

# WMA

Santa Ynez River Valley Groundwater Basin  
Western Management Area  
Groundwater Sustainability Agency

# October 2020 HCM Stakeholder Workshop



**DUDEK**

Geosyntec   
consultants

engineers | scientists | innovators

# Housekeeping

- Recording the meeting for the purpose of capturing public feedback
- Recording can be made available upon request
- Opportunities for public feedback and questions throughout the workshop
- Public comments on the HCM should be submitted to the website:

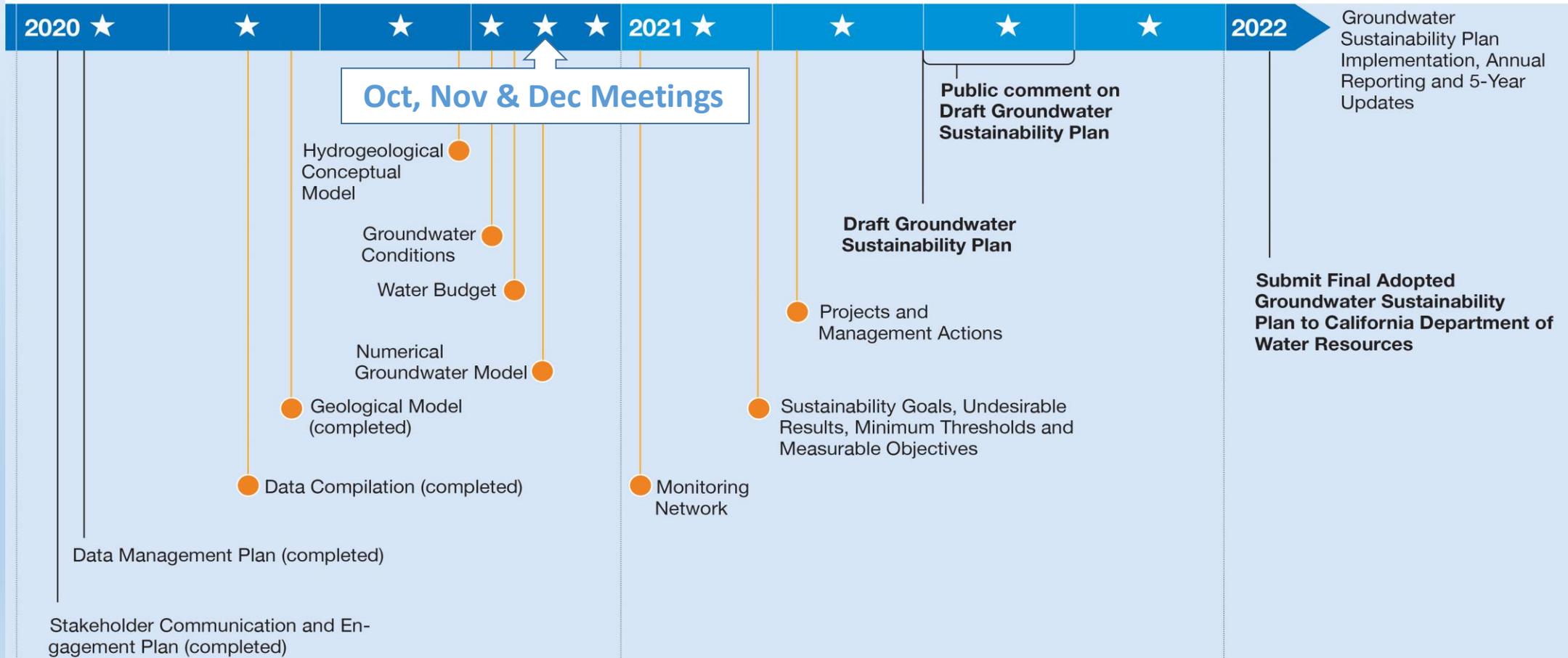


[www.santaynezwater.org](http://www.santaynezwater.org)

# Schedule

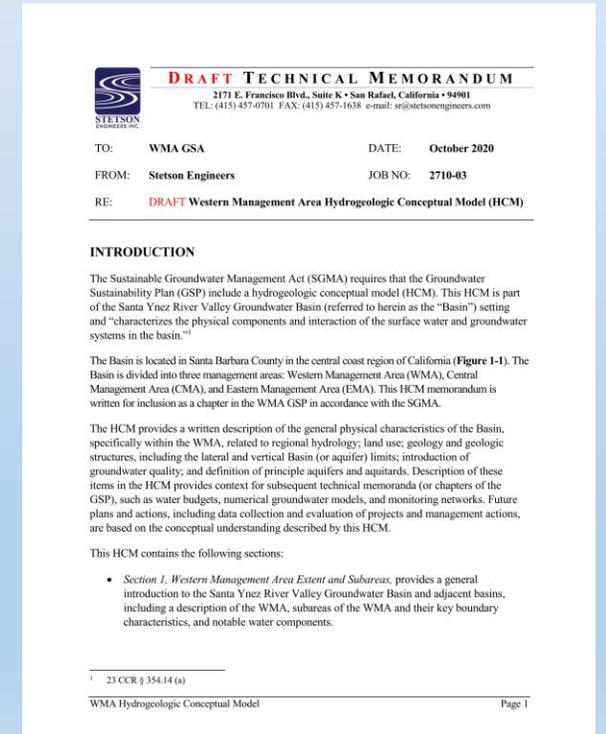
## Groundwater Sustainability Plan Development Milestones

★ Groundwater Sustainability Agency Committee Public Meeting      ● Technical Memorandum



# WMA GSA Special Meeting Agenda

1. Hydrogeological Conceptual Model (HCM) Workshop
  - Document Overview
  - Facilitated Q & A Discussion
2. Path Forward Schedule
  - Additional GSA Special Meetings
  - SkyTEM Flight Update
  - Opportunities for Public Engagement



# HCM Workshop

The BMPs and Guidance Documents inform various steps in the workflow toward increased sustainability.

These steps may be repeated or re-ordered as a basin approaches its sustainability goal.

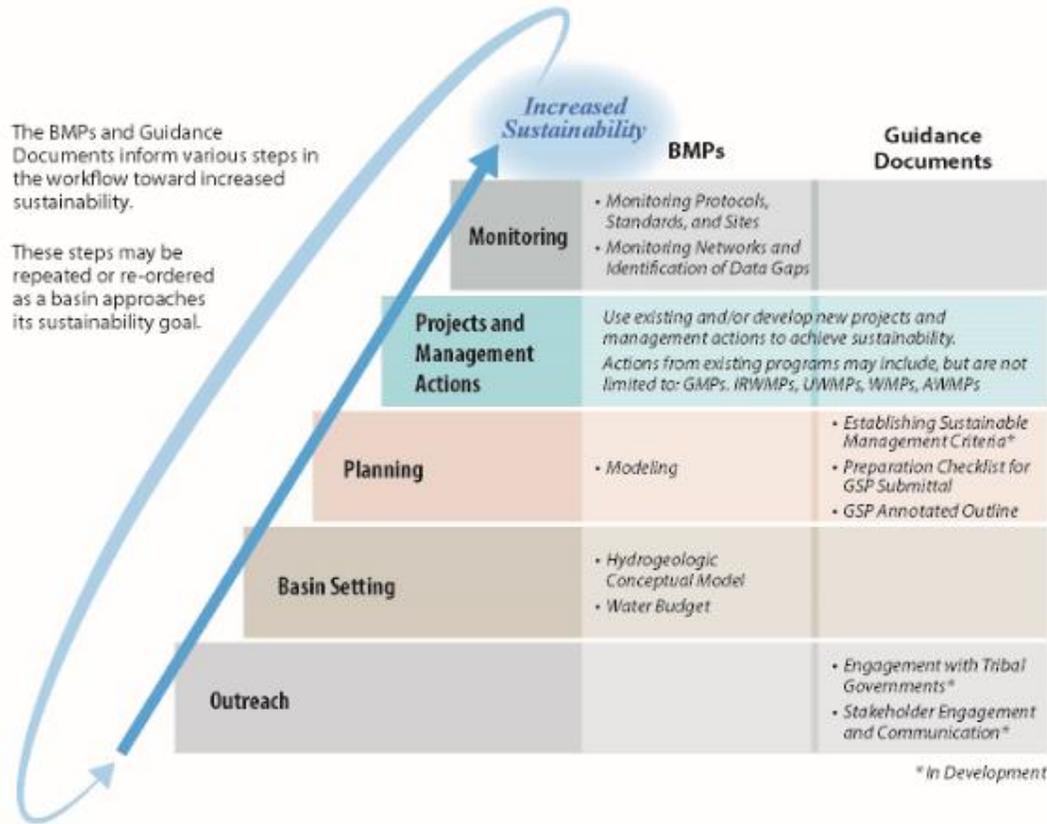


Figure 2. Logical Progression of Basin Activities Needed to Increase Basin Sustainability

## Goals of Meeting

- Understand SGMA regulations and requirements for a compliant HCM
- Understand HCM document chapters and how the requirements are met
- Provide opportunity for public engagement and feedback on the draft HCM

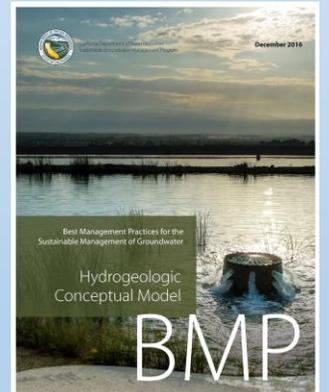
HCM = Hydrogeologic Conceptual Model

# Hydrogeologic Conceptual Model (HCM)

*Describes the conceptual understanding of the general physical characteristics of the groundwater basin. Part of the Regulations "Subarticle 2. Basin Setting" which also includes Groundwater Conditions (§ 354.16), Water Budget (§ 354.18), and Management Areas (§ 354.20) to be addressed in later documents and meetings.*

The Hydrogeological Conceptual Model consists of:

- Written narrative description
- Graphics that clearly portray the geographic and climatic setting, regional geology and structures, groundwater basin geometry, general groundwater water quality, and consumptive water uses in the basin.



**Hyperlink to DWR Guidance Documents:**  
<https://water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents>

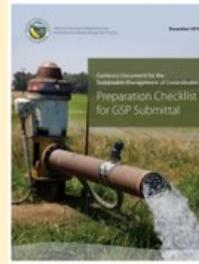
Reference: BMP-3: Hydrogeologic Conceptual Model

# Explanation / Key for subsequent slides

## DWR Checklist Requirements for HCM

### 2.2.1 Hydrogeologic Conceptual Model (Reg. § 354.14)

- Graphical and narrative description of the physical components of the basin
- [Minimum] two scaled cross-sections
- Map(s) of physical characteristics
  - Topographic information
  - Surficial geology
  - Soil characteristics
  - Delineation of existing recharge areas that substantially contribute to the replenishment of the basin, potential recharge areas, and discharge areas
  - Surface water bodies
  - Source and point of delivery for local and imported water supplies



DWR (2016) Groundwater Sustainability  
Guidance Document for the Sustainable

The DWR Checklist is a summary of some key requirements for an HCM, as written in the SGMA regulations

## SGMA Regulations

### § 354.14. Hydrogeologic Conceptual Model

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    - (D) General water quality of the principal aquifers, which may be based on information derived from existing technical studies or regulatory programs.
    - (E) Identification of the primary use or uses of each aquifer, such as domestic.

(d) Physical characteristics of the basin shall be represented on one or more maps that depict the following:

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- (6) The source and point of delivery for imported water supplies.

### § 354.16. Groundwater Conditions

(g) Identification of groundwater dependent ecosystems within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information.

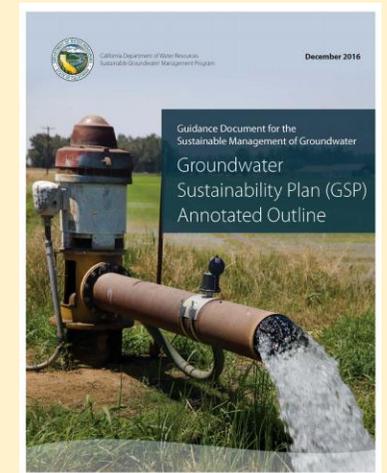
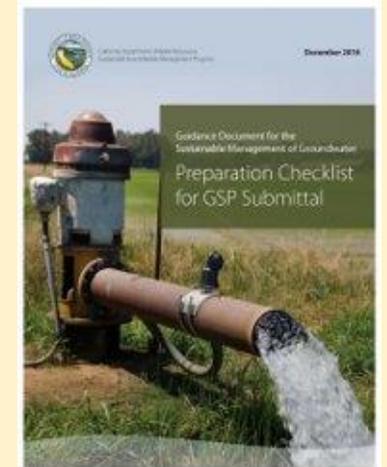
These are the SGMA regulations which describe the full list of requirements for preparing a compliant HCM



# DWR Checklist Requirements for HCM

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# SGMA Regulations

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(5) Identification of data gaps and uncertainty within the hydrogeologic conceptual model

(c) The hydrogeologic conceptual model shall be represented graphically by at least two scaled cross-sections that display the information required by this section and are sufficient to depict major stratigraphic and structural features in the basin.

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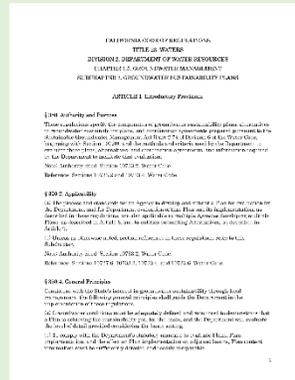
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(g) Identification of groundwater dependent ecosystems within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information.



