San Pasqual Valley Groundwater Basin Sustainable Groundwater Management Act Technical Peer Review Meeting

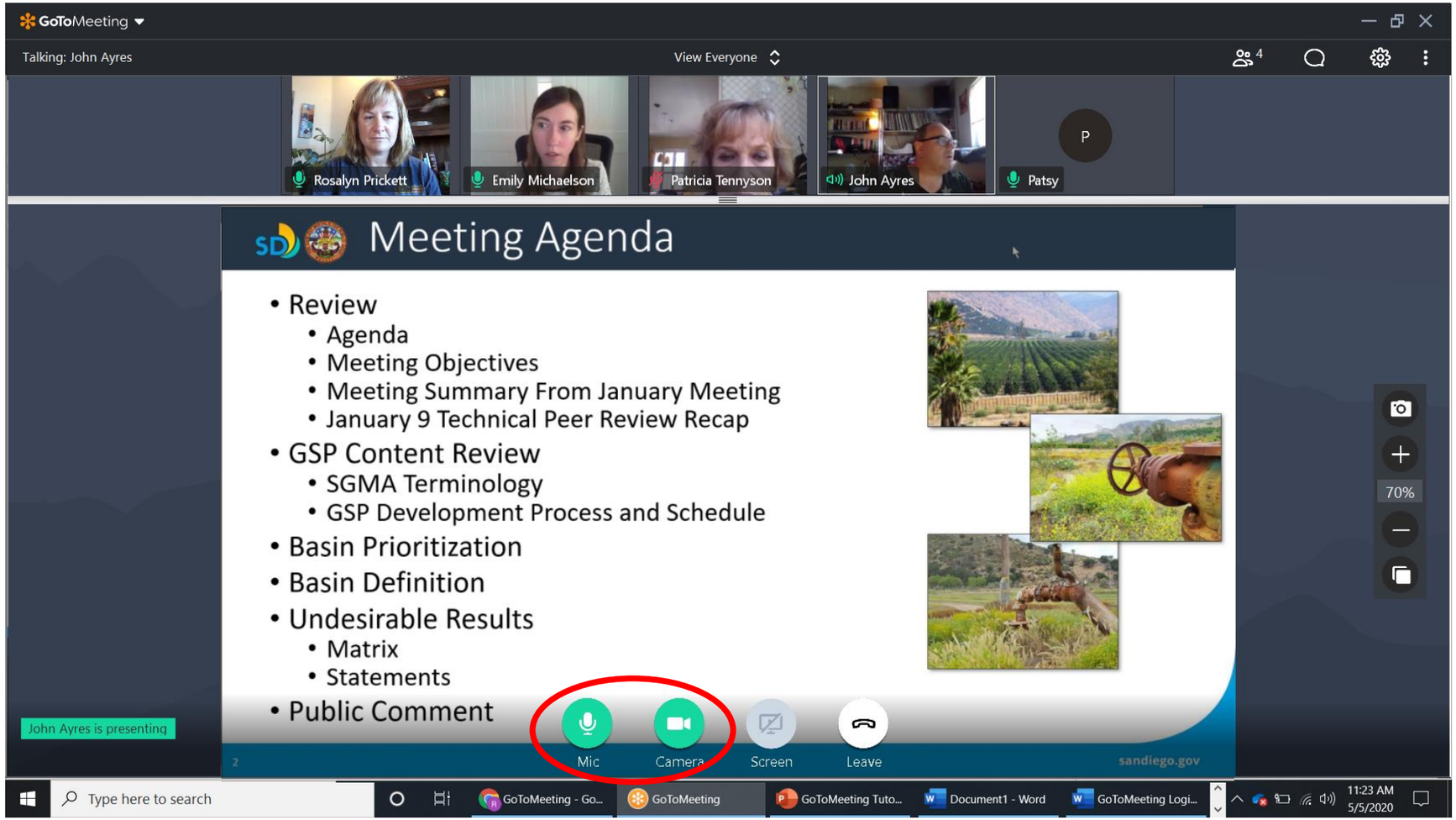
Numerical Model Update
Monitoring Networks
Sustainable Management Criteria

July 9, 2020

Draft Work Product

GoToMeeting – Quick How To

- Your screen should look like this:



- Turn on/off your Mic (mute) and Camera (video) using the controls along the bottom
- During the meeting, you may need to wiggle your mouse to make the controls appear

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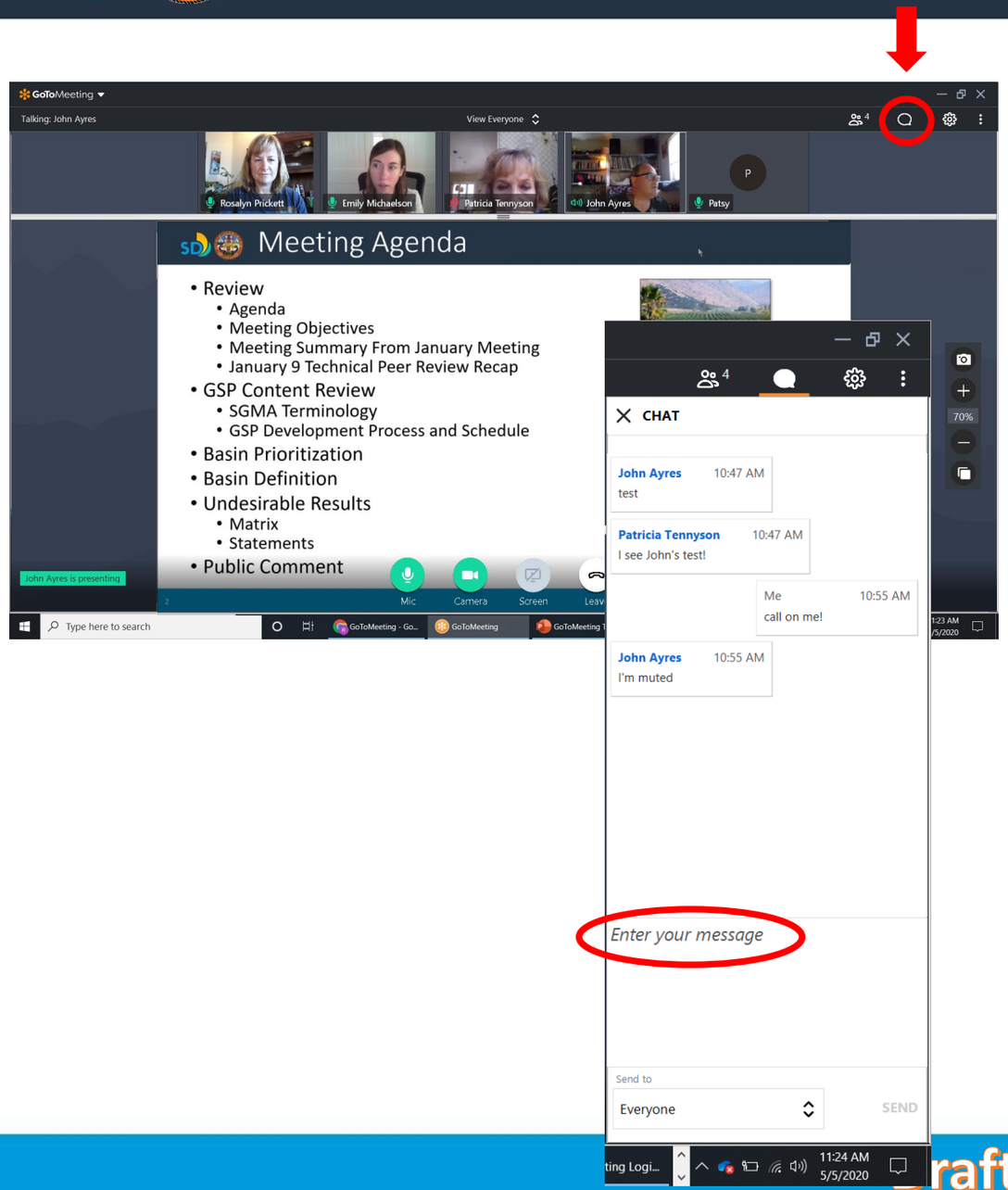
GoToMeeting – How to Ask a Question



- Let us know you have a question by clicking the **Chat** icon in the top right
- Click on *Enter your message*, type your message in the Chat and hit SEND
- Our organizer will mute everyone at the beginning of the meeting
- Once we receive your Chat and can pause to answer your question:
  - Our meeting organizer will unmute you to relay your question or comment
  - Please also check your phone/computer to make sure you're not muted there too
- For folks on the phone only, we will pause, unmute all callers, and ask for your questions or comments

