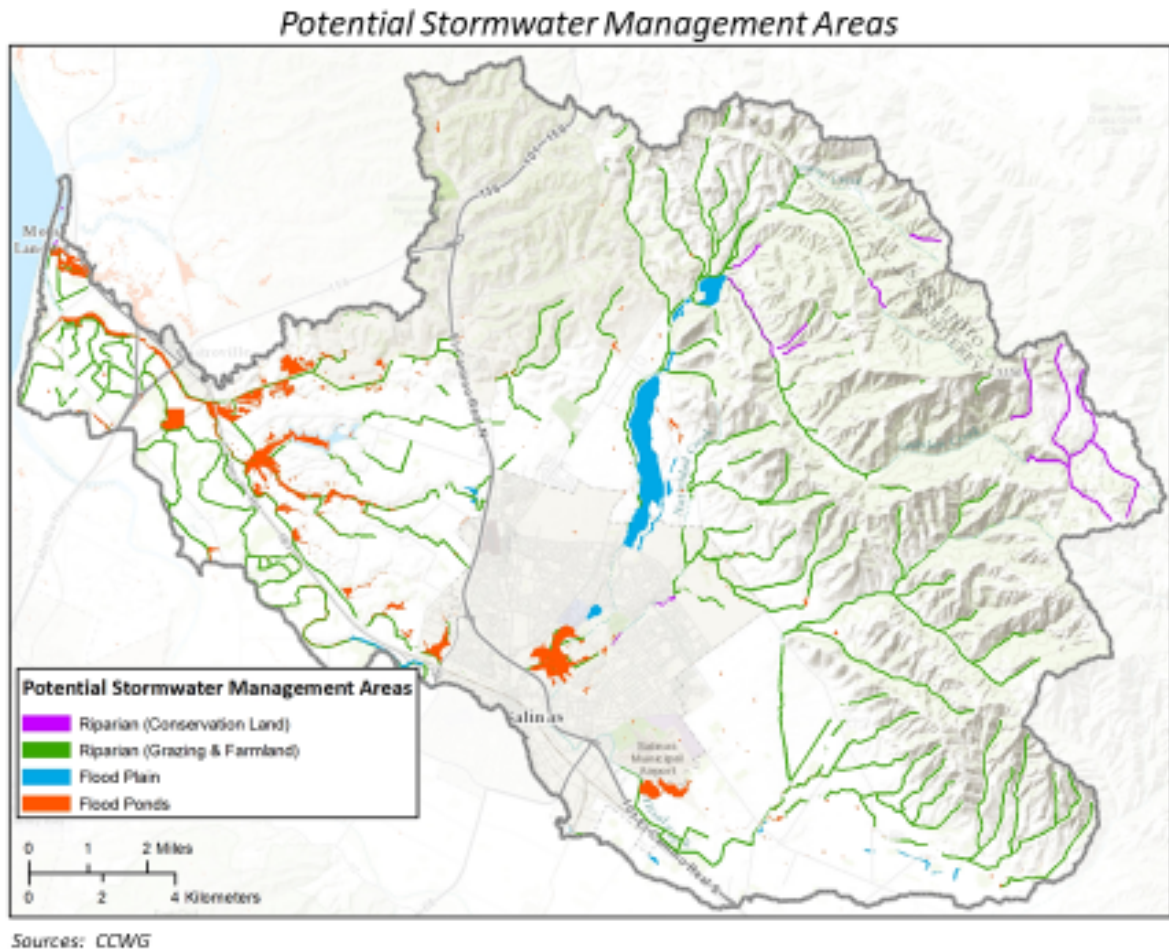


**Figure 6. Map created with layers from historical ecological analyses by the Central Coast Wetlands Group. Pre-development hydrologic features are used to help identify potential storm water storage and treatment areas and opportunities for habitat restoration.**