### Hyperlink to Regulations:

[https://govt.westlaw.com/calregs/Browse/Home/California/CaliforniaCodeofRegulations?guid=I74F39D13C76F497DB40E93C75FC716AA&originationContext=documenttoc&transitionType=Default&contextData=\(sc.Default\)](https://govt.westlaw.com/calregs/Browse/Home/California/CaliforniaCodeofRegulations?guid=I74F39D13C76F497DB40E93C75FC716AA&originationContext=documenttoc&transitionType=Default&contextData=(sc.Default))



*Questions?*

# ***HCM Section 1:***

## *Western Management Area Extent and Subareas*

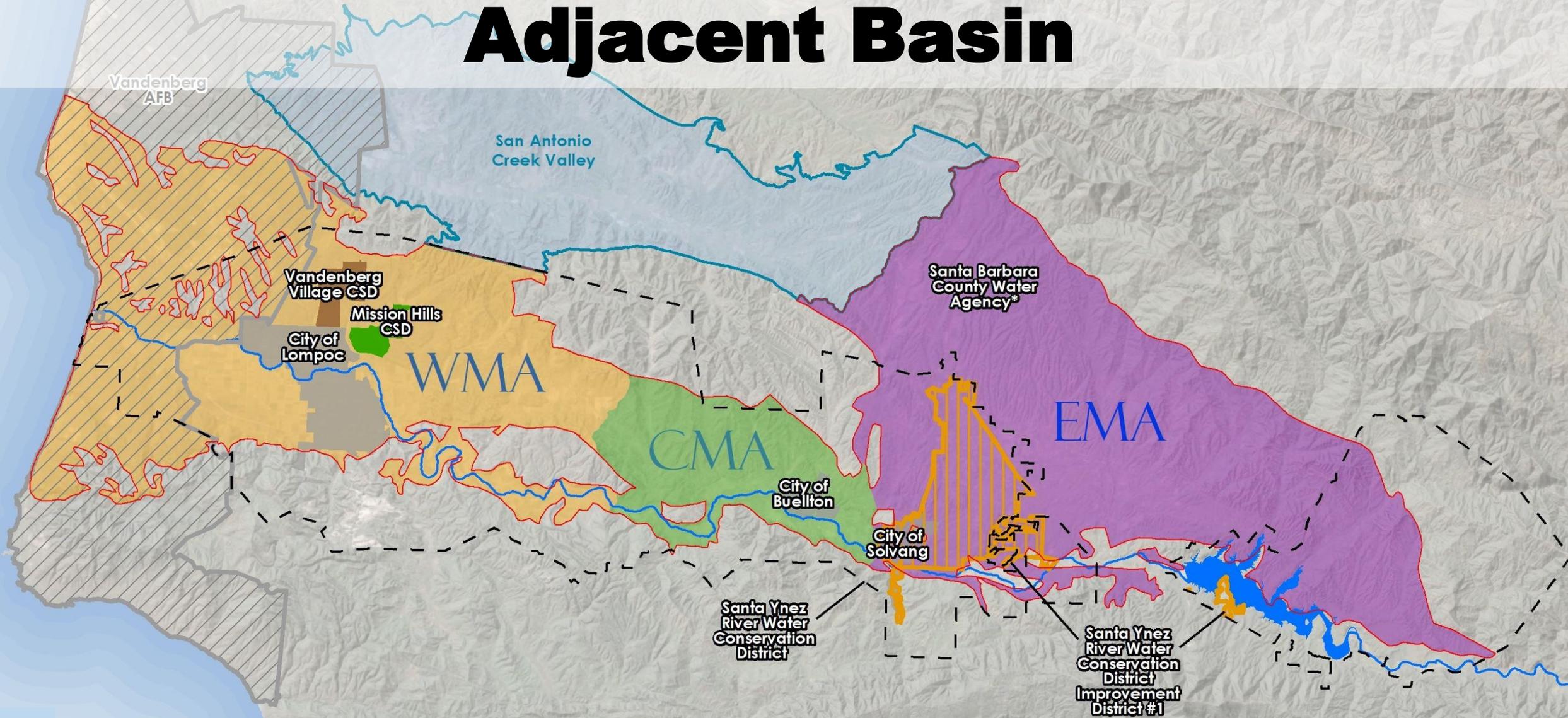
Section provides a general introduction to the Santa Ynez River Valley Groundwater Basin, key Western Management Area (WMA) boundary characteristics, and notable WMA water components.

### **Highlights:**

- Santa Ynez River Valley Groundwater Basin Boundary
- Adjacent Groundwater Basins
- WMA Boundary
- WMA Subareas

**Next two figures were presented and discussed in August 2020 WMA GSA Meeting**

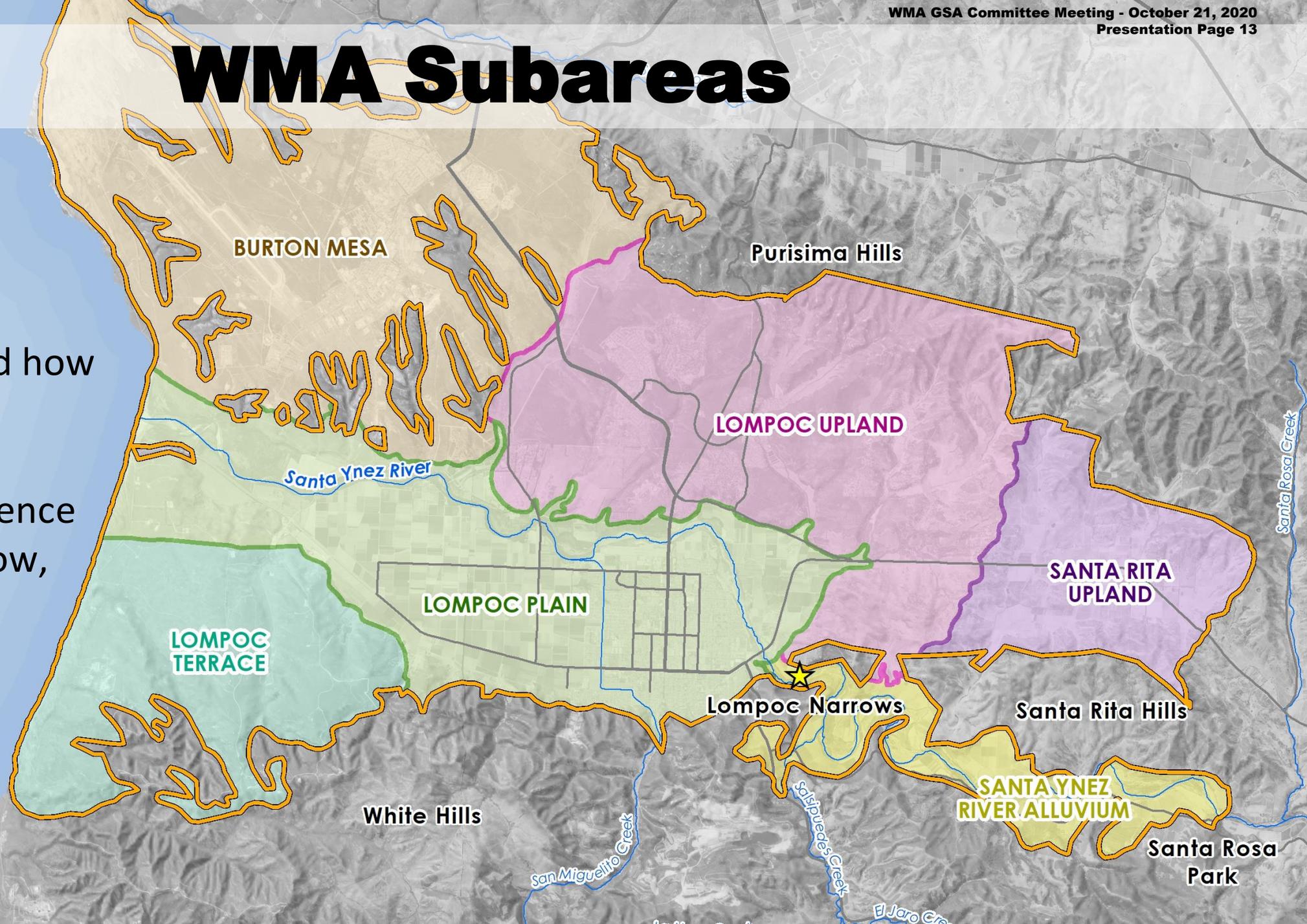
# Basin, Management Areas, & Adjacent Basin



Updated Aug. 2020, includes WMA/CMA/EMA boundary updates.

# WMA Subareas

HCM provides descriptions of the WMA Subareas and how they contribute to groundwater and surface water presence and/or absence, flow, and storage

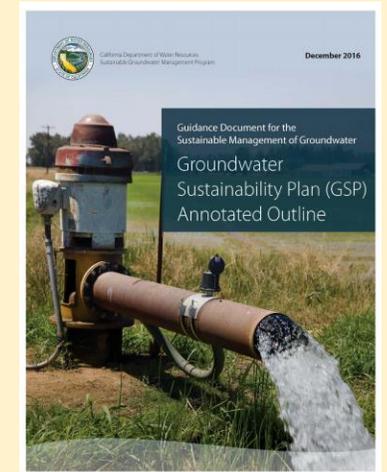
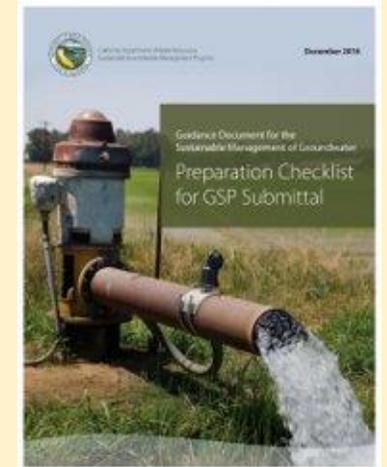


# ***HCM Section 1:*** ***WMA Extent and Subareas***

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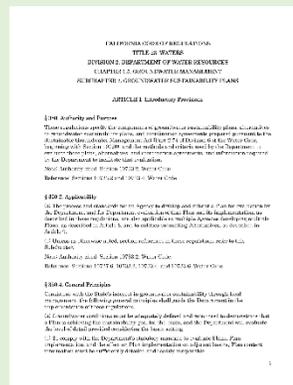
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# ***HCM Section 1:***

## *Western Management Area Extent and Subareas*

*Questions?*

# ***HCM Section 2:*** ***WMA and Adjacent Geology***

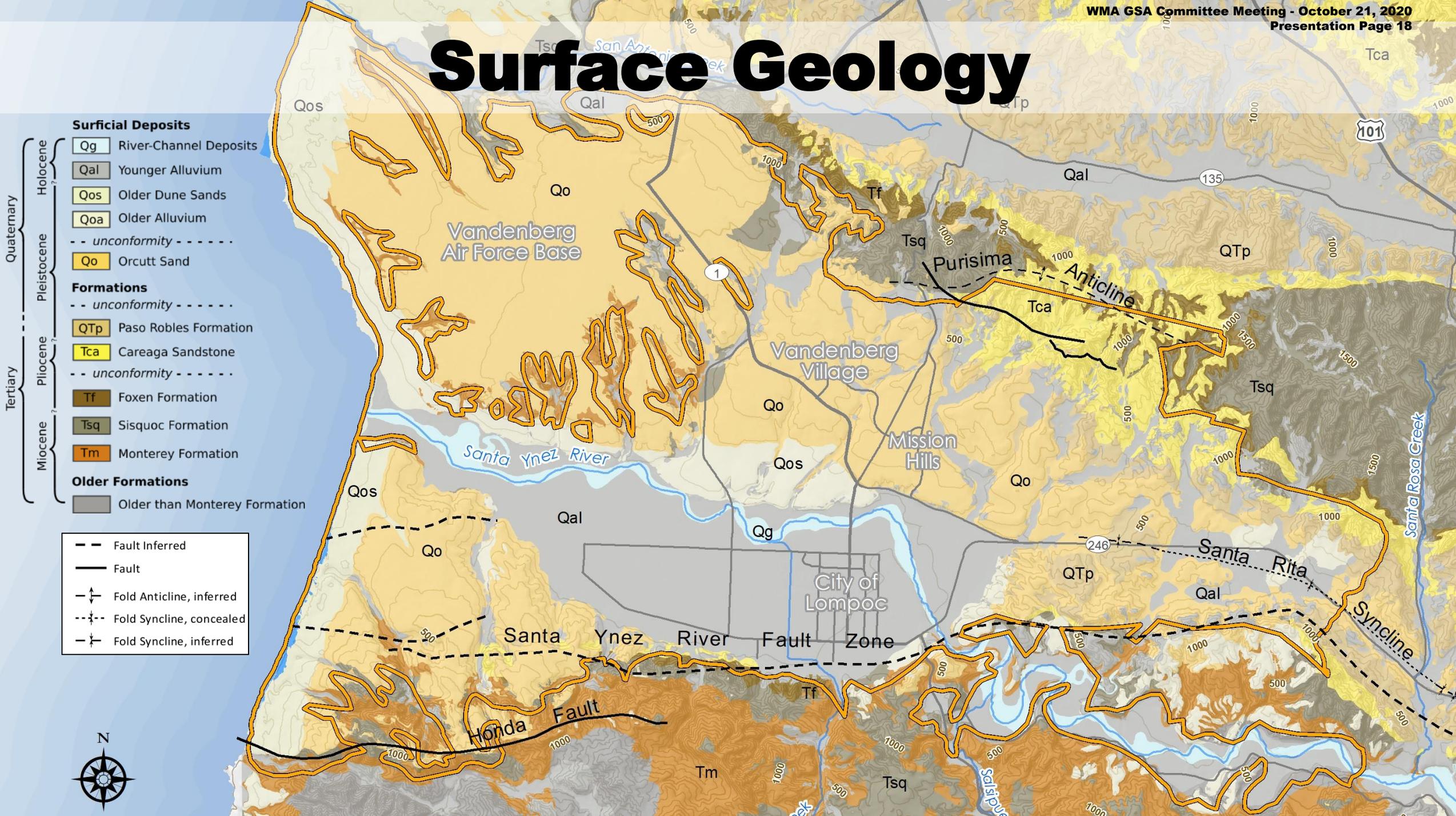
*Section* provides an introduction and overview of the geology of the WMA

## **Highlights:**

- Surface Geology, Geologic Units (three unconformities)
- Geologic History, Geologic Structure (Folds Synclines / Anticlines and Faults)
- Subsurface Geology (3D Geologic Model and Cross Sections)

**Material previously presented at past GSA Meetings**

# Surface Geology

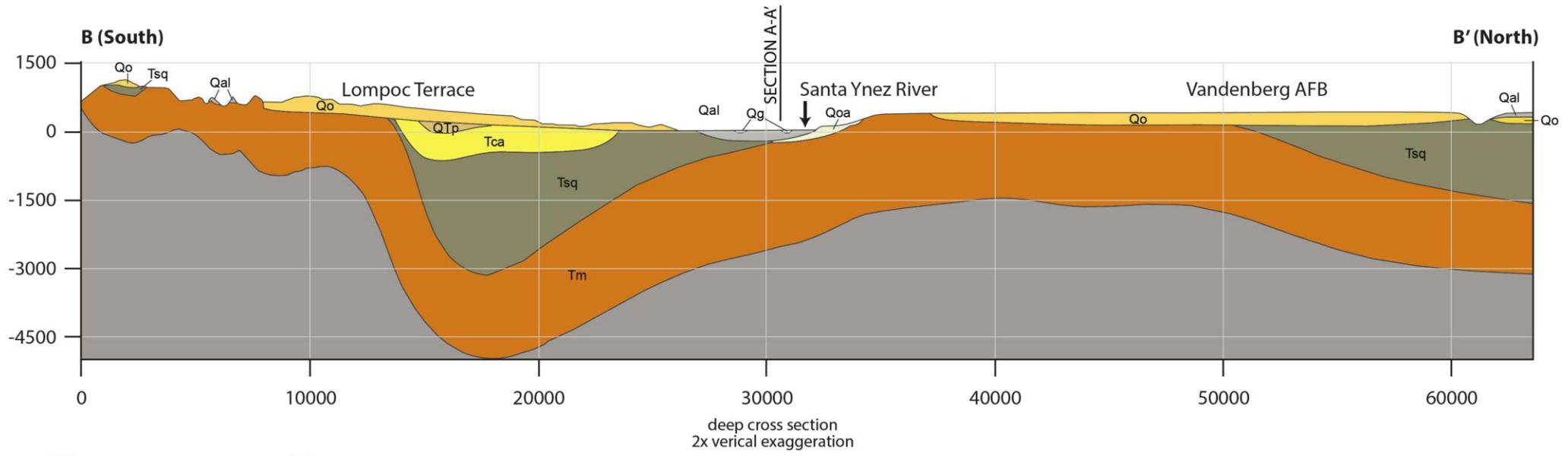
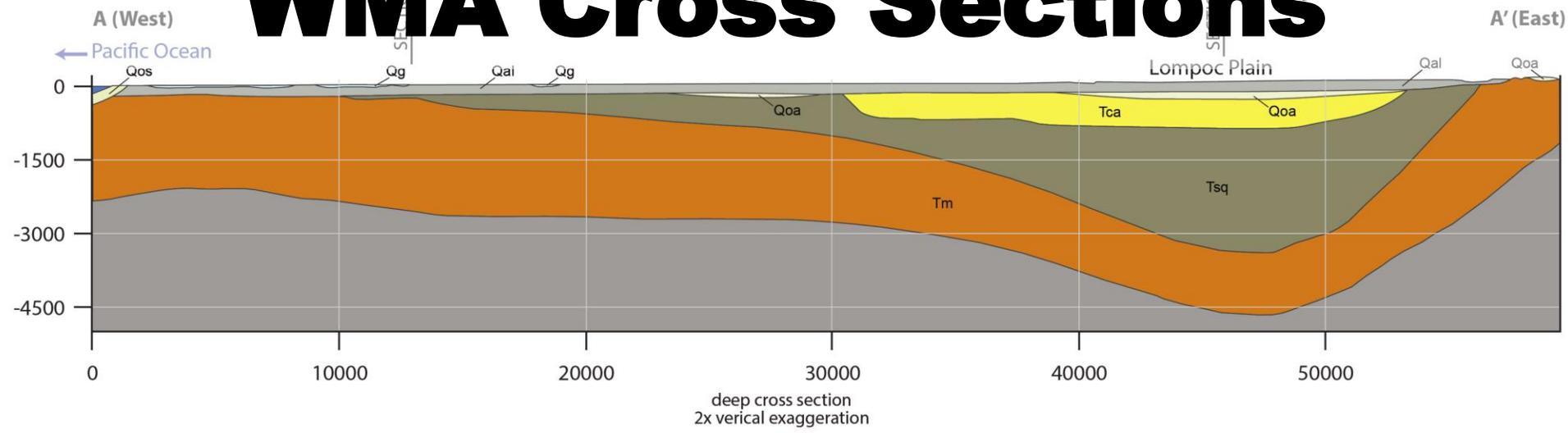