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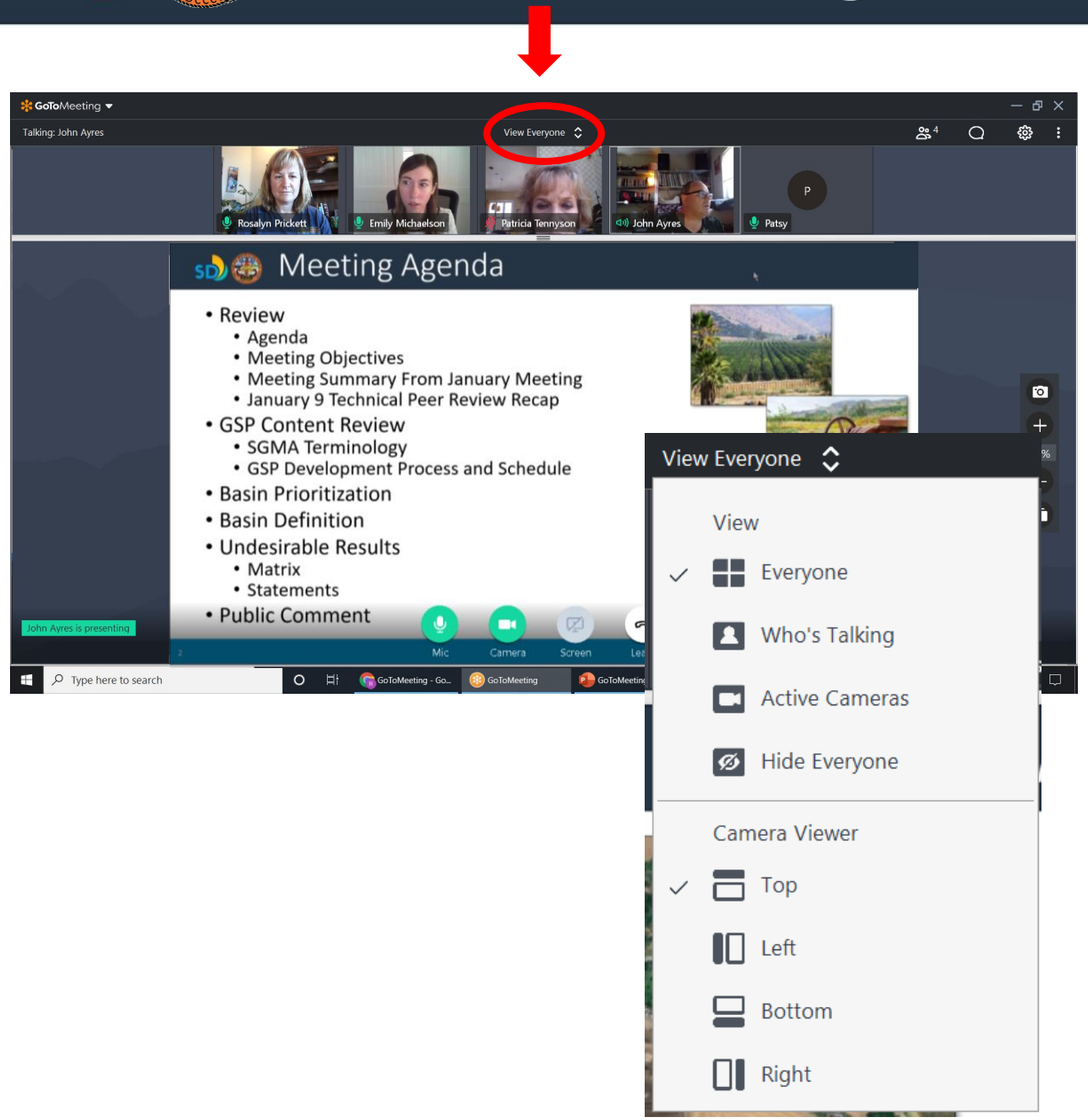
GoToMeeting – How to See Everyone



- To change your display options, select the **View Everyone** icon in the top right
- Select View-Everyone to display all attendees in the meetings
- Select Camera Viewer-Top to display participant images along the top of your screen
- The grey divider can be raised or lowered, which will change the screen size

Draft Work Product

San Pasqual Valley GSP
Technical Peer Review Meeting

REVIEW

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The City of SAN DIEGO

Agenda and Meeting Objectives

1. Roll Call and Introductions
2. Review
   - Agenda
   - Meeting Objectives
   - Previous Meeting Summary
3. TPR Comments
   - Overview and Responses
   - AC Comments
4. Technical Input on Approach
   - Groundwater Model
   - Monitoring Networks
   - Sustainability Criteria – Levels and Quality
   - AC Comments
5. Preliminary Analysis Results
   - Groundwater Model
   - AC Comments
6. Refined Analysis
   - Cross Sections
   - AC Comments
7. Field Program Update
8. Public Comments
9. Next Steps & Closing Remarks

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Meeting Objectives and Minutes

- Meeting Objectives
  - Share groundwater modeling approach and preliminary results
  - Gain input on Sustainable Management Criteria approach
  - Review refined geologic cross sections
  - Provide field program update

- Meeting Summary
  - See Handout 1

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San Pasqual Valley GSP
Technical Peer Review Meeting

TPR COMMENT REVIEW

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The City of SAN DIEGO

TPR Comments Received - Overview

1. Bottom of Basin: Concern was expressed about how decision was made on the basin boundary definition
   - According to SGMA, a basin's boundaries shall be as identified in Bulletin 118. Bulletin 118 indicates that the physical bottom of a basin occurs where the porous valley deposits contact the underlying bedrock. It further states that the water bearing units of the San Pasqual Valley Groundwater Basin are alluvium and residuum. The Core Team recognizes that we do not understand the interaction of the basin with underlying granitic rock. If groundwater conditions require the implementation of management actions, additional data collection, studies, aquifer testing and/or surveying may be recommended to improve understanding of this interaction.
2. Various editorial suggestions and corrections
   - Are being incorporated into the figures
3. Historical groundwater data exists in areas without current monitoring
   - Historical data will be used in the groundwater conditions section, while describing groundwater in the basin.
4. Well Metering Information
   - Is going to be used (where available) during model development

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TPR Comments Received - Overview

5. Cross-Sections: Request for increased detail on cross-sections
   - Increasing level of detail by adding well construction of wells in cross-section, and adding lithology at well locations
   - Worked with Frank Konyn to identify additional logs in the area of ‘the bump’ to re-route the cross-section through the middle of the basin to the south of the outcrop
6. Land Use: How land use will be improved and used in the GSP
   - Details on how land use is being used are presented today
7. Monitoring Well 129 Construction: Concerns about the construction of monitoring wells
   - City is working with Kleinfelder to address Well 129 construction challenges
   - Lithology is still useful, monitoring points will be useful in GSP implementation
8. Was High TDS in streams in 2011 the result of runoff from a fire?
   - Aerial photo imagery does not show a fire in the immediate watersheds near SPV the 5 years prior to 2011 (2007 fire?)

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San Pasqual Valley GSP
Technical Peer Review Meeting

TPR COMMENT REVIEW
AC COMMENTS

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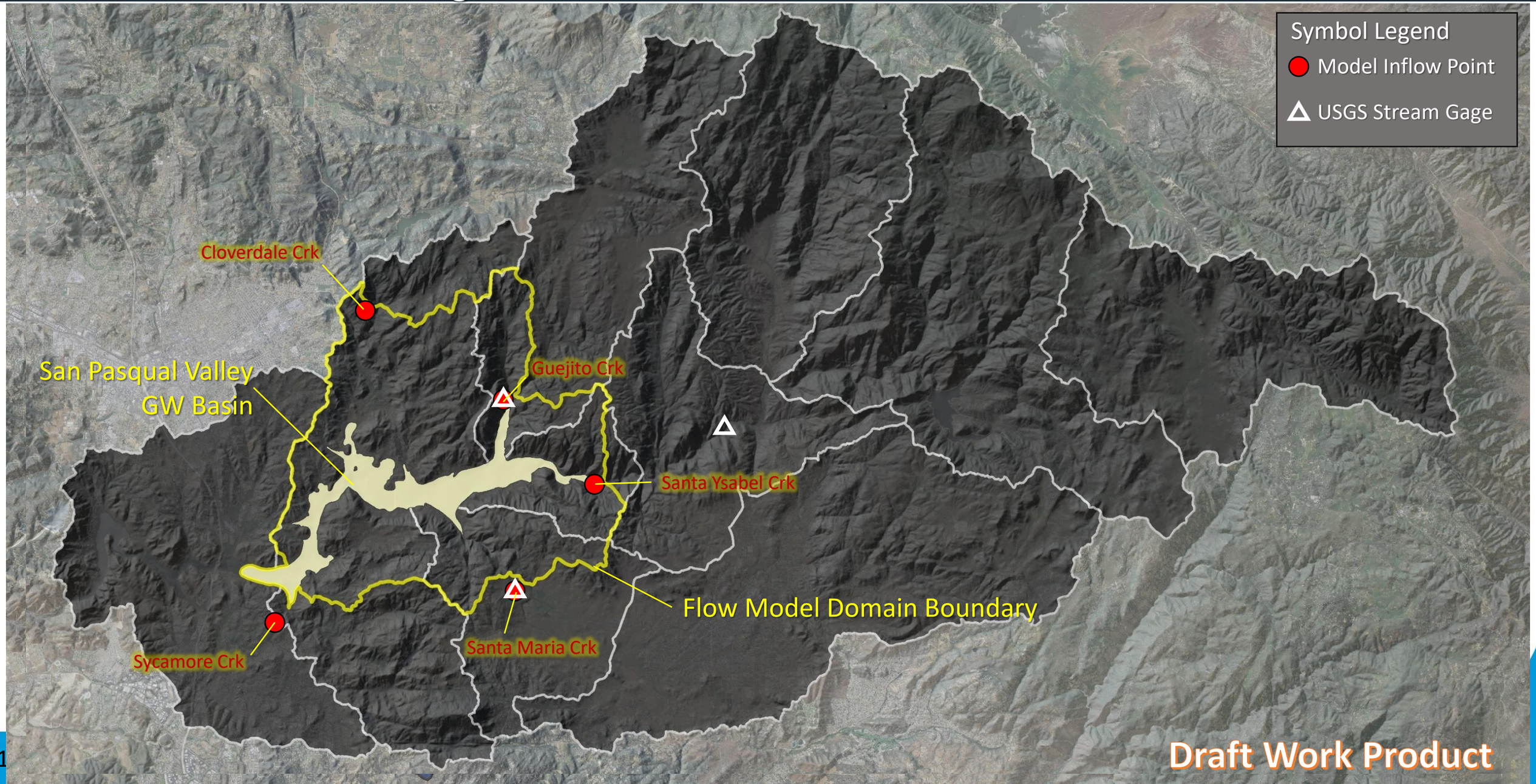
San Pasqual Valley GSP
Technical Peer Review Meeting