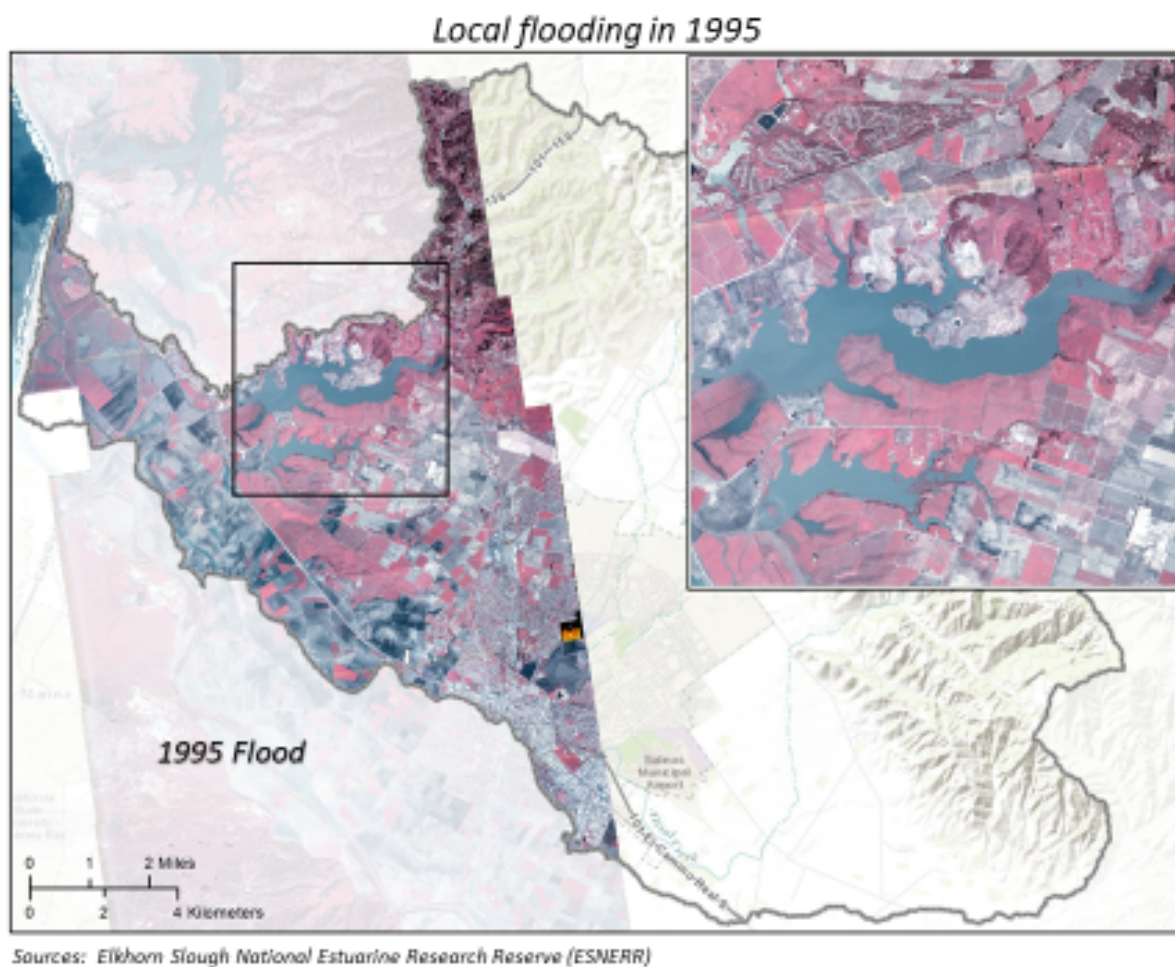
Sources: National Wetlands Inventory (NWI)

**Figure 7. Map showing storm water management opportunity areas based on GIS analysis of topography, flood ponds, land cover and hydrology.**