- Quaternary**
  - Holocene**
    - Qg River-Channel Deposits
    - Qal Younger Alluvium
    - Qos Older Dune Sands
    - Qoa Older Alluvium
  - Pleistocene**
    - Qo Orcutt Sand
- Tertiary**
  - Pliocene**
    - QTP Paso Robles Formation
    - Tca Careaga Sandstone
  - Miocene**
    - Tf Foxen Formation
    - Tsq Sisquoc Formation
    - Tm Monterey Formation
  - Older Formations
    - Older than Monterey Formation

- Fault Inferred
- Fault
- |> Fold Anticline, inferred
- |< Fold Syncline, concealed
- |> Fold Syncline, inferred



# WMA Cross Sections



**Model Geology**

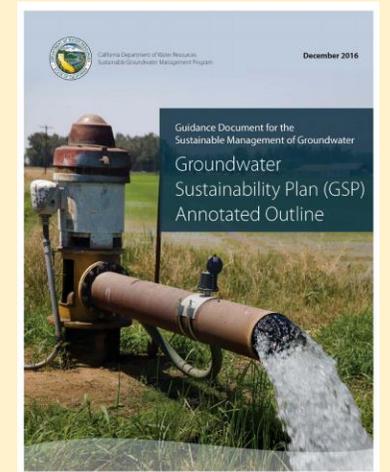
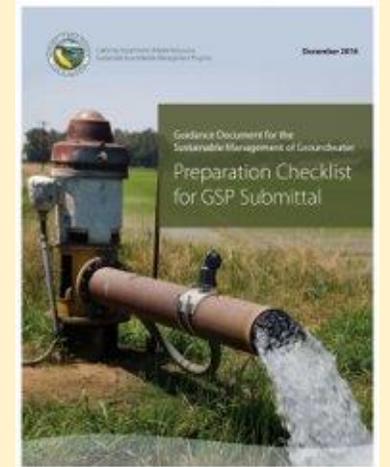
River-Channel Deposits (Qg)	Orcutt Sand (Qo)	Sisquoc Formation (Tsq)
Younger Alluvium (Qal)	Paso Robles Formation (QTP)	Monterey Formation (Tm)
Older Dune Sands (Qos)	Careaga Sandstone (Tca)	Tertiary - Older than Monterey
Older Alluvium (Qoa)	Foxen Formation (Tf)	

# ***HCM Section 2:*** ***WMA and Adjacent Geology***

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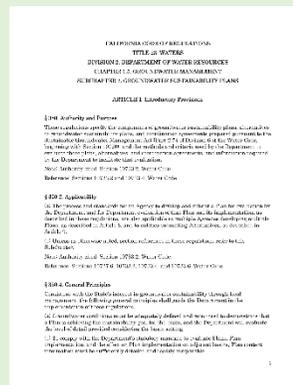
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# ***HCM Section 2:*** *WMA and Adjacent Geology*

*Questions?*

# ***HCM Section 3:***

## *Principal Aquifers and Aquitards*

*Section 3* provides a discussion of geologic units corresponding to aquifers. The physical characteristics of the aquifers in each subarea are summarized.

### **Highlights:**

- Aquifer Formations
- Aquifer Base, Aquifer Lateral Extents

**Material partially presented at past GSA Meetings**

# Stratigraphic Columns

## Geologic units can be categorized into two broad categories:

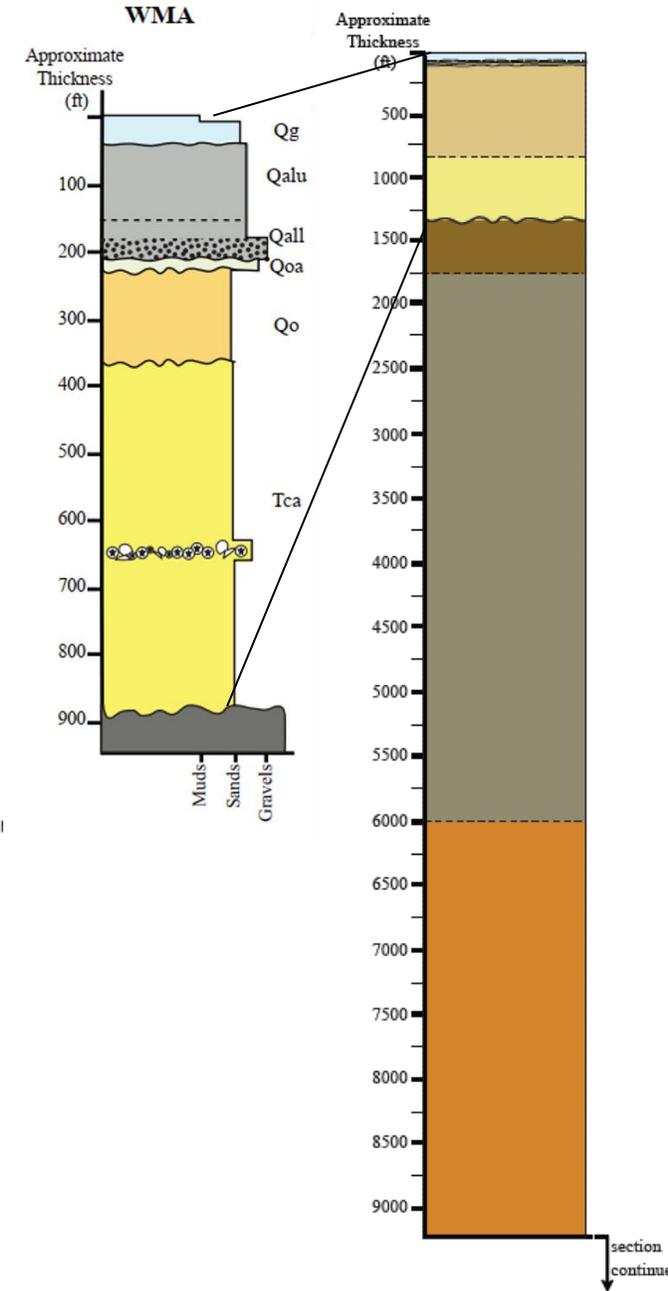
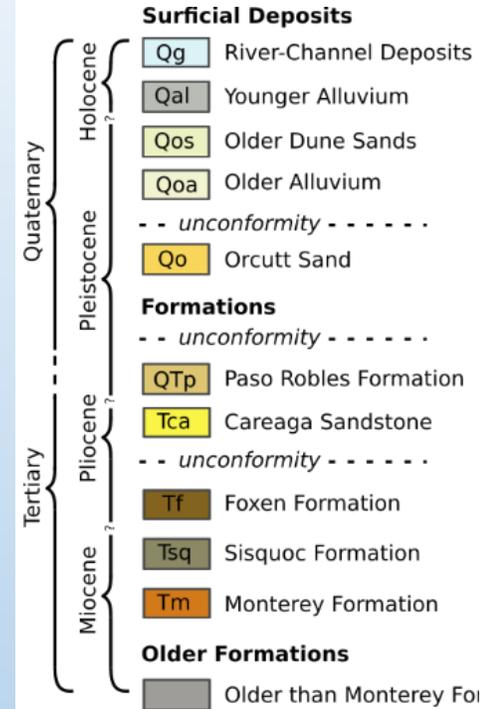
### 1. Unconsolidated Deposits, water bearing

- Upper Aquifer
  - River gravels, Younger alluvium, Older Alluvium, Beach Sands
  - Orcutt Sand

- Lower Aquifer
  - Paso Robles, Careaga Sand

### 2. Consolidated Rock, not water bearing

- underlies the ground-water basin and crops out in the surrounding hills, Monterey Shale, Foxen, and Sisquoc Formations
- In terms of SGMA terminology forms the “definable bottom of the basin” and “lateral basin boundaries”



# UNCONSOLIDATED DEPOSITS

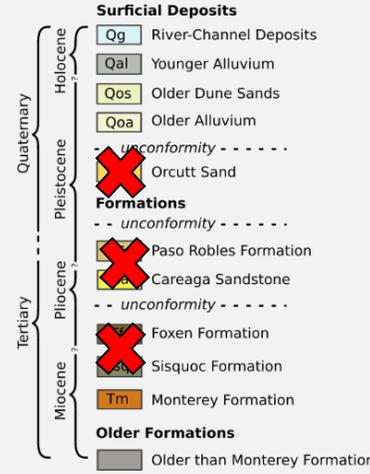
## UPPER:

Younger Alluvium along Santa Ynez River floodplain and tributaries

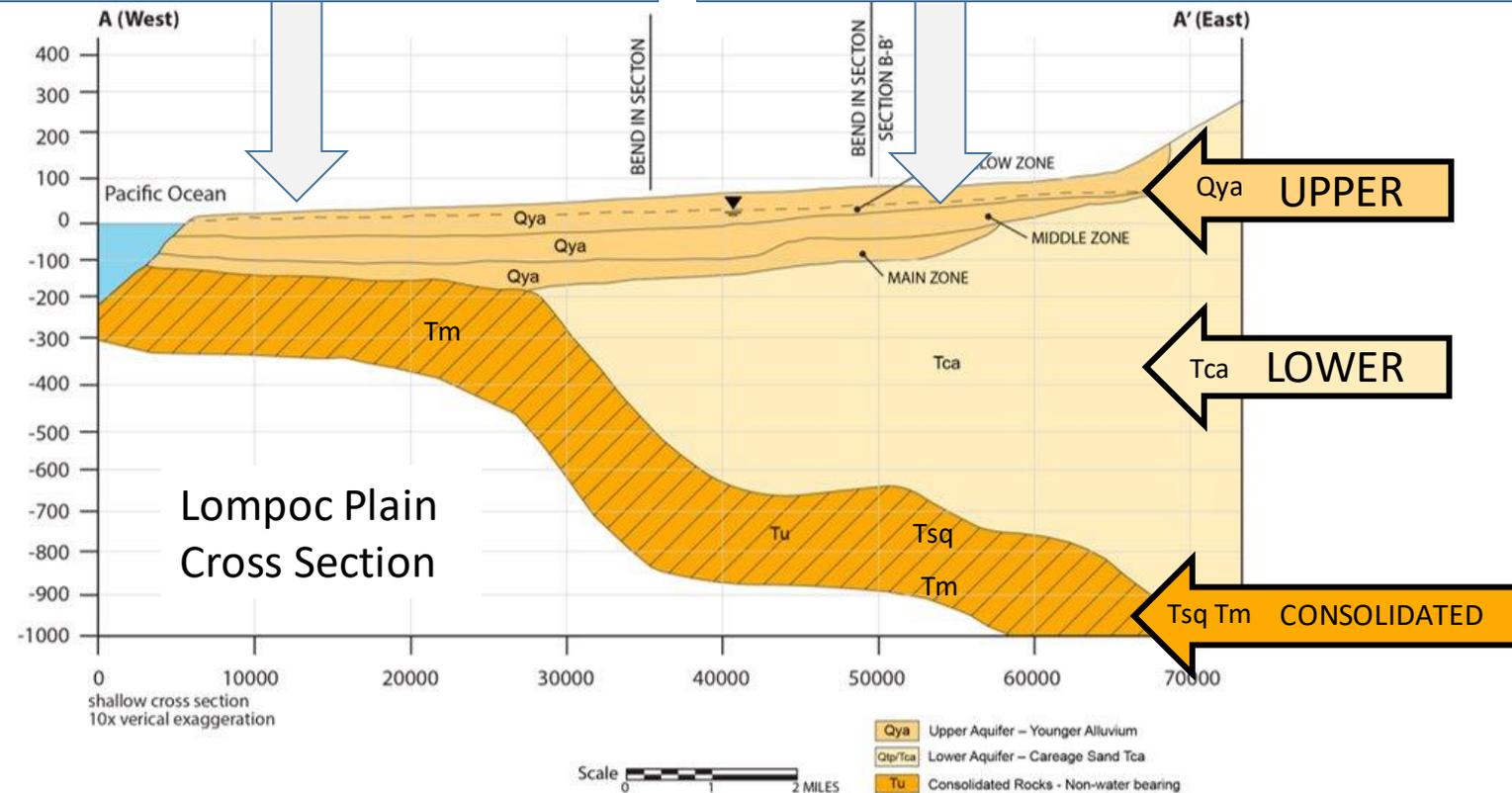
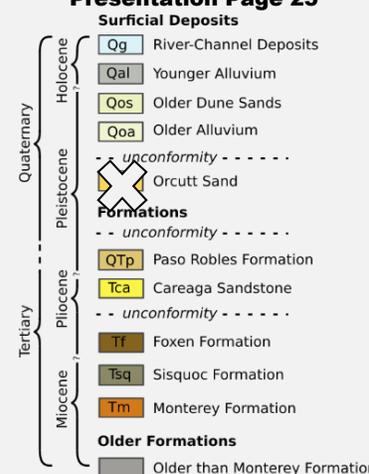
## LOWER:

Older Deposits (Paso Robles/Careaga) underneath Upper Aquifer/ perched aquifers and in the Lompoc Upland, Santa Rita Upland and Lompoc terrace

**Santa Ynez Estuary:**  
Orcutt Sand and Lower Aquifer eroded away prior to Santa Ynez River Alluvium deposition (unconformity)



**Lompoc Plain:**  
Orcutt Sand eroded away prior to Santa Ynez River Alluvium deposition (unconformity)



Cross sections based on City of Lompoc Groundwater Management Plan (West Yost, 2013); Originally based on United States Geological Survey, Bright and Others, 1992 (Plate 1).