TECHNICAL INPUT – APPROACH
Groundwater Model

Draft Work Product

Technical Input – Approach

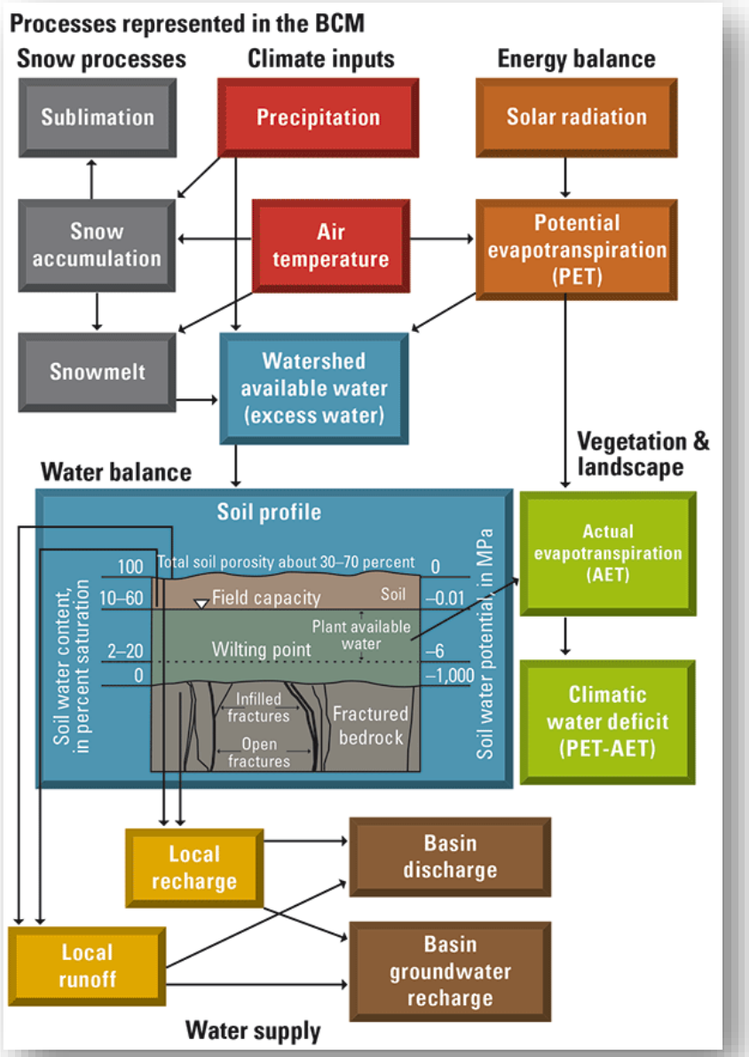
Additional Thoughts on Numerical Flow Model Domain



Technical Input – Approach
Planned Flow Modeling Codes

USGS One-Water Hydrologic Flow Model

USGS Basin Characterization Model (BCM)



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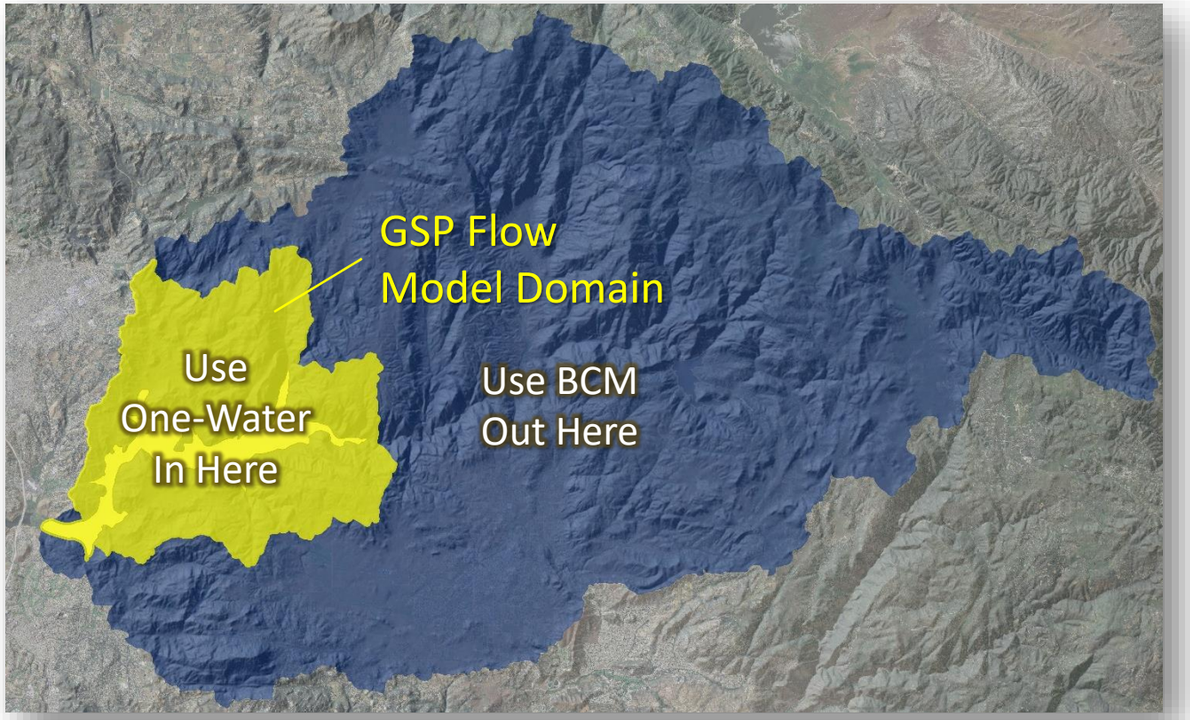
Technical Input – Approach
Summary of Planned Model Domain and Codes

- Use same/similar model domain as used for the Salt & Nutrient Management Plan
- Use BCM to compute stream and groundwater inflows to GSP flow model domain from watershed areas tributary to GSP flow model domain
- Use One-Water Hydrologic Flow Model code within the GSP flow model domain



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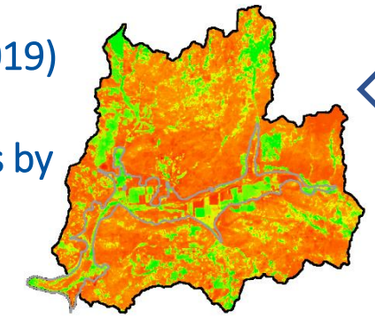
Technical Input – Approach

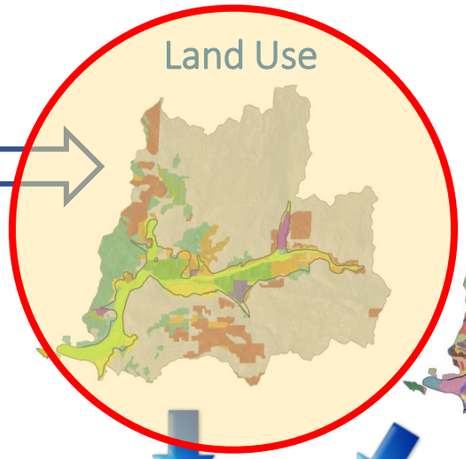
How Land and Water Use Fits Into the Modeling Process

CalETa Actual ET
(2005, 2010-2017, 2019)

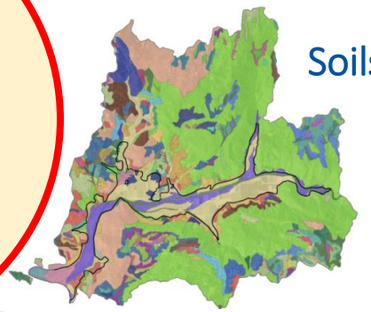
Adj. Crop Coefficients by Land Use
(All other years)