**Figure 8. Map showing Google Earth (kml file) image of a flood event overlaid on GIS base map topography.**



**Figure 9. Map showing groundwater recharge areas based on analysis of soils, geology, depth to water table and surface topography.**

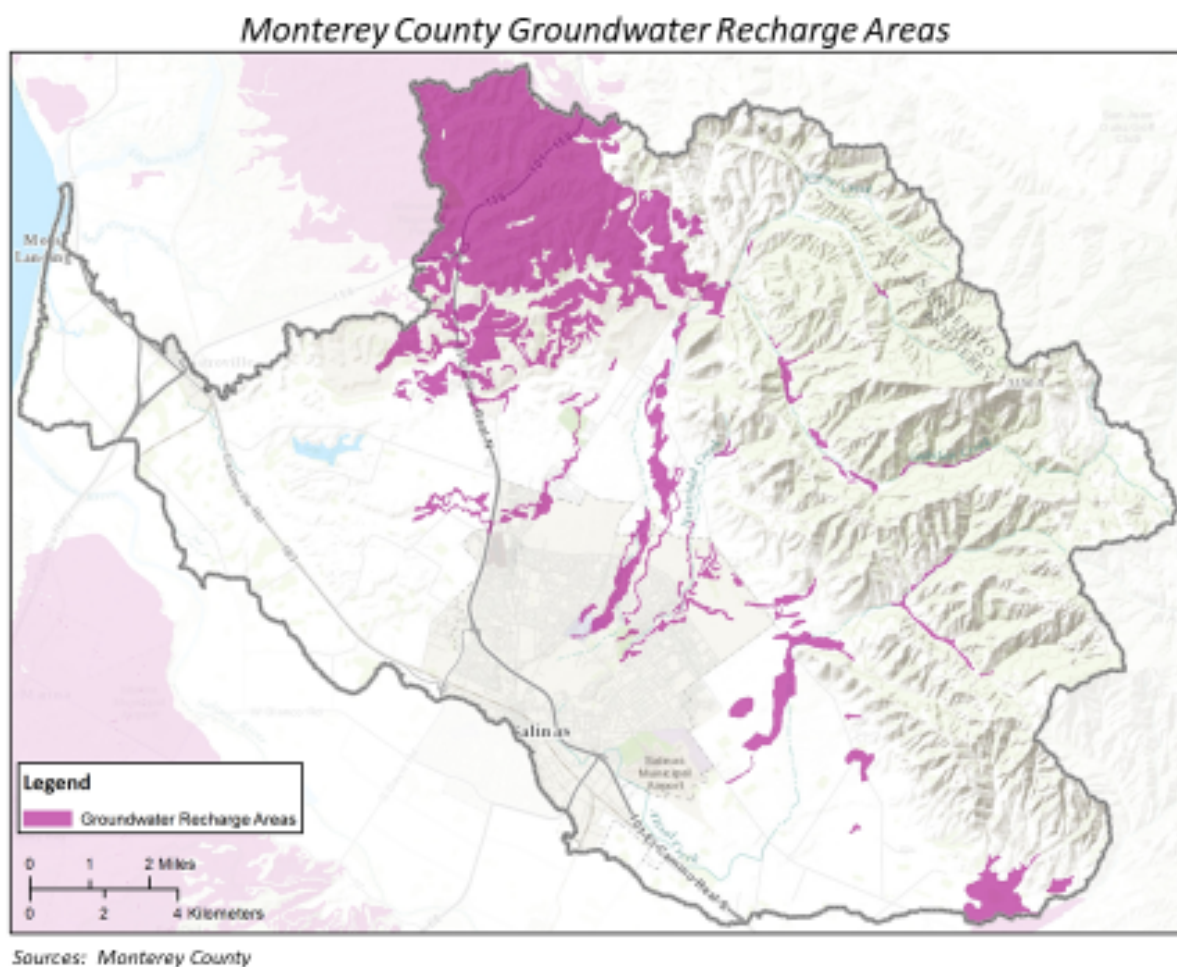
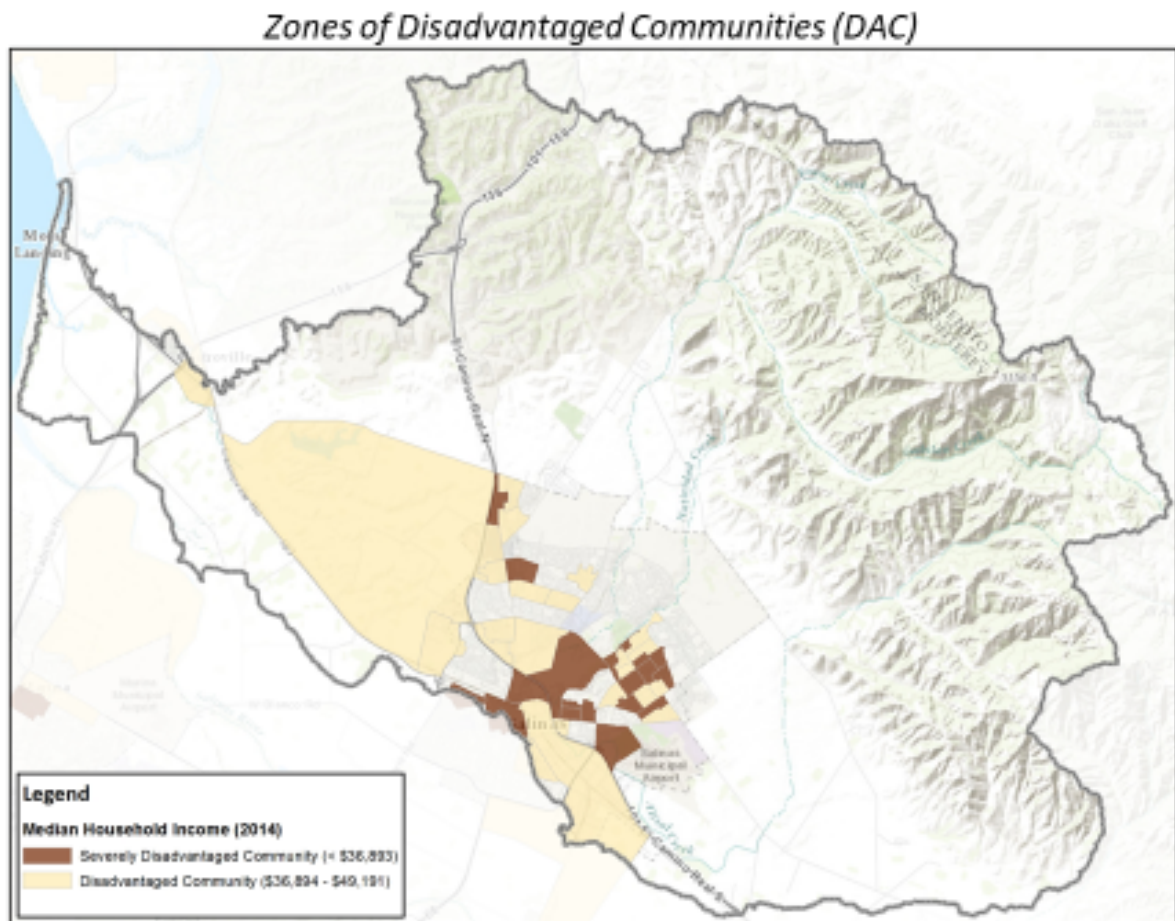




Figure 10. Map showing layers of median household income relative to thresholds for disadvantaged community designation. Additional GIS layers used to analyze community benefits of storm water management projects will include parks and open space per capita, bike and walkway corridors per capita, and real estate values relative to proximity of aquatic habitat.



Sources: U.S. Census (2010)