# UNCONSOLIDATED DEPOSITS

## PERCHED (UPPER) AQUIFER:

Orcutt Sand directly overlying older consolidated Monterey Formation (unconformity).

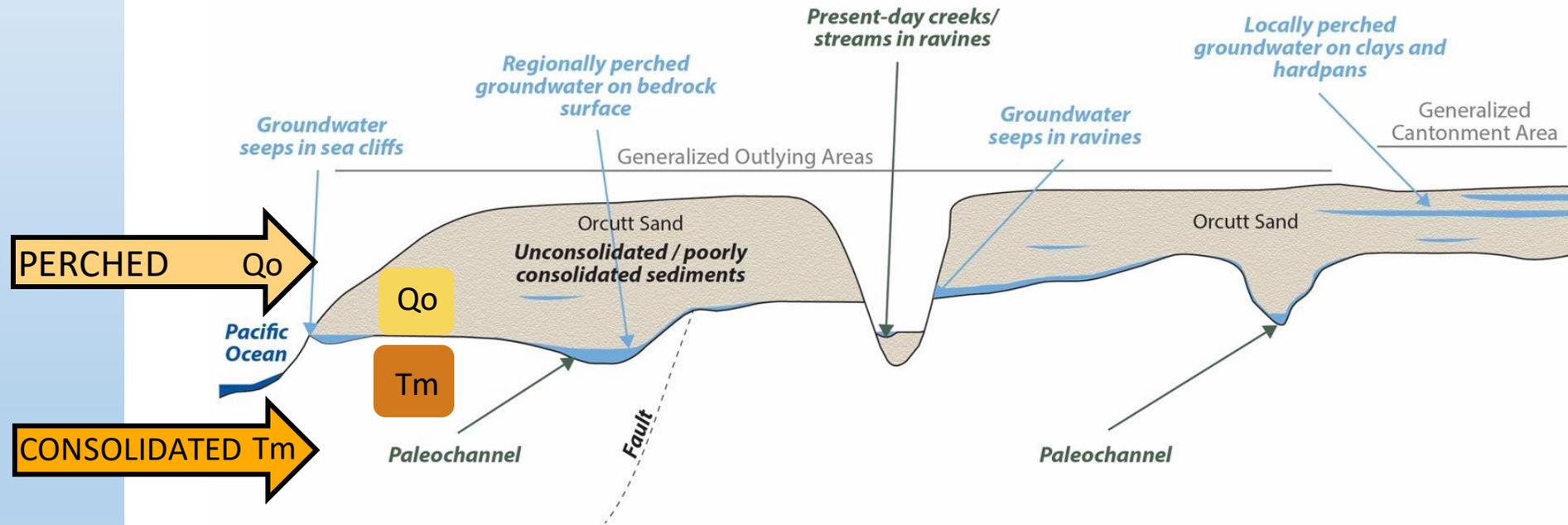
## No Lower Aquifer

### Subareas:

- Burton Mesa
- Lompoc Terrace (South)

**Burton Mesa:**  
Lower Aquifer eroded away prior to Orcutt Sand deposition, no Santa Ynez River Alluvium (unconformity)

Quaternary		Tertiary	
Holocene	Surficial Deposits	✗	River-Channel Deposits
		✗	Younger Alluvium
		✗	Older Dune Sands
Pleistocene		✗	Older Alluvium
		- - - - -	unconformity - - - - -
	Qo		Orcutt Sand
Pliocene	Formations	- - - - -	unconformity - - - - -
		✗	Paso Robles Formation
		✗	Careaga Sandstone
		- - - - -	unconformity - - - - -
Miocene		✗	Foxen Formation
		✗	Sisquoc Formation
		Tm	Monterey Formation
			Older Formations
			Older than Monterey Formation



Burton Mesa Generalized Cross Section

NOT TO SCALE. This a generalized diagram with a high degree of vertical exaggeration to illustrate general concepts. It is not meant to illustrate any specific site at VAFB.

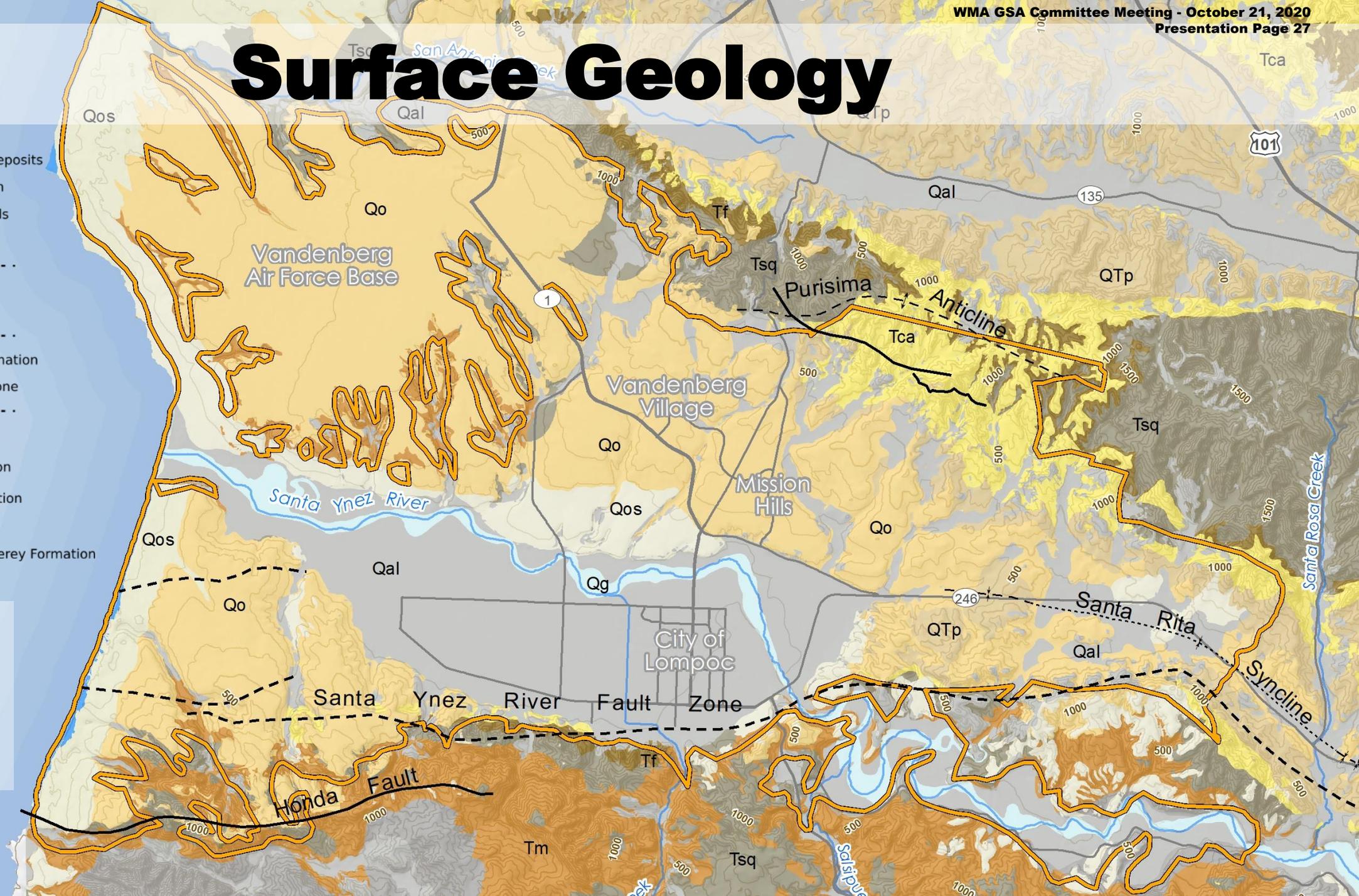
(Source: Arcadis 2016)

★ Potential Data Gap:  
Perched Groundwater  
Conditions of the Burton  
Mesa and Lompoc Terrace  
Subareas

# Surface Geology

- Quaternary**
- Holocene
    - Qg River-Channel Deposits
    - Qal Younger Alluvium
    - Qos Older Dune Sands
    - Qoa Older Alluvium
  - Pleistocene
    - unconformity ---
    - Qo Orcutt Sand
- Formations**
- unconformity ---
  - QTp Paso Robles Formation
  - Tca Careaga Sandstone
- Tertiary**
- Pliocene
    - unconformity ---
    - Tf Foxen Formation
  - Miocene
    - Tsq Sisquoc Formation
    - Tm Monterey Formation
- Older Formations**
- Older than Monterey Formation

★ **Potential Data Gap:**  
 Certainty around faults, and effect on groundwater movement in WMA



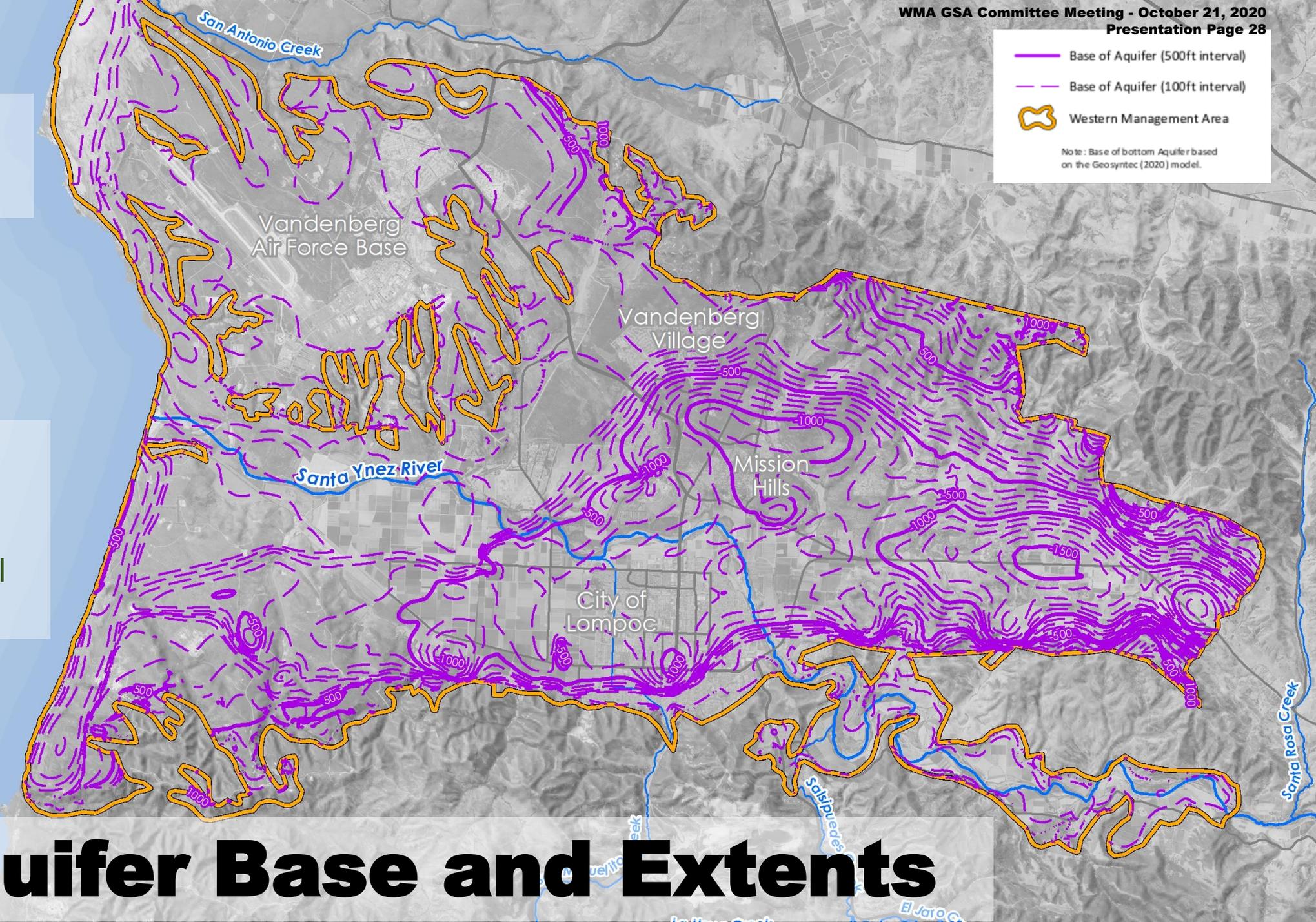
SGMA requirement  
Base of the  
unconsolidated units.

— Base of Aquifer (500ft interval)  
- - - Base of Aquifer (100ft interval)  
👉 Western Management Area

Note: Base of bottom Aquifer based on the Geosyntec (2020) model.

PACIFIC OCEAN

★ *Potential Data Gap: Santa Rita Groundwater Movement Not well constrained*



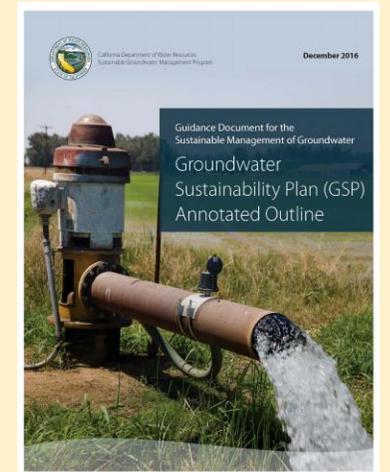
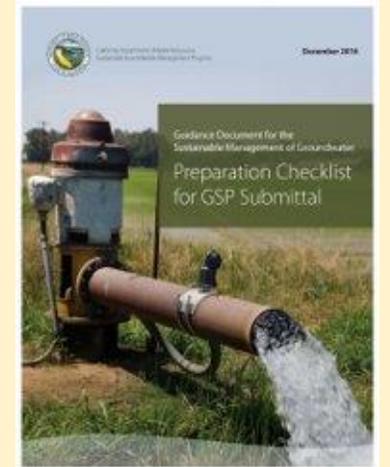
# Aquifer Base and Extents

# ***HCM Section 3:*** ***Principal Aquifers & Aquitards***

## **DWR Checklist Requirements for HCM**

### 2.2.1 Hydrogeologic Conceptual Model (*Reg. § 354.14*)

- ✓ **Graphical and narrative description of the physical components of the basin**
- ✓ **[Minimum] two scaled cross-sections**
- Map(s) of physical characteristics
  - Topographic information
  - ✓ **Surficial geology**
  - Soil characteristics
  - Delineation of existing recharge areas that substantially contribute to the replenishment of the basin, potential recharge areas, and discharge areas
  - Surface water bodies
  - Source and point of delivery for local and imported water supplies



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# SGMA Regulations

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(E) Identification of the primary use or uses of each aquifer, such as domestic, irrigation, or municipal water supply.

(5) Identification of data gaps and uncertainty within the hydrogeologic conceptual model

(c) ✓ The hydrogeologic conceptual model shall be represented graphically by at least two scaled cross-sections that display the information required by this section and are sufficient to depict major stratigraphic and structural features in the basin.

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## § 354.16. Groundwater Conditions

(g) Identification of groundwater dependent ecosystems within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information.