Land Use



Soils

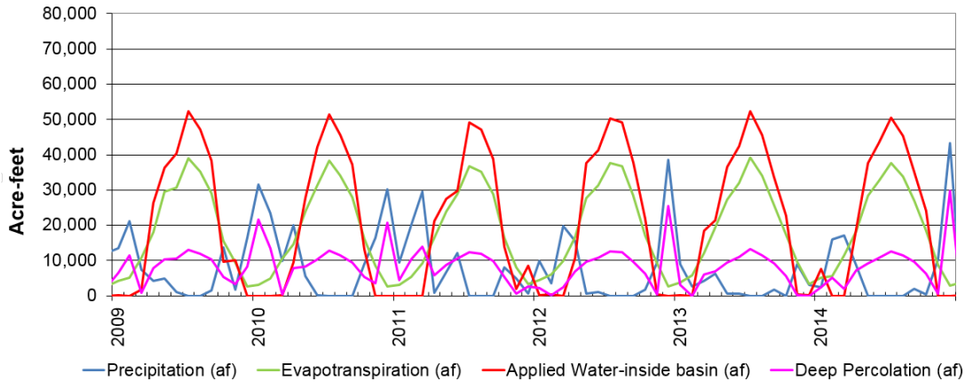


Irrigation Methods & Efficiency

Farm Process Input Files

Climate Data

Numerical Flow Model



–Applied Irrigation Water By Parcel

--Deep Percolation By Parcel

Water Budgets

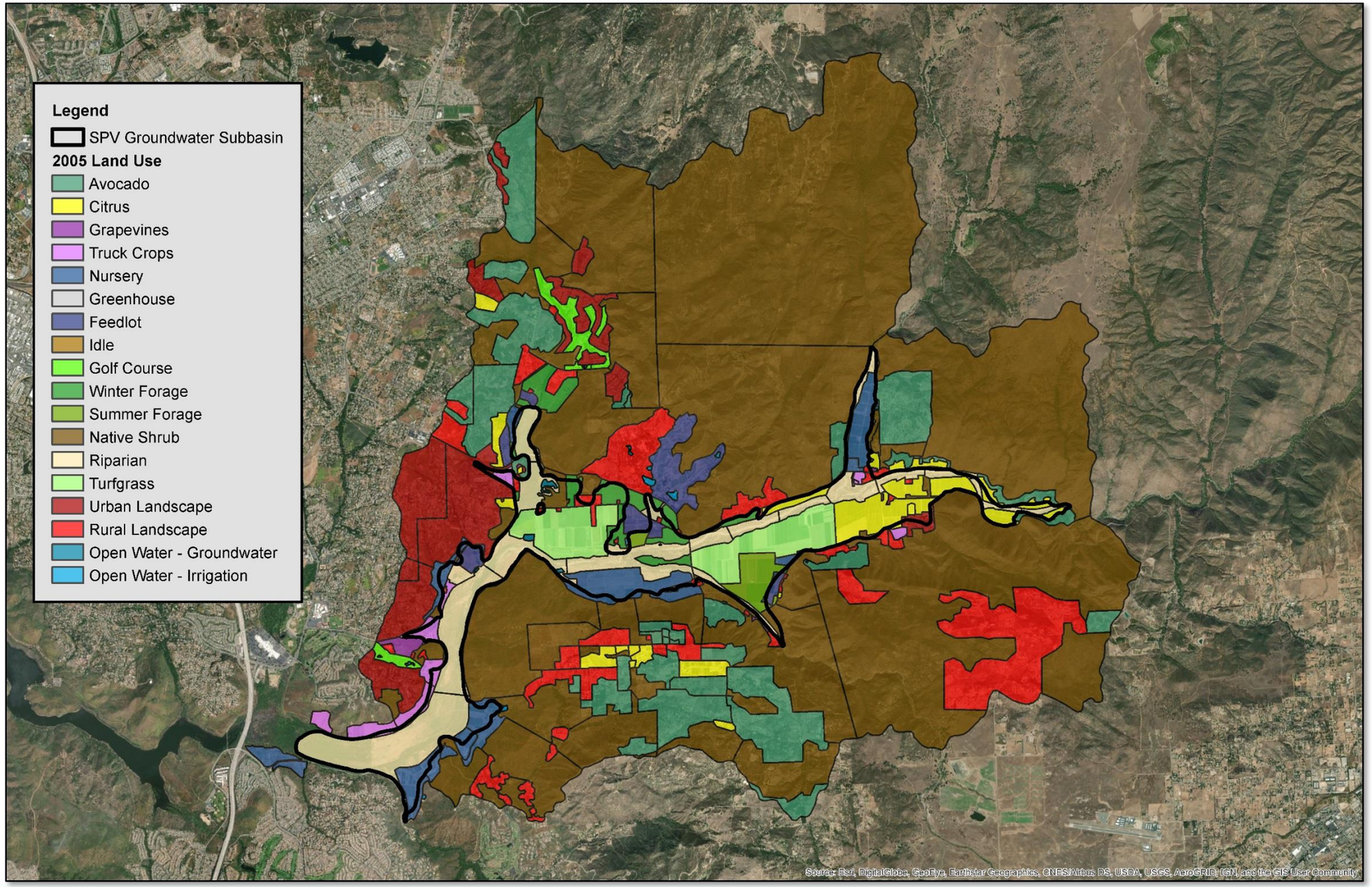
Draft Work Product

Technical Input – Approach
Basis for Land Use Mapping

- We reviewed SANDAG, SANGIS, DWR County, and LandIQ datasets
  - Datasets are incomplete or inaccurate for model needs
  - Data contains limited specificity of agricultural crops
- We reviewed SNMP land use
  - Contains the best resolution of data to capture entire model domain and the range of specific agricultural practices
  - Contains well-to-parcel relationships
- We refined SNMP land use geodata to produce 2005 and 2018 datasets with the aid of 2018 aerial imagery
  - Provided to GSA for stakeholder review of accuracy (see Handout 2)

Draft Work Product

Technical Input – Approach
2005 Land Use



Draft Work Product

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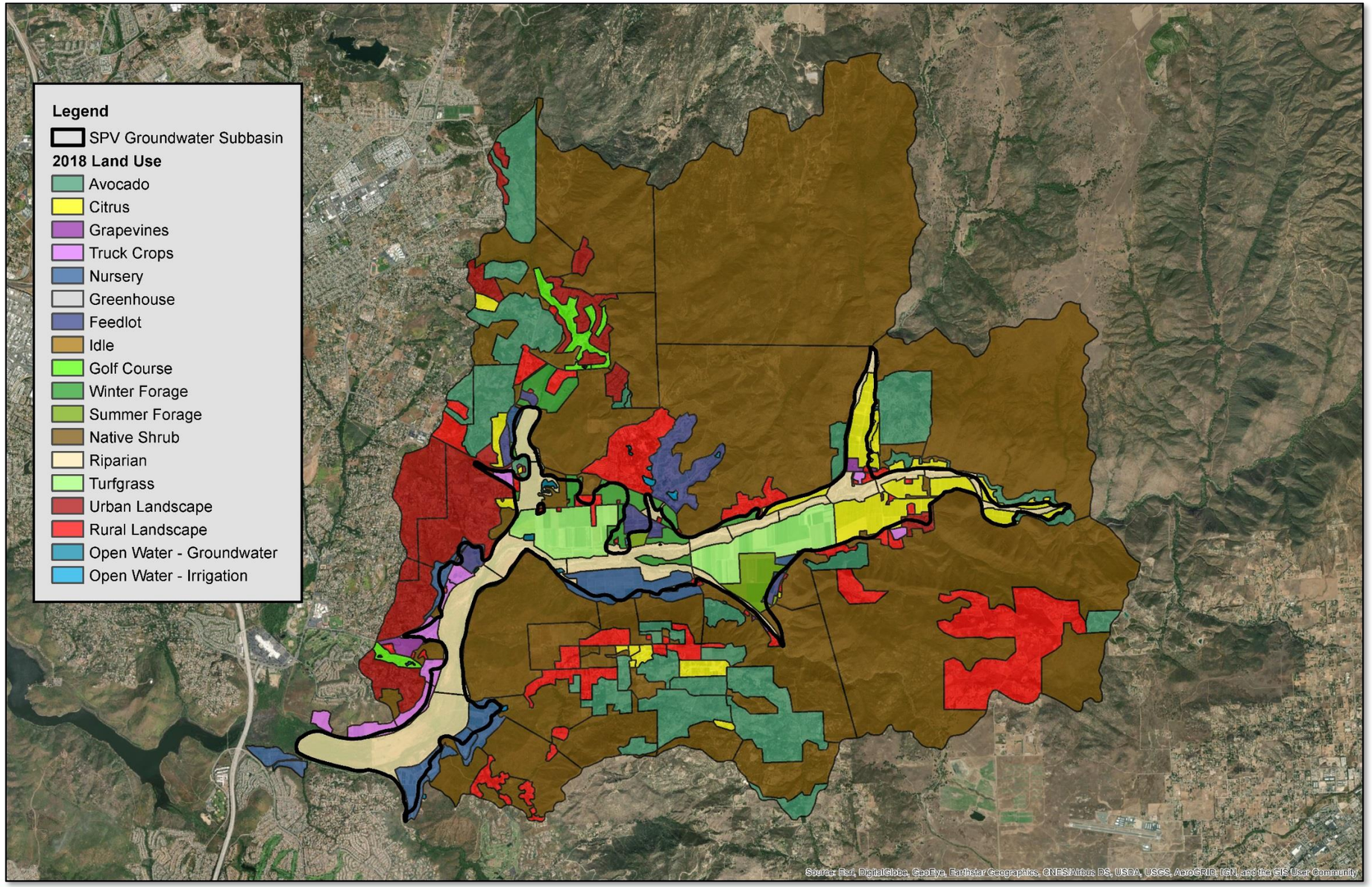
Technical Input – Approach
2018 Land Use



Draft Work Product

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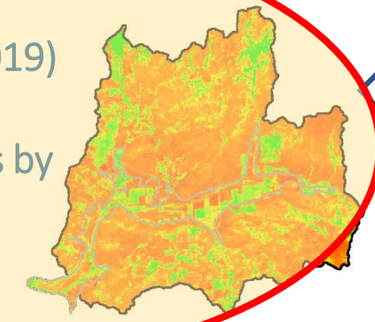
Technical Input – Approach

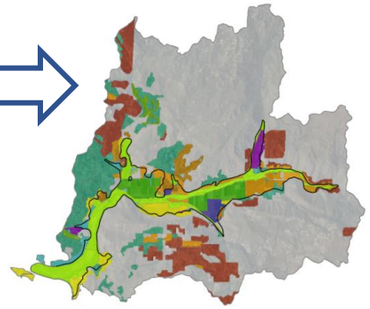
How Land and Water Use Fits Into the Modeling Process

CalETa Actual ET
(2005, 2010-2017, 2019)

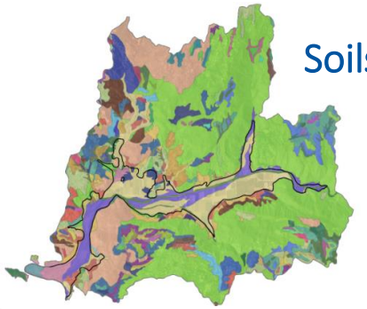
Adj. Crop Coefficients by Land Use
(All other years)



Land Use



Soils



Irrigation Methods & Efficiency

Farm Process Input Files

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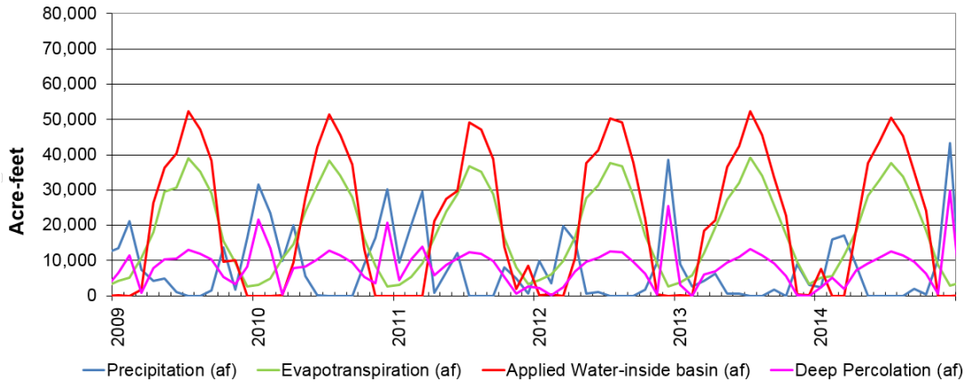
Numerical Flow Model



–Applied Irrigation Water By Parcel

--Deep Percolation By Parcel

Water Budgets

Draft Work Product

Technical Input – Approach

How Consumptive Use is Computed in the Numerical Flow Model

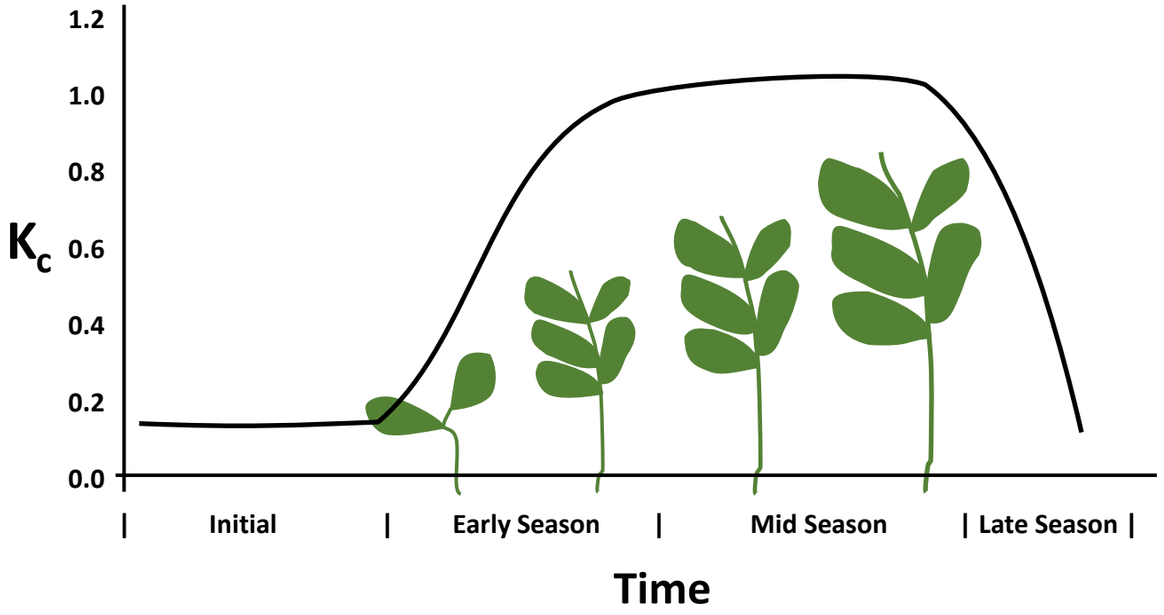
$$CU = CalET_a = K_c \times ET_{REF}$$

$CU = Crop\ Consumptive\ Use$

$CalET_a = Actual\ Crop\ Evapotranspiration$

$K_c = Crop\ Coefficient$

$ET_{REF} = Reference\ Evapotranspiration$



Year	Consumptive Use Dataset	ET_{REF} Needed?	Example Land Use Condition
2005	CalETa Direct	No	2005
2006	CalETa Kc	Yes	2005
2007	CalETa Kc	Yes	2005
2008	CalETa Kc	Yes	2005
2009	CalETa Kc	Yes	2005
2010	CalETa Direct	No	2005
2011	CalETa Direct	No	2018
2012	CalETa Direct	No	2018
2013	CalETa Direct	No	2018
2014	CalETa Direct	No	2018
2015	CalETa Direct	No	2018
2016	CalETa Direct	No	2018
2017	CalETa Direct	No	2018
2018	CalETa Kc	Yes	2018
2019	CalETa Direct	No	2018

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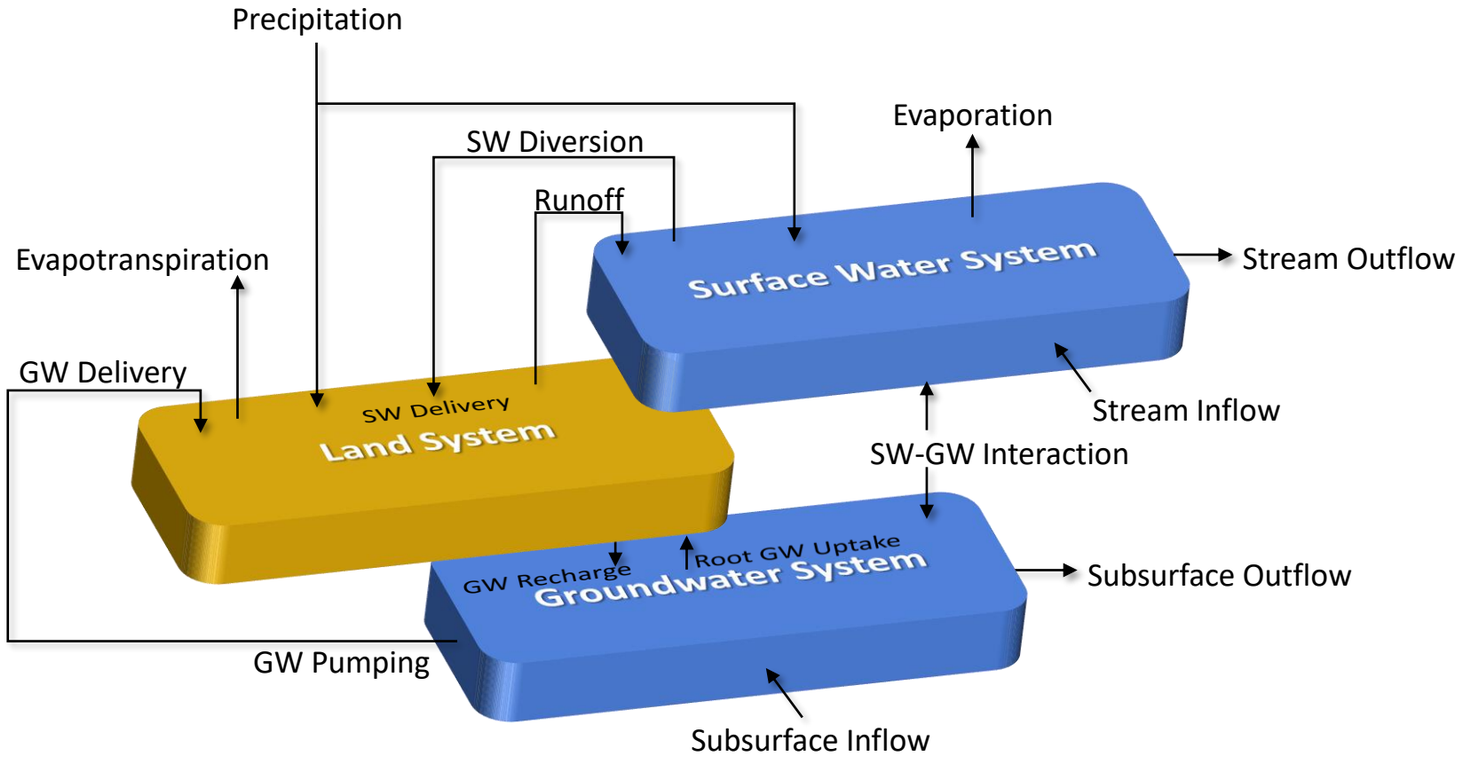
Technical Input – Approach
Agricultural Pumping in the Numerical Flow Model

- Hierarchy of water supply in One-Water Code
  - Root groundwater uptake
  - Precipitation
  - Specified deliveries
  - Ag pumping (if needed)



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San Pasqual Valley GSP
Technical Peer Review Meeting

TECHNICAL INPUT – APPROACH
Monitoring Networks

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Monitoring Networks
Sustainable Management Criteria (SMC)

Sustainability Indicator	Measurement Process
Groundwater Levels	Groundwater elevations
Groundwater Storage	Groundwater elevations
~~Seawater Intrusion~~	~~Location of isocontour~~
Degraded Groundwater Quality	Water quality measurements
Land Subsidence	Groundwater Elevations
Depletion of Interconnected Surface Waters	Groundwater Elevations

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Monitoring Networks

- Representative <u>Groundwater Level</u> Network
  - Wells with existing monitoring data
  - Wells that will be monitored in the future
  - Note: Newly constructed wells are not included due to not having measurements