# ***HCM Section 3:***

## *Principal Aquifers and Aquitards*

*Questions?*

# ***HCM Section 4:***

## *Hydrologic Characteristics*

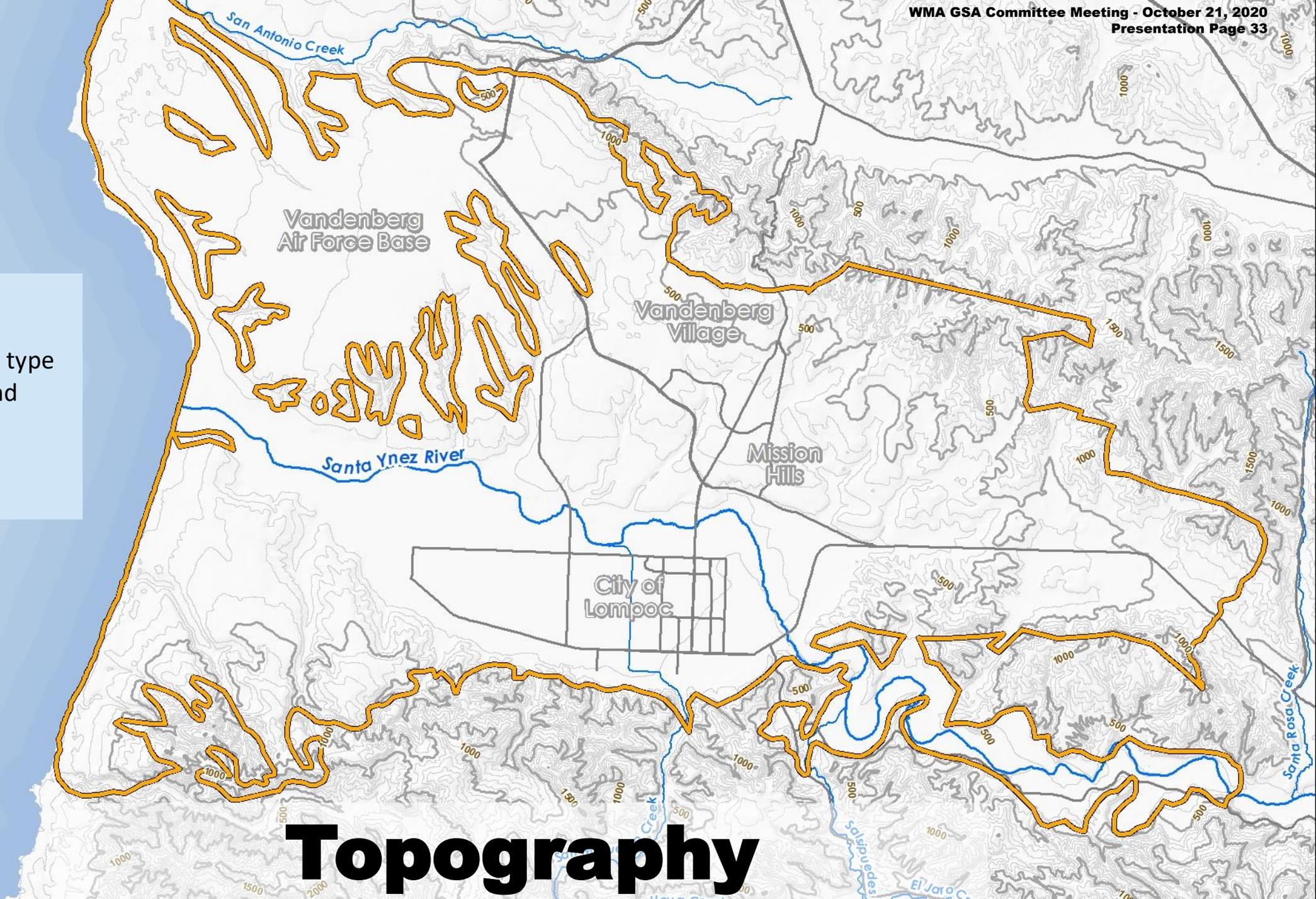
*Section 4* describes physical surface conditions that interact with the groundwater as potential sources of inflows into the groundwater.

### **Highlights:**

- Topography and derived components (Precipitation, Watersheds, and Surface Water)
- Imported Water
- Wastewater
- Soils and Groundwater Recharge Potential

- SGMA requirement
- Affects precipitation
- Slope along with soil type affects infiltration and runoff.

(continued)

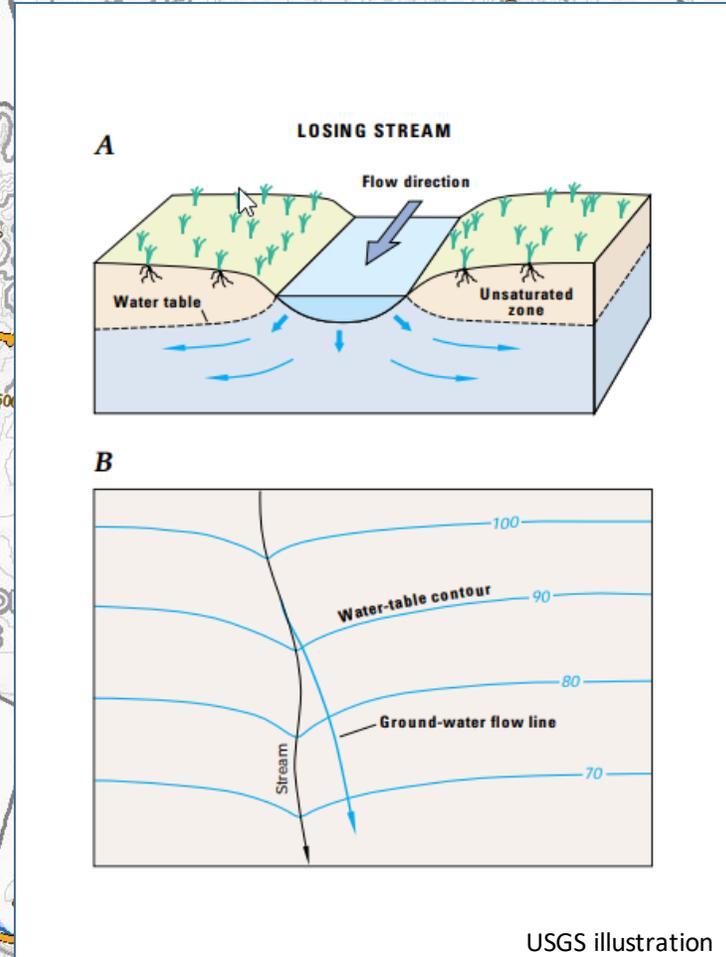
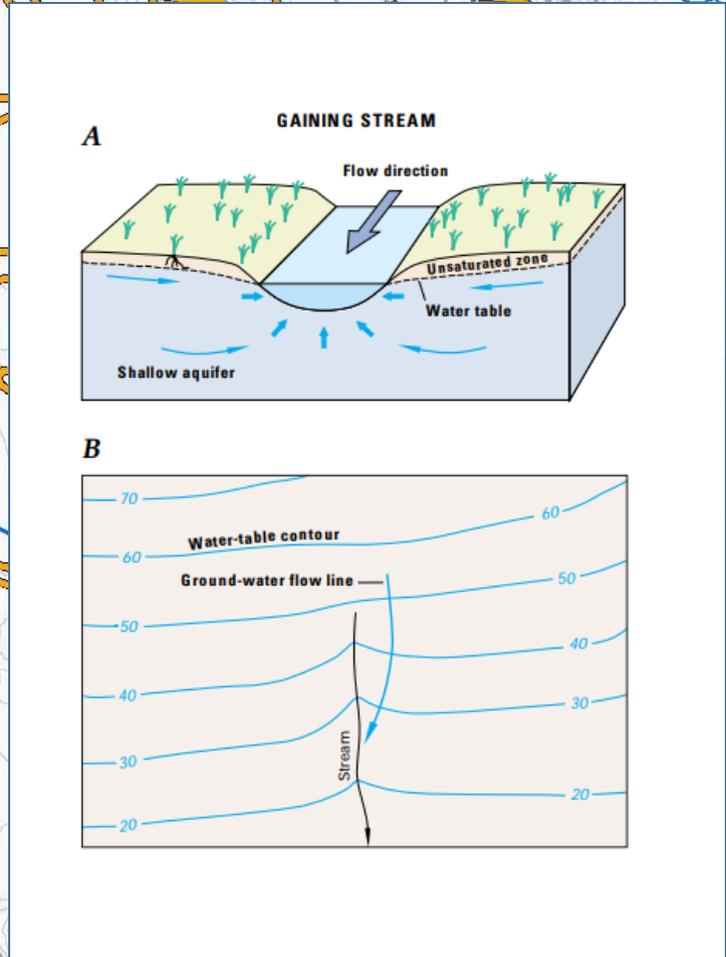


# Topography

## Groundwater Recharge or Discharge

When groundwater elevation and ground surface elevation intersect, groundwater may be observed as surface water, streams, seeps or springs (a point of discharge).

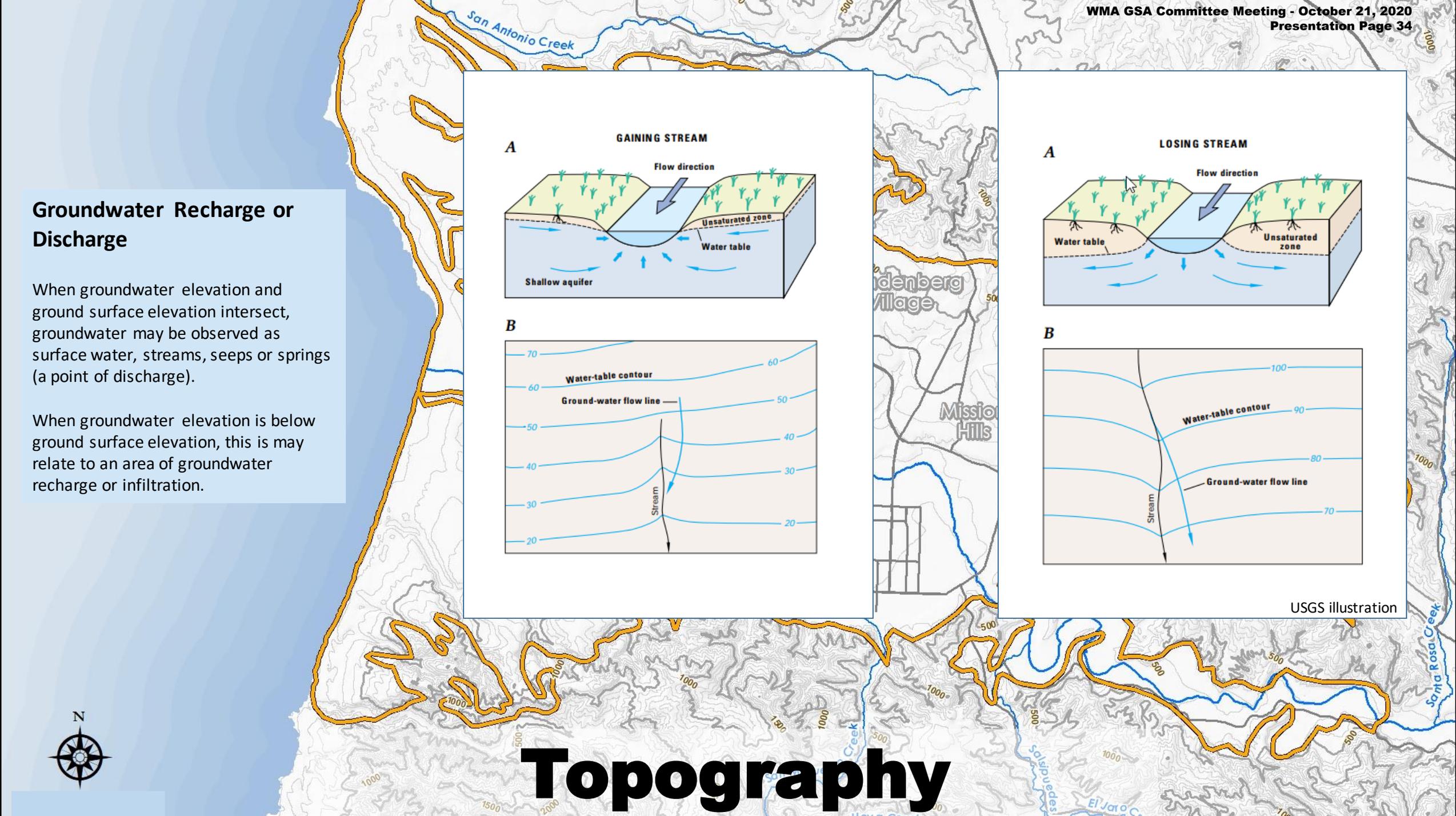
When groundwater elevation is below ground surface elevation, this may relate to an area of groundwater recharge or infiltration.



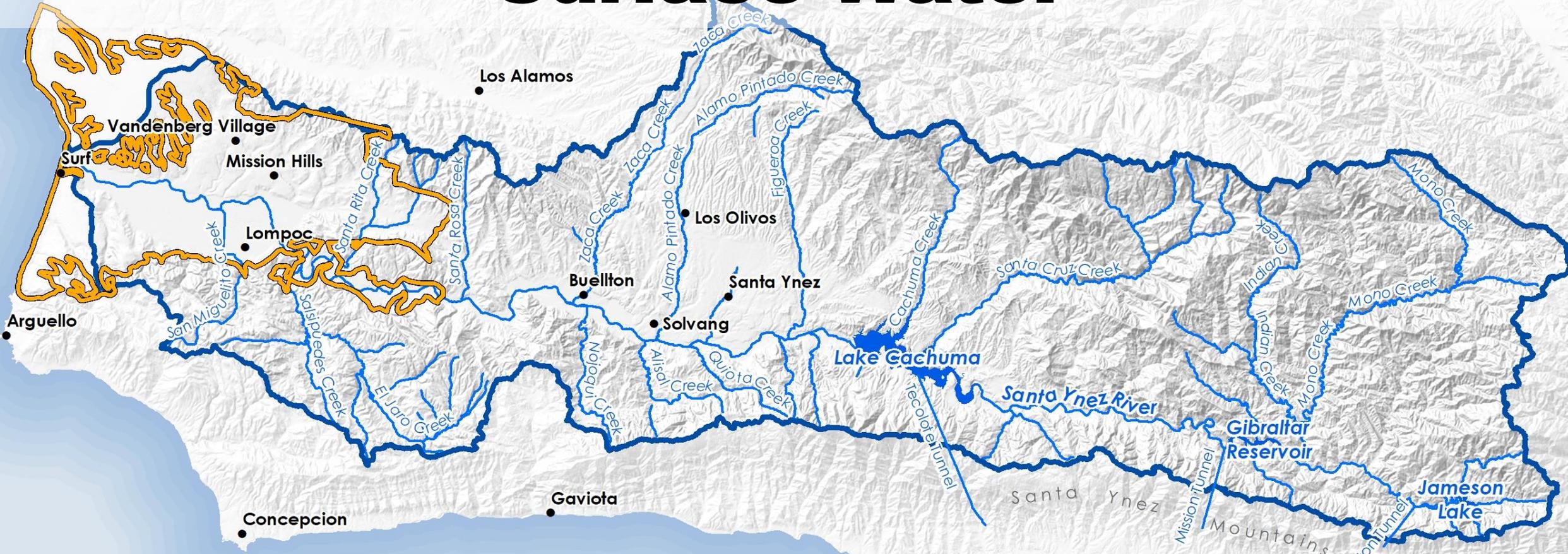
USGS illustration



# Topography



# Surface Water



- Surface water at WMA boundary affected by runoff from entire watershed
- Cahuma Project impacts Santa Ynez River, currently (October 2020) releasing **PACIFIC OCEAN** for downstream recharge