Monitoring Networks

- Representative Groundwater Quality Network

San Pasqual Valley GSP
Technical Peer Review Meeting

TECHNICAL INPUT – APPROACH
Sustainability Criteria

Draft Work Product

Sustainable Management Criteria (SMC)

Sustainability Indicator	Measurement Process
Groundwater Levels	Groundwater elevations
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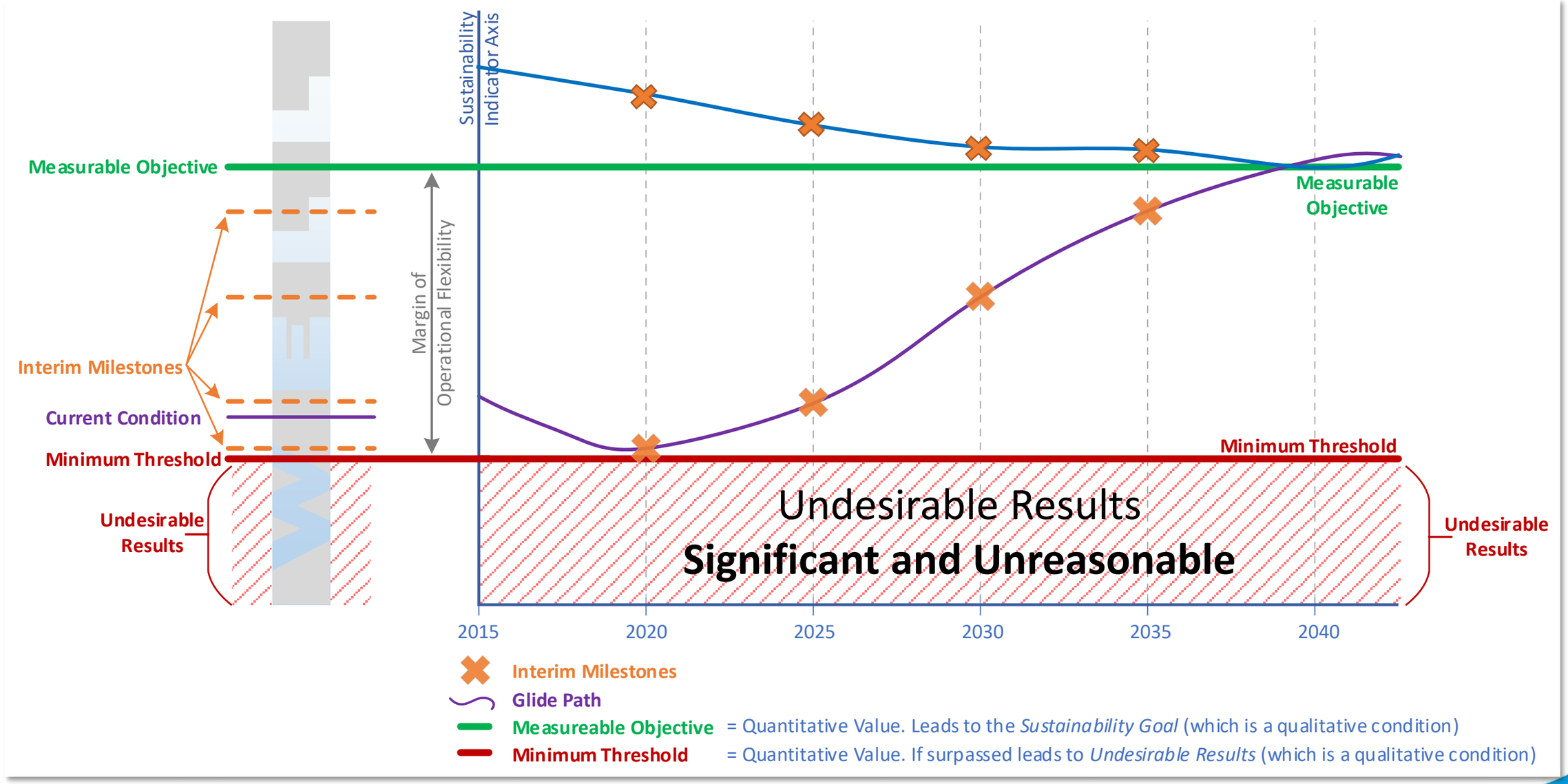
Degraded Groundwater Quality	Water quality measurements
Land Subsidence	Groundwater Elevations
Depletion of Interconnected Surface Waters	Groundwater Elevations

Draft Work Product

Sustainable Management Criteria
Term Diagram – Showing Two Conditions



Draft Work Product

Sustainable Management Criteria
Minimum Thresholds Input

- Seeking TPR input on considerations for setting Minimum Thresholds
- Stakeholder input considered:
  - Well infrastructure
  - GDEs
- Consulting team considered for first cut:
  - Conditions at January 1, 2015
  - Historic Low
  - Number and depth of WCRs near each monitoring well
  - GDEs monitored with a different network
- Other Considerations?

Sustainability Indicator [1]	II. GROUNDWATER ELEVATION
Undesirable Results Consideration[2]	Chronic lowering of groundwater levels indicating unreasonable depletion of supply, which results in: a. Adverse impacts to the viability of agriculture, and the agricultural economy. b. Unusable and stranded groundwater extraction infrastructure. c. Need to deepen or construct new wells. d. Adverse impacts to domestic wells users. e. Adverse impacts on connected ecosystems.
Minimum Threshold Consideration [3]	• Local well infrastructure depths • Groundwater dependent ecosystems

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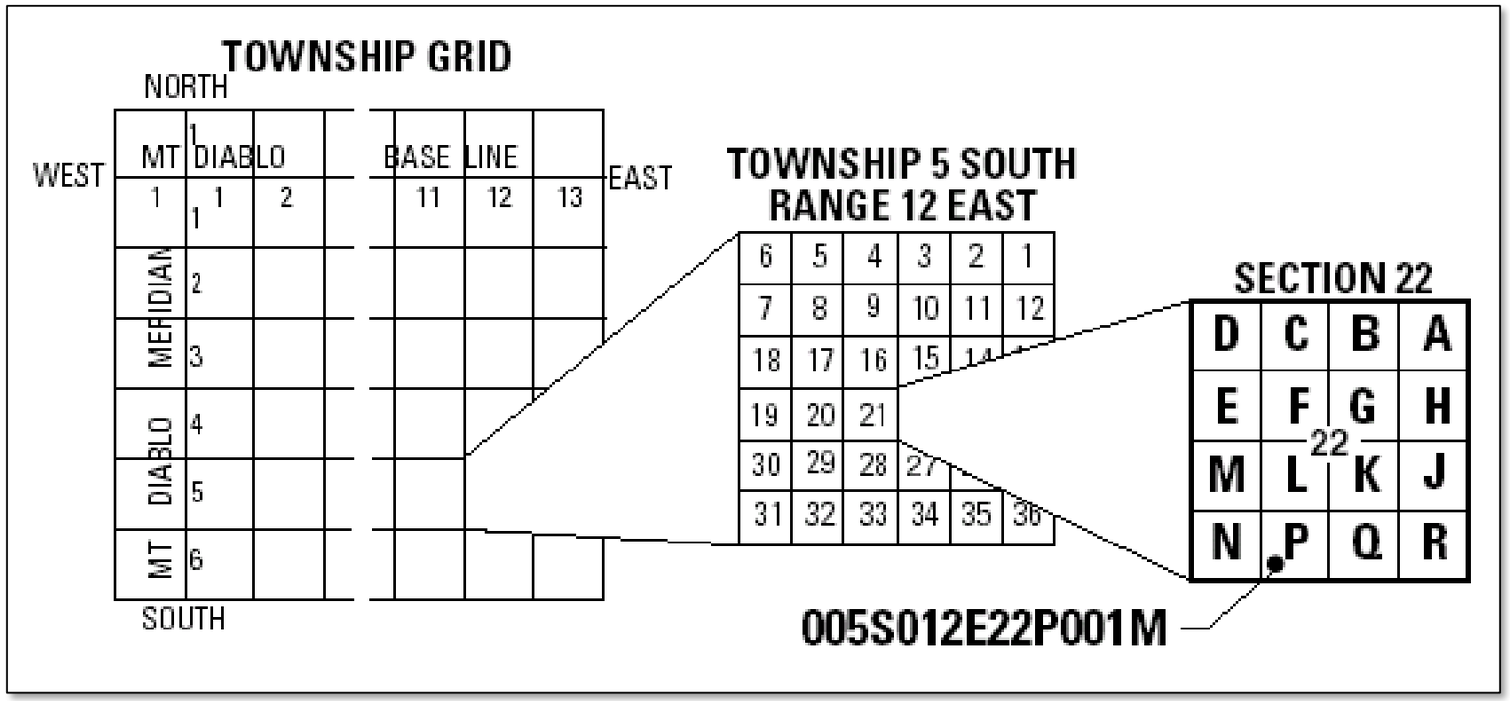
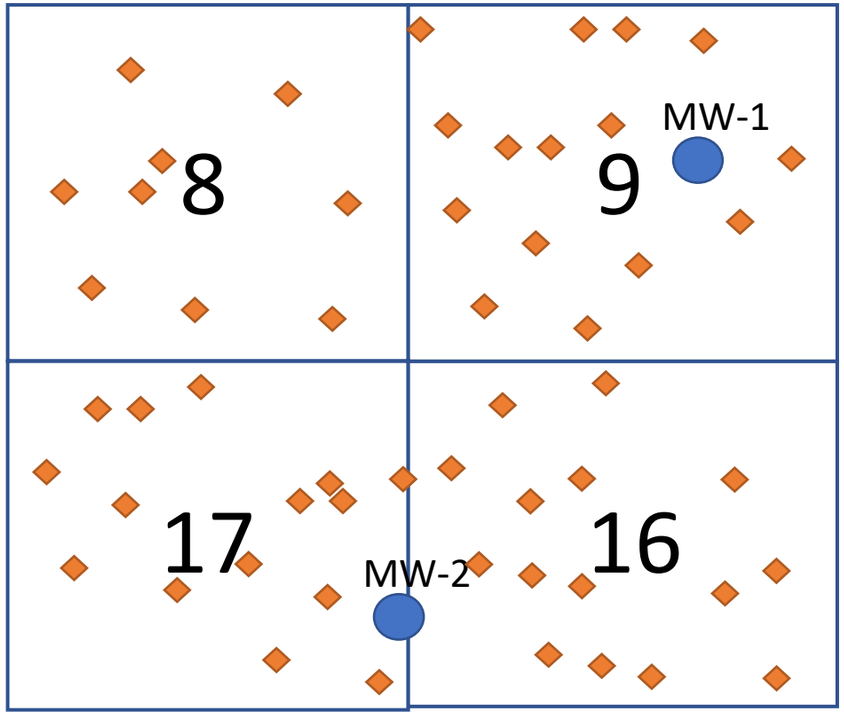
Sustainable Management Criteria
Well Infrastructure