# Local Watersheds

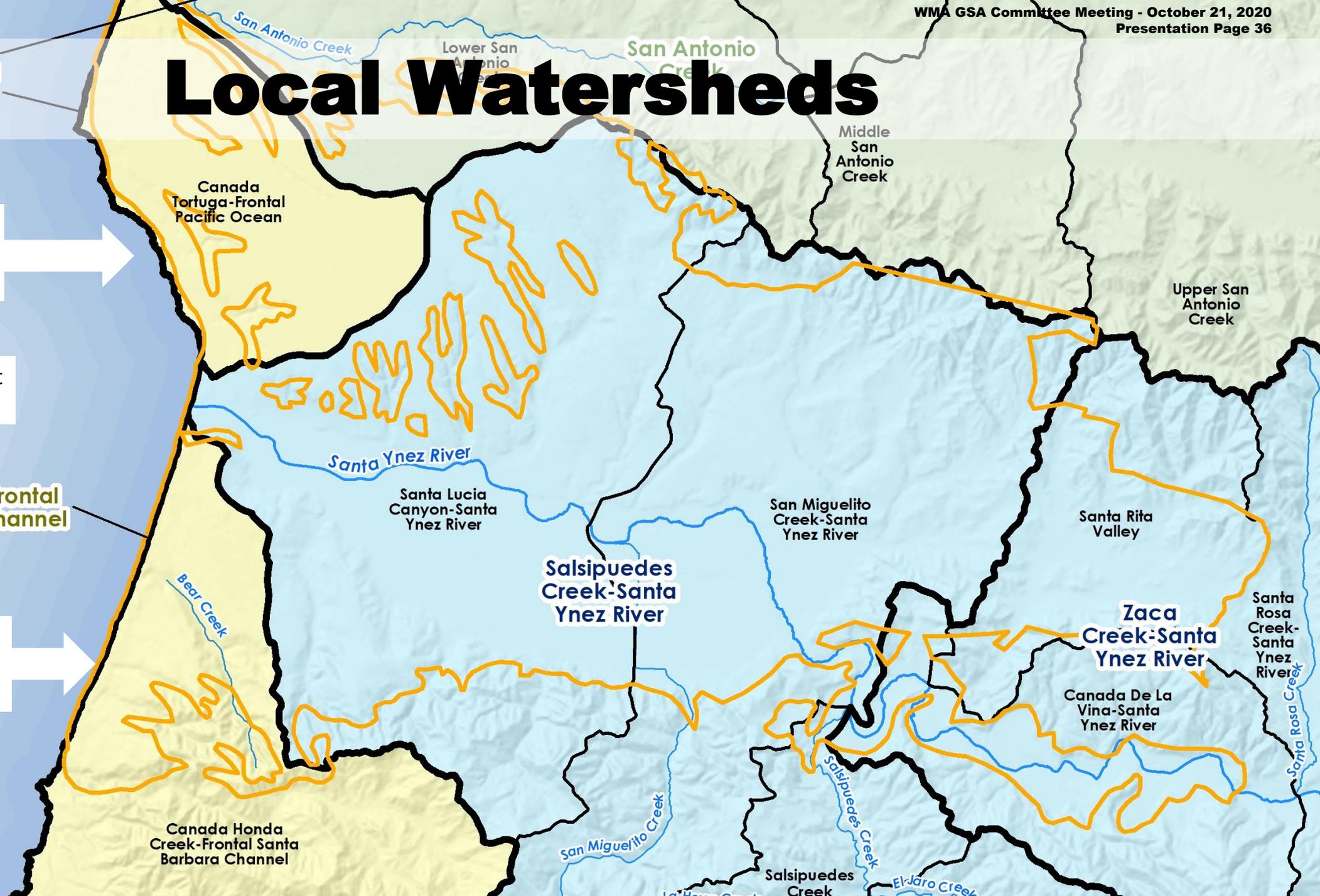
**Shuman  
Canyon-Frontal  
Pacific Ocean**

Portion of Burton  
Mesa outside of Santa  
Ynez River Watershed.

Runoff in these areas is lost  
to the Pacific Ocean.

**Jalama Creek-Frontal  
Santa Barbara Channel**

Portion of Lompoc Terrace  
outside of Santa Ynez  
River Watershed.



Canada  
Tortuga-Frontal  
Pacific Ocean

Santa Lucia  
Canyon-Santa  
Ynez River

Salsipuedes  
Creek-Santa  
Ynez River

San Miguelito  
Creek-Santa  
Ynez River

Zaca  
Creek-Santa  
Ynez River

Canada De La  
Vina-Santa  
Ynez River

Canada Honda  
Creek-Frontal Santa  
Barbara Channel

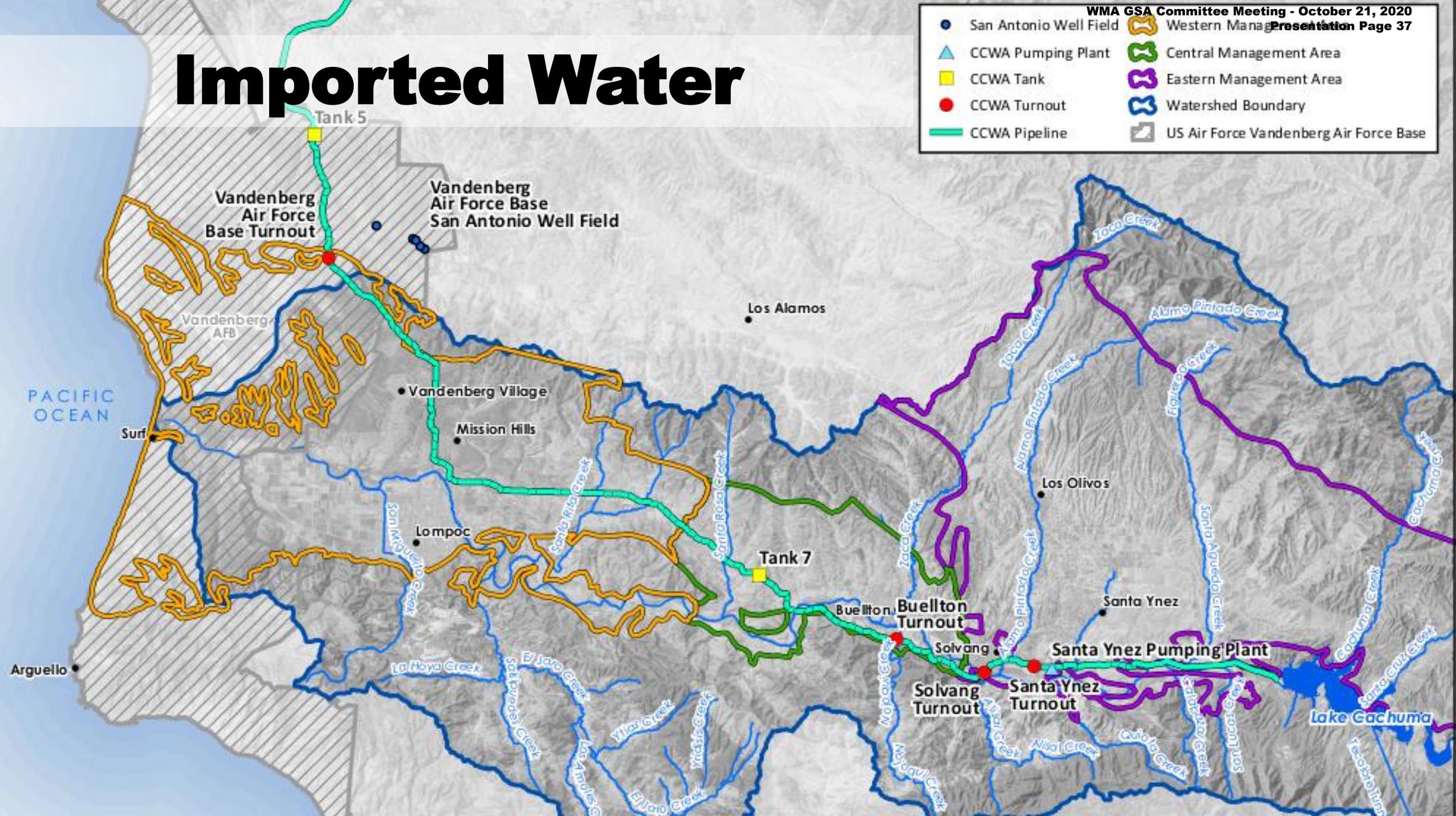
Salsipuedes  
Creek

El Jaro Creek

Santa Rosa  
Creek-Santa  
Ynez River

# Imported Water

● San Antonio Well Field	Western Management Area
▲ CCWA Pumping Plant	Central Management Area
■ CCWA Tank	Eastern Management Area
● CCWA Turnout	Watershed Boundary
— CCWA Pipeline	US Air Force Vandenberg Air Force Base



# Wastewater Treatment



PACIFIC OCEAN

Vandenberg  
Air Force Base

Vandenberg  
Village

**Mission  
Hills CSD**

Mission  
Hills

Lompoc

Penitentiary

**Lompoc Regional  
Wastewater Reclamation**

City of  
Lompoc

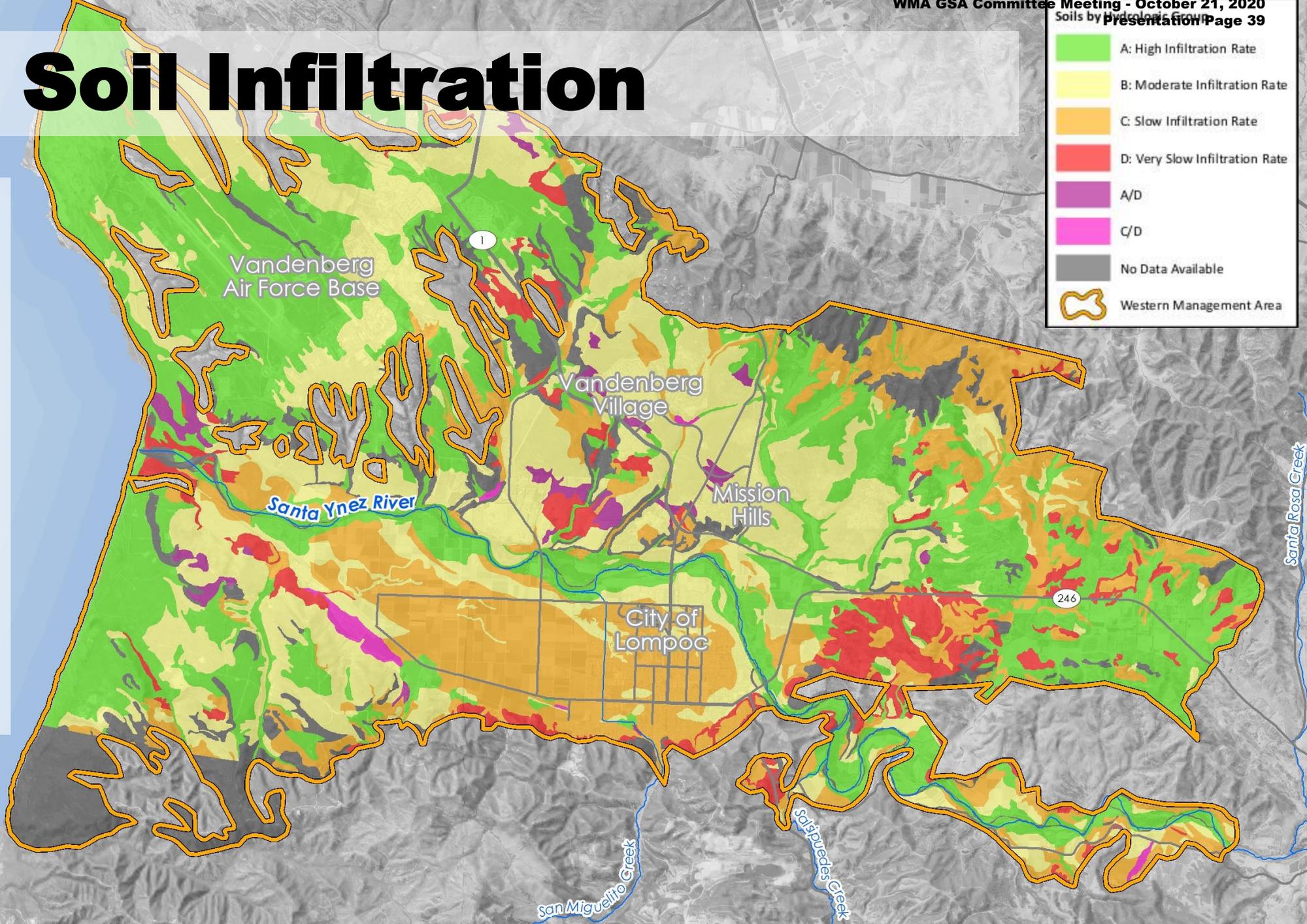
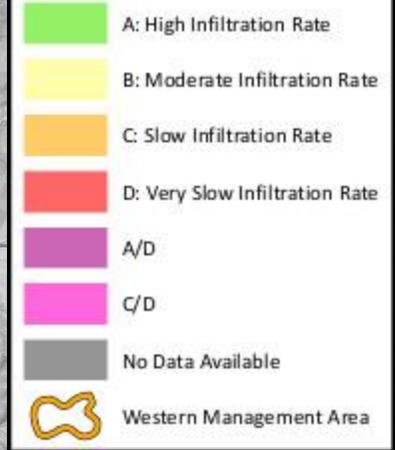
Santa Ynez River

Creek

Salinas Creek

Santa Rosa Creek

# Soil Infiltration



HCM presents the various soil types within the WMA and how they contribute to groundwater recharge and return flows.