- Depth of Well Completion Reports
  - 15 wells in Section 9 are used to compare MW-1
  - 29 wells in Sections 16 and 17 are used to compare MW-2





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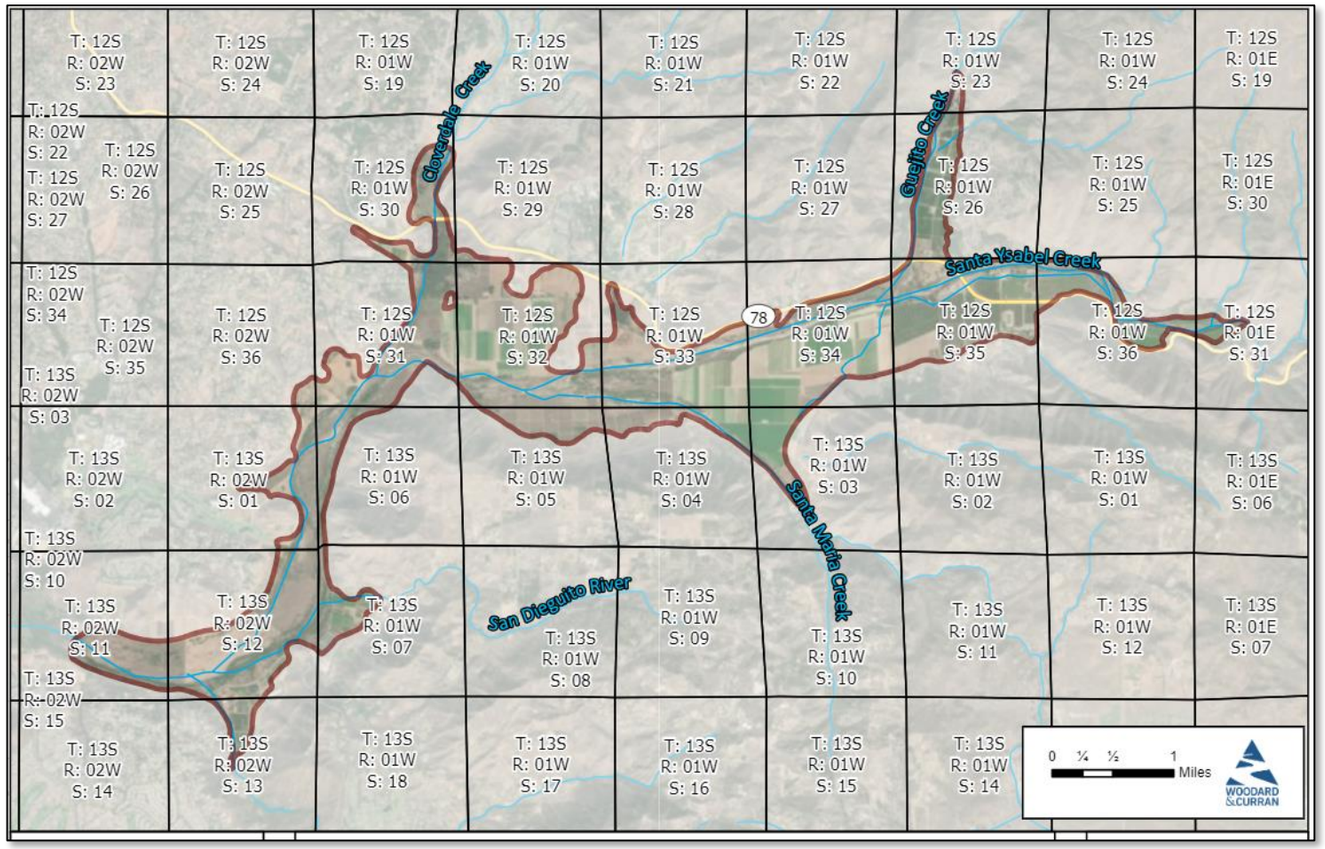
Sustainable Management Criteria
Well Infrastructure

- Limits of Well Completion Reports
  - DWR's WCR database typically is missing 20% of wells
    - This was improved by adding City and County WCRs
  - Sections (1 square mile) often include areas outside of the basin
  - Wells in the WCR database are not commonly reported when may be not in service or destroyed



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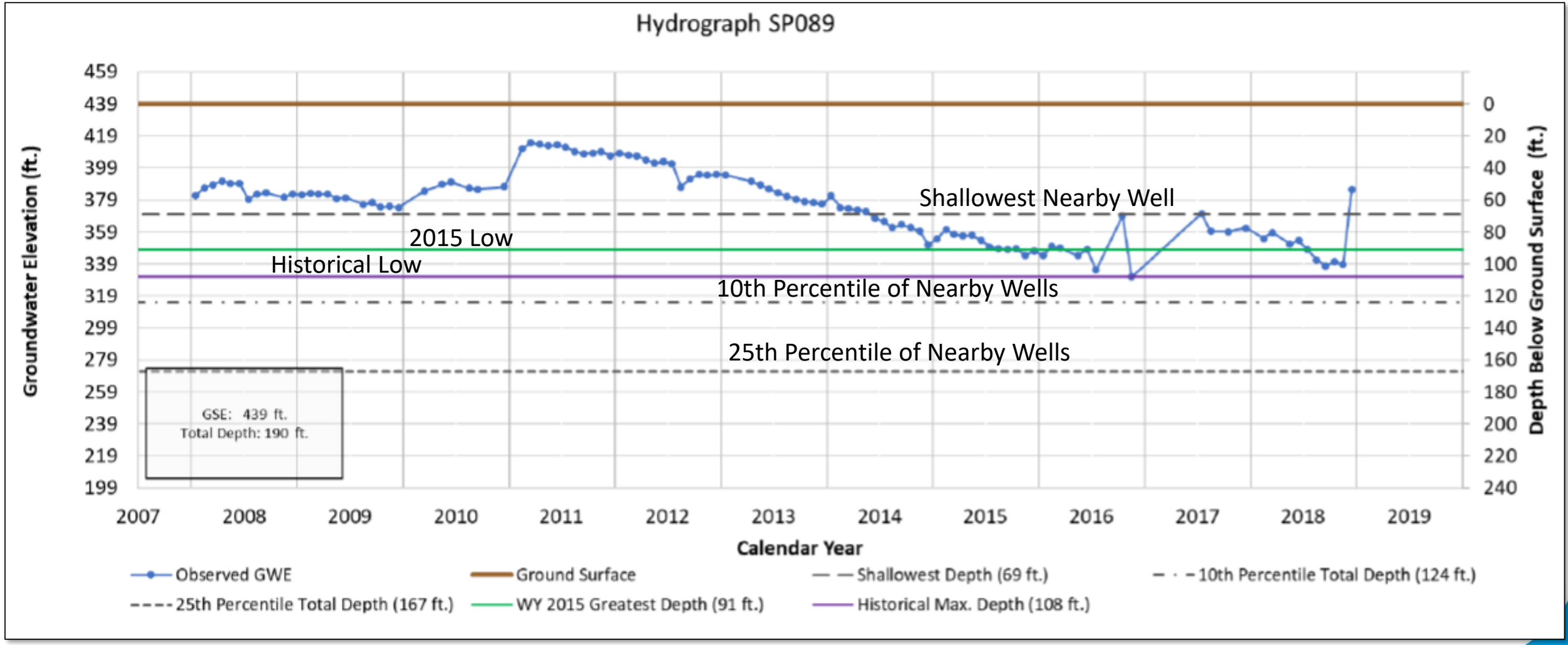
Sustainable Management Criteria
Potential Minimum Thresholds