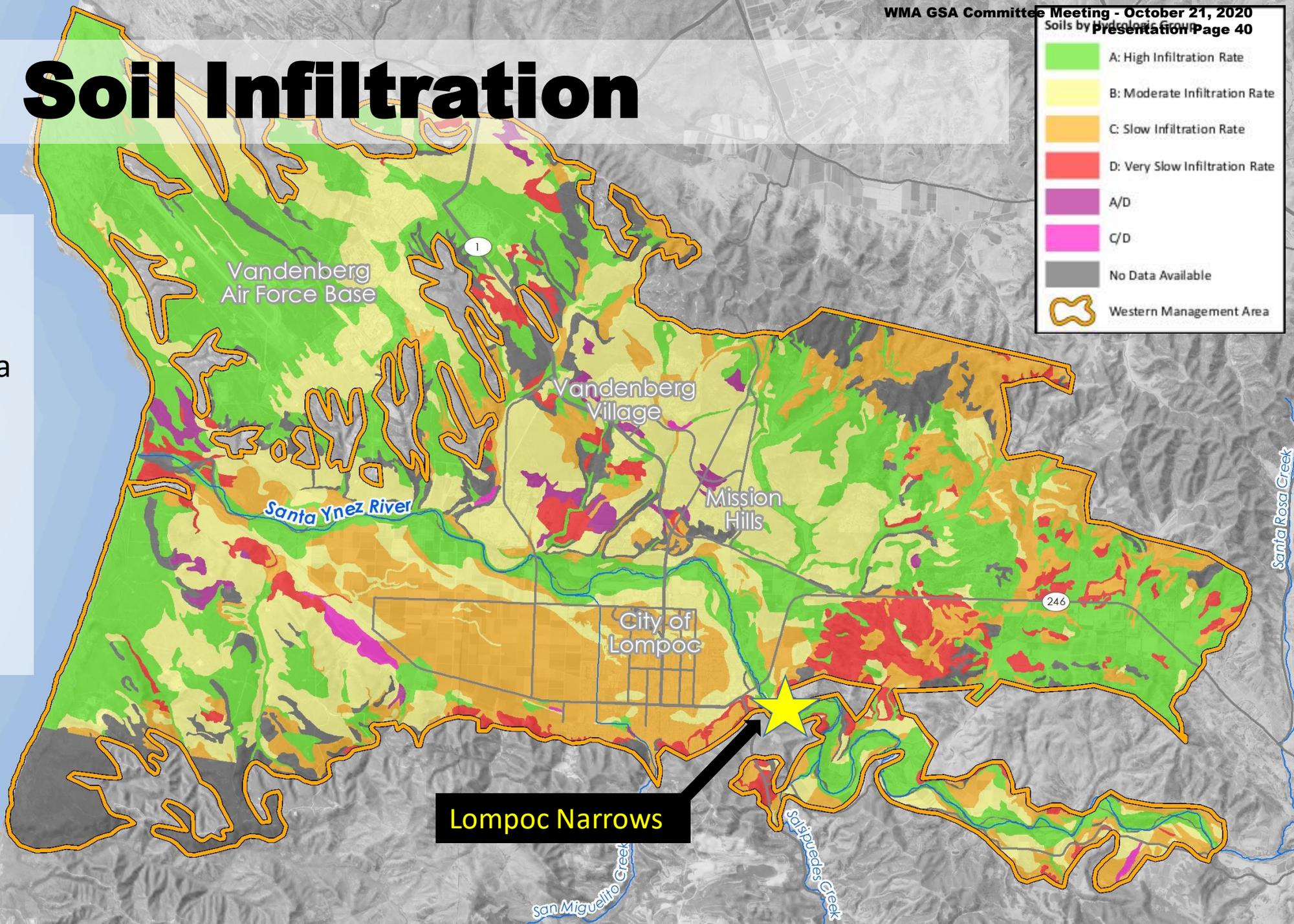
The various soil types contributions to recharge are quantified in the Water Budget.

(continued)

# Soil Infiltration

## Key Recharge Areas:

- Mountain Front in Lompoc and Santa Rita Uplands and Terrace
- Santa Ynez River in Lompoc Plain, Downstream of Lompoc Narrows.



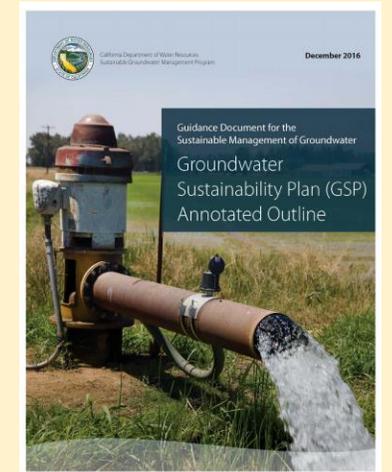
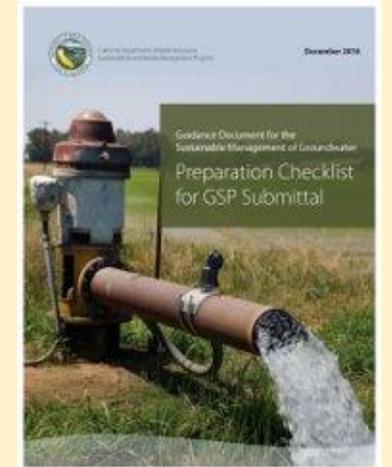
**Lompoc Narrows**

# ***HCM Section 4:*** *Hydrologic Characteristics*

## **DWR Checklist Requirements for HCM**

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(5) Identification of data gaps and uncertainty within the hydrogeologic conceptual model

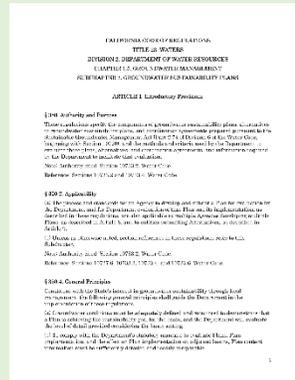
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## § 354.16. Groundwater Conditions

(g) Identification of groundwater dependent ecosystems within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information.



# ***HCM Section 4:*** *Hydrologic Characteristics*

*Questions?*

# ***HCM Section 5:***

## *Groundwater Uses and Users in the WMA*

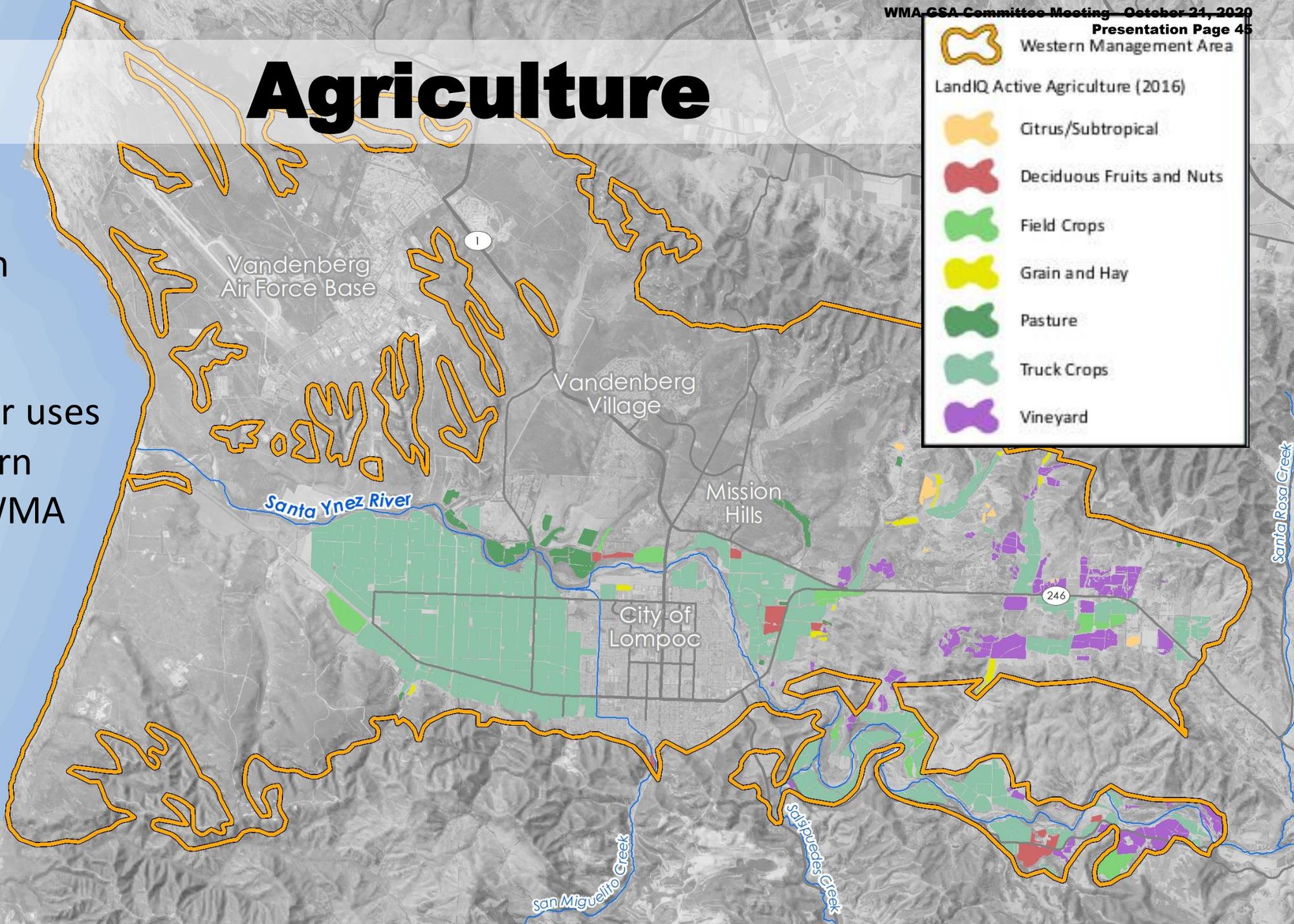
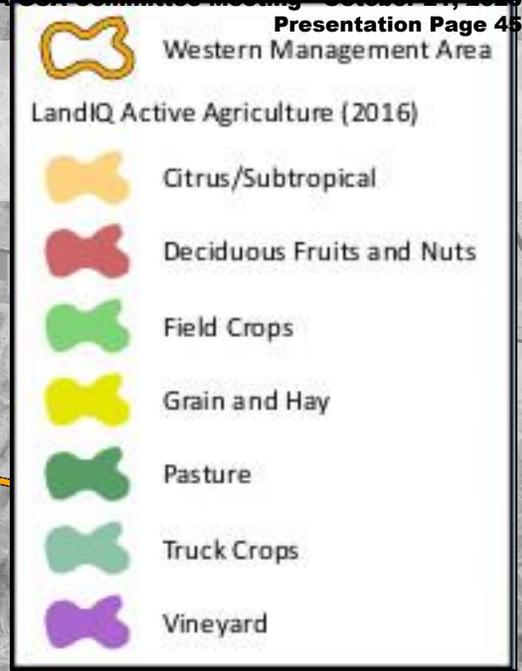
*Section 5* discusses the various uses and users of the groundwater within the WMA.

### **Highlights:**

- Agriculture
  - Farmers, Ranchers, Vintners
- Municipal & Industrial
  - City of Lompoc, MHCSD, VVCSD, MWCs, Mining
- Environmental
  - Groundwater Dependent Ecosystems
    - Phreatophytes
  - Surface water, Springs and Seeps

# Agriculture

In accordance with SGMA, the HCM evaluates various consumptive water uses and potential return flows within the WMA



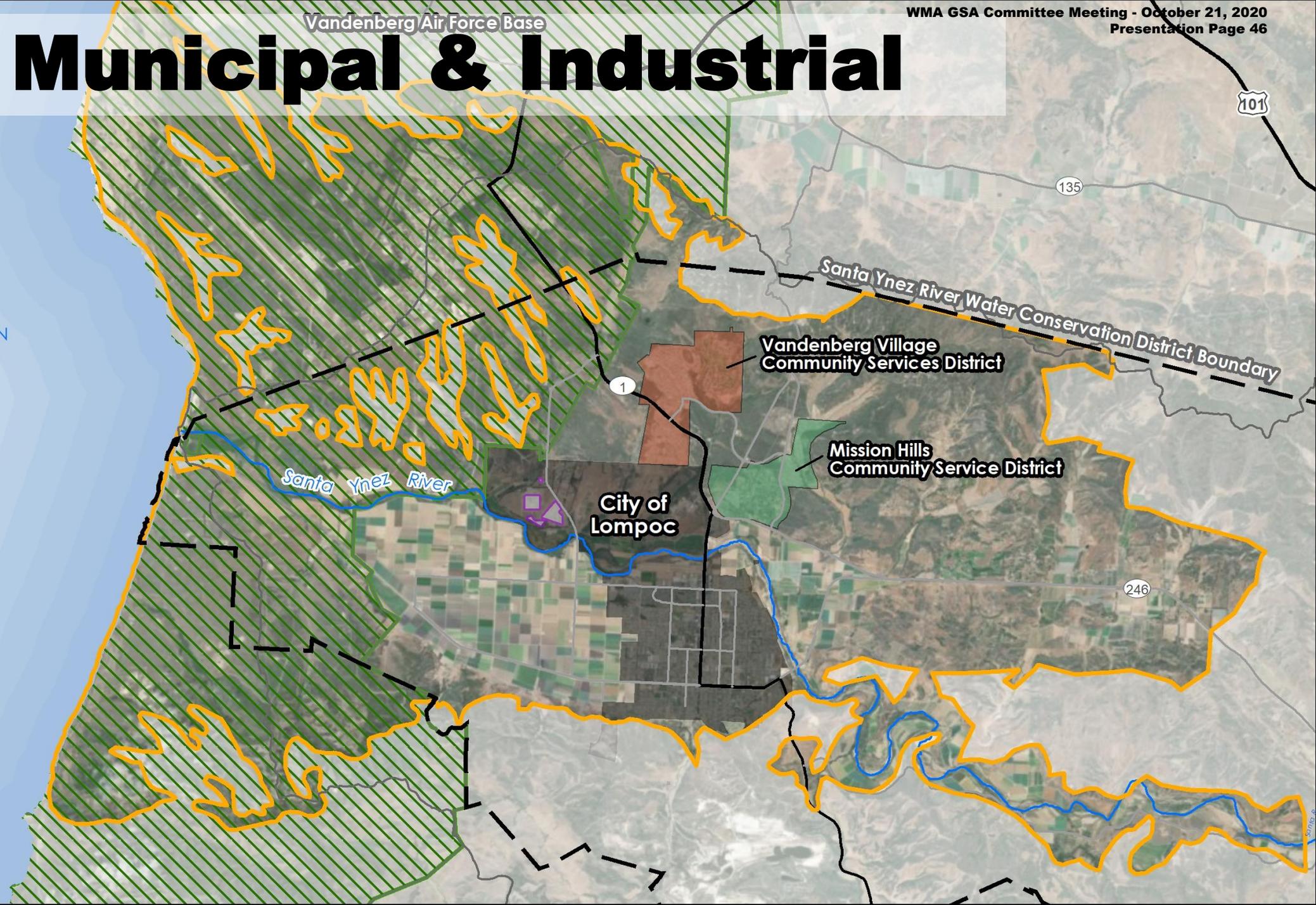
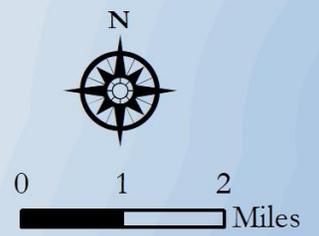
PACIFIC OCEAN

\*2016 agriculture areas shown as provided by DWR

Vandenberg Air Force Base

# Municipal & Industrial

PACIFIC OCEAN



# Environmental

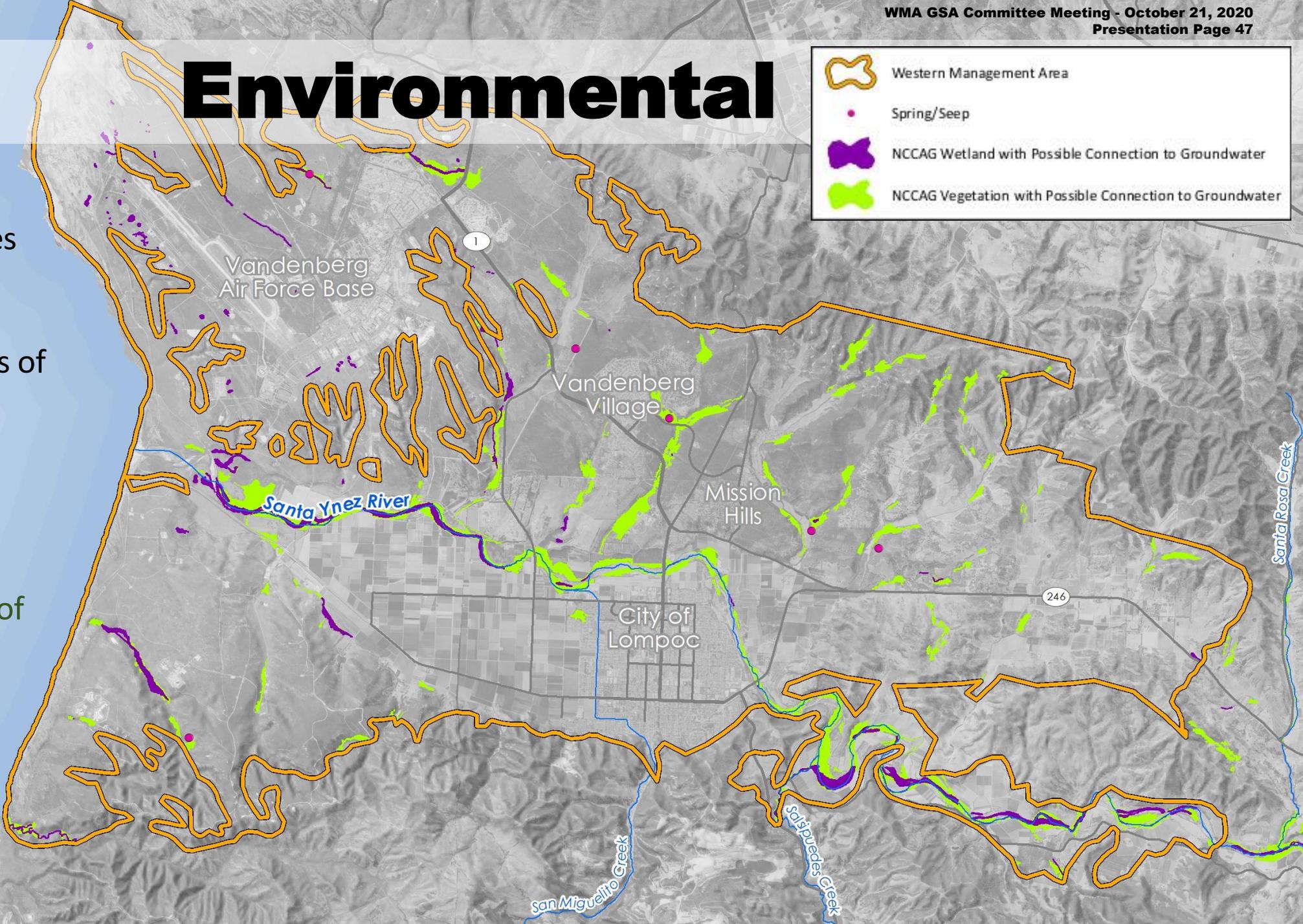
- Western Management Area (orange outline)
- Spring/Seep (pink dot)
- NCCAG Wetland with Possible Connection to Groundwater (purple shape)
- NCCAG Vegetation with Possible Connection to Groundwater (green shape)

In accordance with SGMA, phreatophytes are environmental users commonly associated with areas of discharge.



*Potential Data Gap:*  
Temporal affects to source and quantity of spring flow.

PACIFIC OCEAN



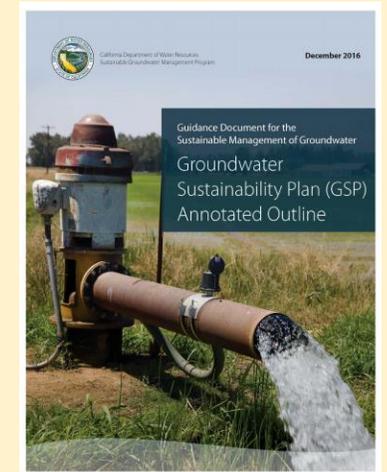
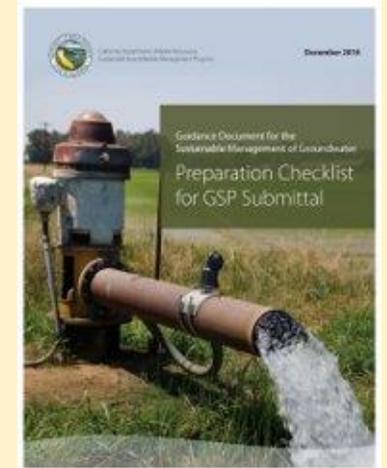
# ***HCM Section 5:***

## *Uses of Groundwater in the WMA*

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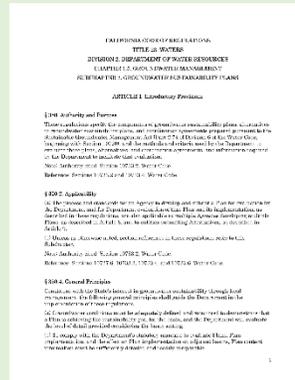
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(g) ✓ Identification of groundwater dependent ecosystems within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information.



# ***HCM Section 5:***

*Uses of Groundwater in the WMA*

*Questions?*

# ***HCM Section 6:***

## *Data Gaps and Uncertainty*

*Section 6* addresses the data gaps at the time that this memorandum was written and uncertainty with respect to certain components of the HCM.

### **Highlights:**

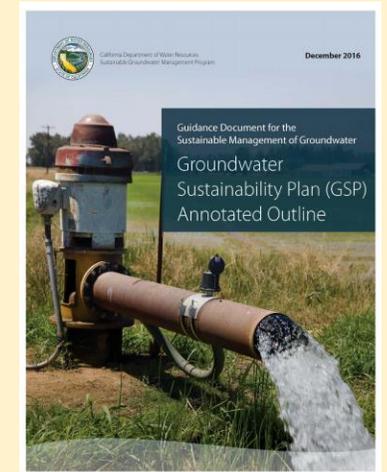
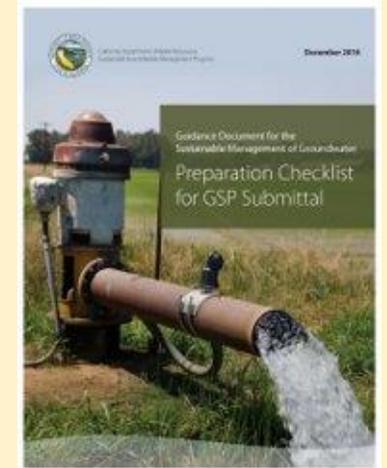
-  Perched groundwater conditions of the Burton Mesa and Lompoc Terrace subareas
-  Influence of faults on groundwater movement
-  Santa Rita Subarea groundwater movement
-  Temporal affects to identified springs in the WMA

# ***HCM Section 6:*** *Data Gaps and Uncertainty*

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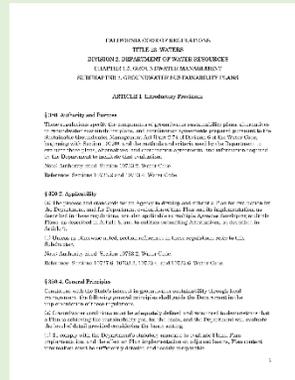
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# ***HCM Section 6:***

## *Data Gaps and Uncertainty*

*Questions?*

# Upcoming Meetings & Opportunities for Engagement

## *Regularly scheduled GSA Meeting / Workshop in November*

- Groundwater Conditions Technical Memo
- Groundwater Modeling status update
- Introduce Sustainable Management Criteria

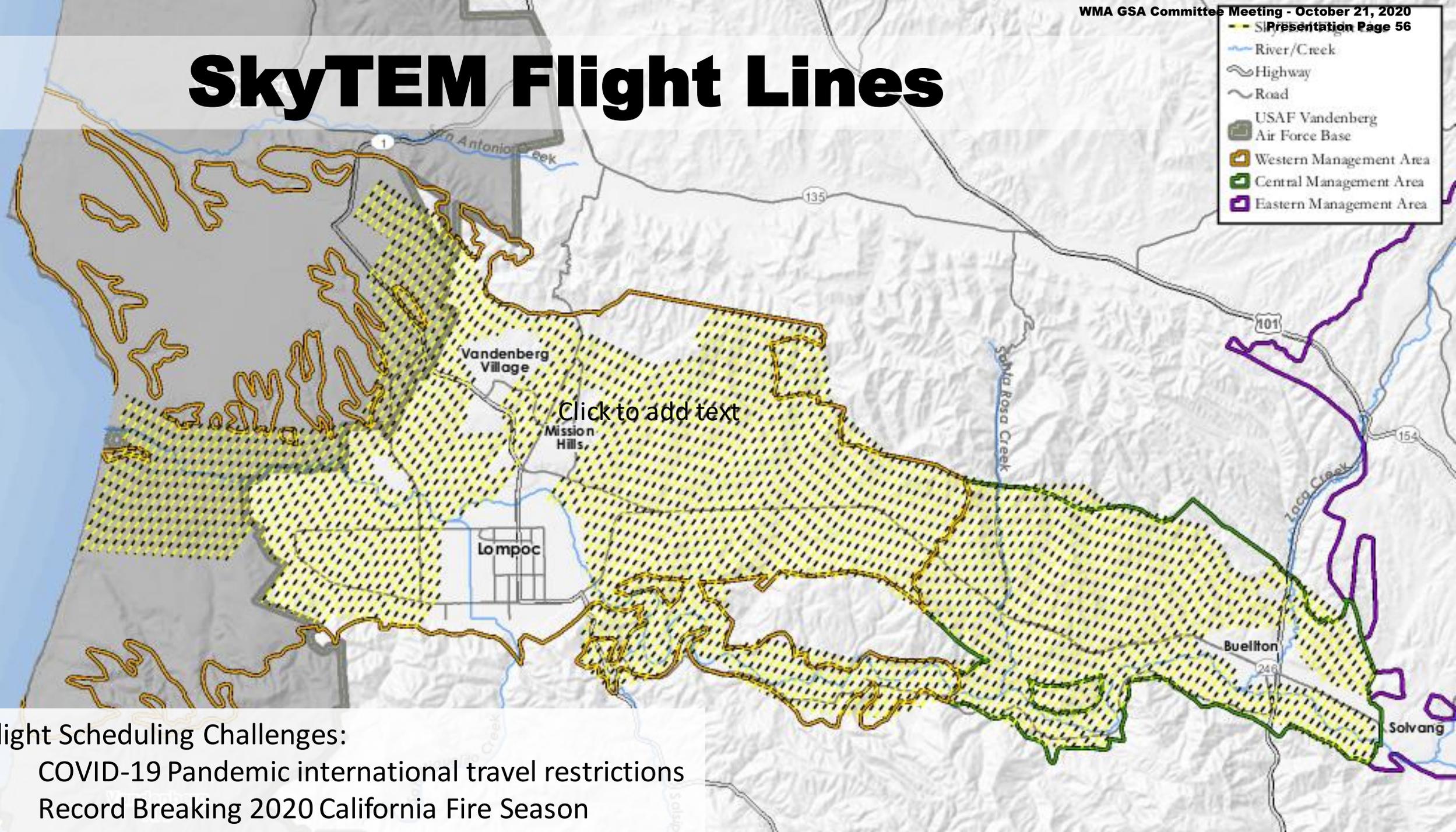
## *GSA Special Meeting / Workshop in December*

- Water Budget Technical Memo
- Groundwater modeling construction, calibration and simulations
- Sustainable Management Criteria

## *GSA Meeting / Workshop in January*

- Sustainable Management Criteria
- Monitoring Network

# SkyTEM Flight Lines

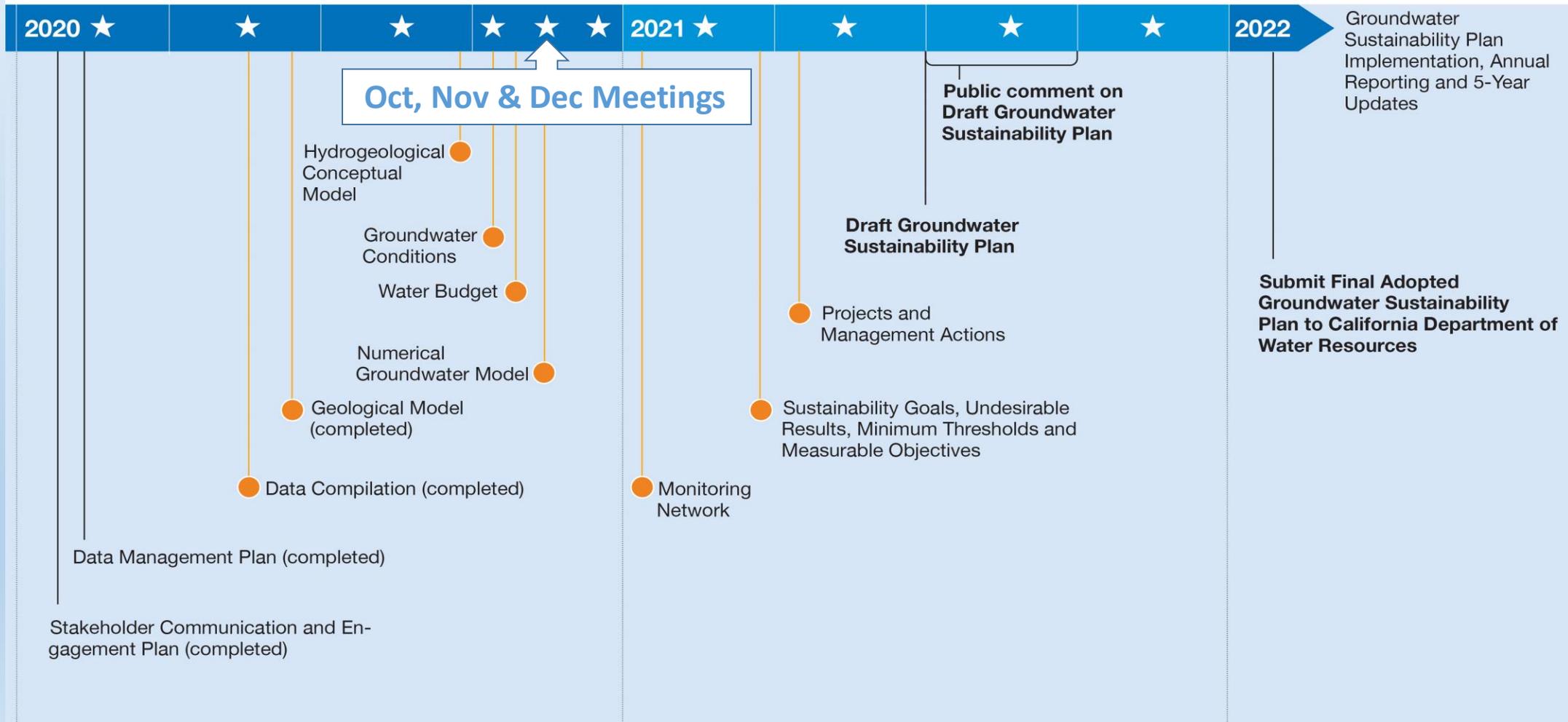


- Flight Scheduling Challenges:
- COVID-19 Pandemic international travel restrictions
  - Record Breaking 2020 California Fire Season

# The Way Ahead

## Groundwater Sustainability Plan Development Milestones

★ Groundwater Sustainability Agency Committee Public Meeting      ● Technical Memorandum



# Questions?



Outreach & Engagement Website  
<https://www.santaynezwater.org/>