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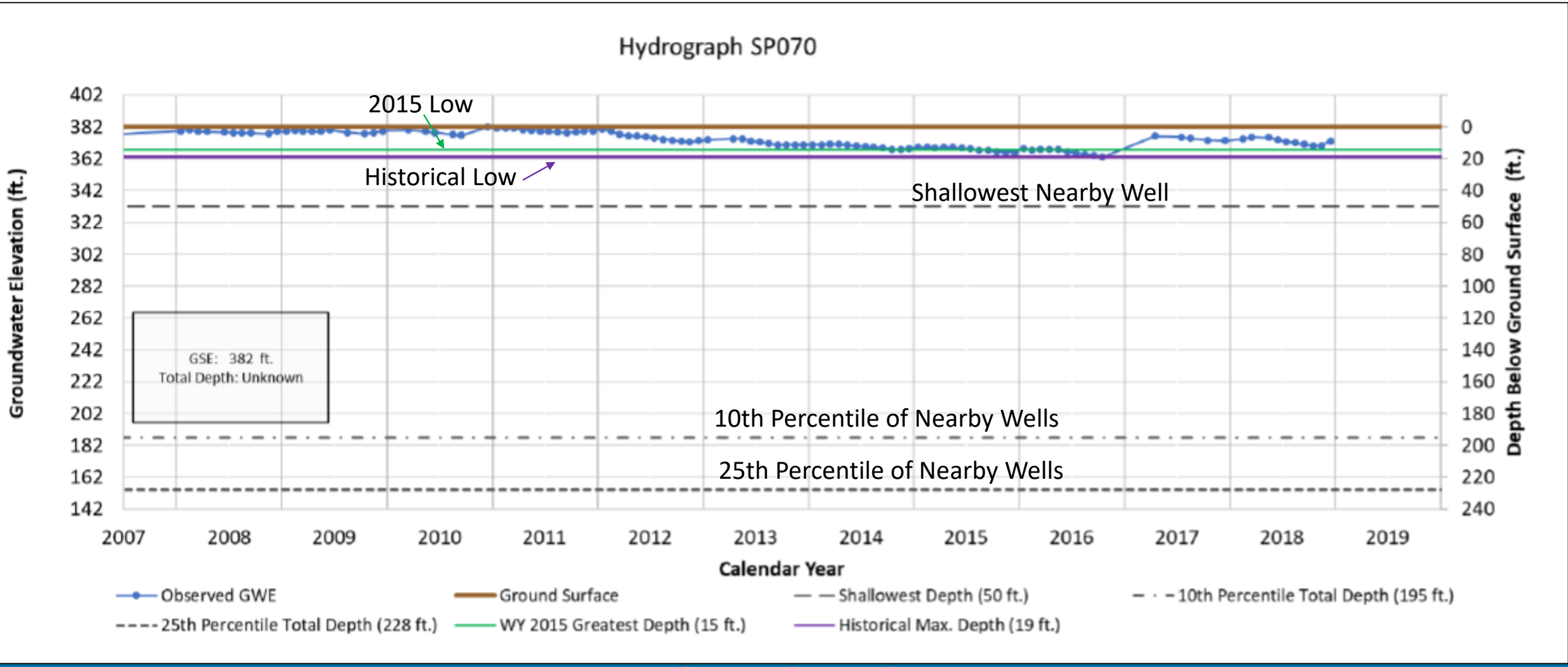
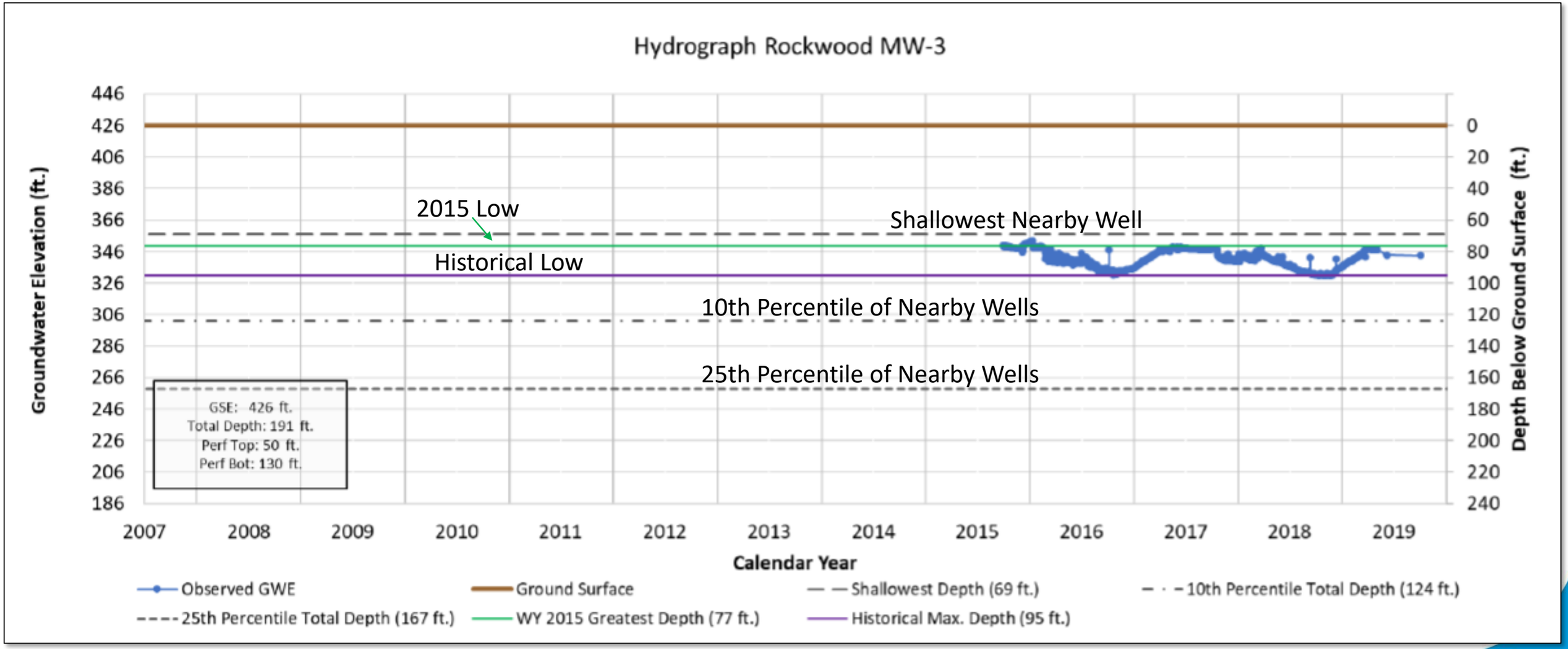
Sustainable Management Criteria
Potential Minimum Thresholds



Draft Work Product

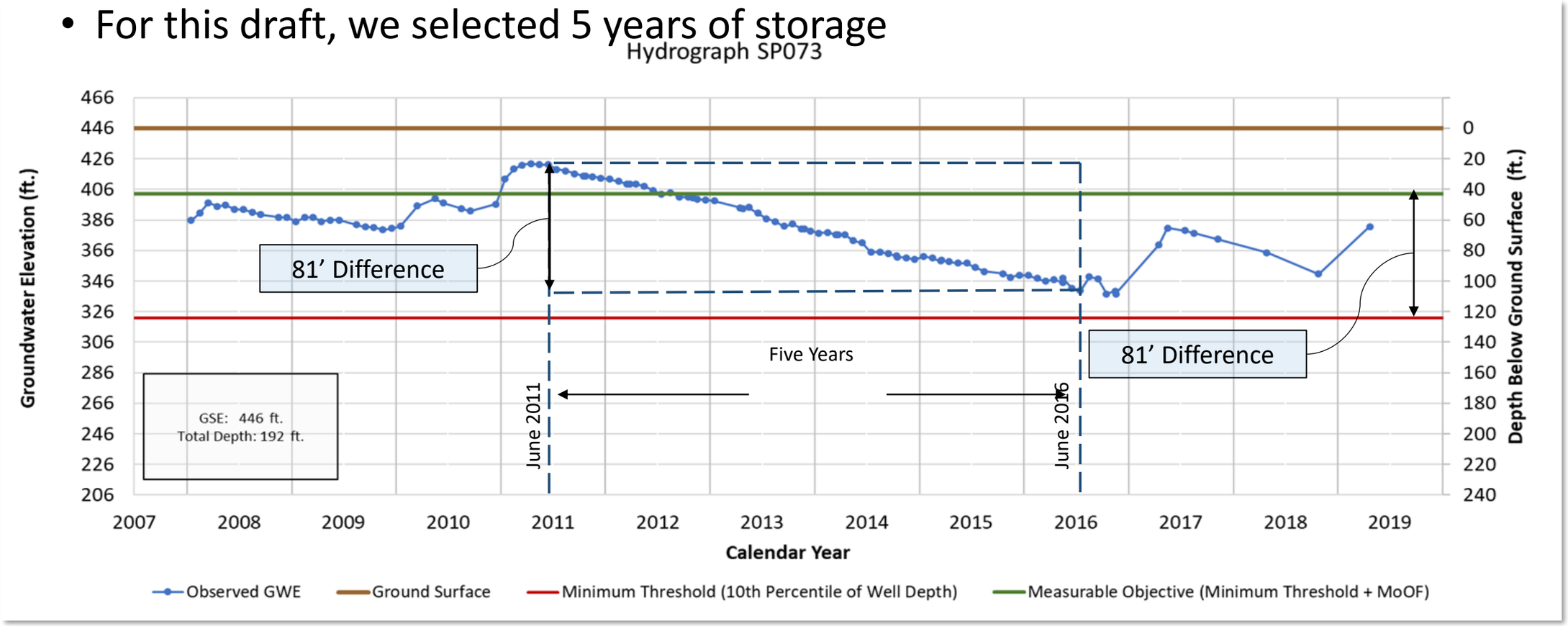
Sustainable Management Criteria
Potential Minimum Thresholds



Draft Work Product

Sustainable Management Criteria
Potential Margin of Operational Flexibility

- Margin of Operational Flexibility (MoOF)
  - Used to set a ‘buffer’ of storage above the minimum threshold to set the measurable objective
  - For this draft, we selected 5 years of storage



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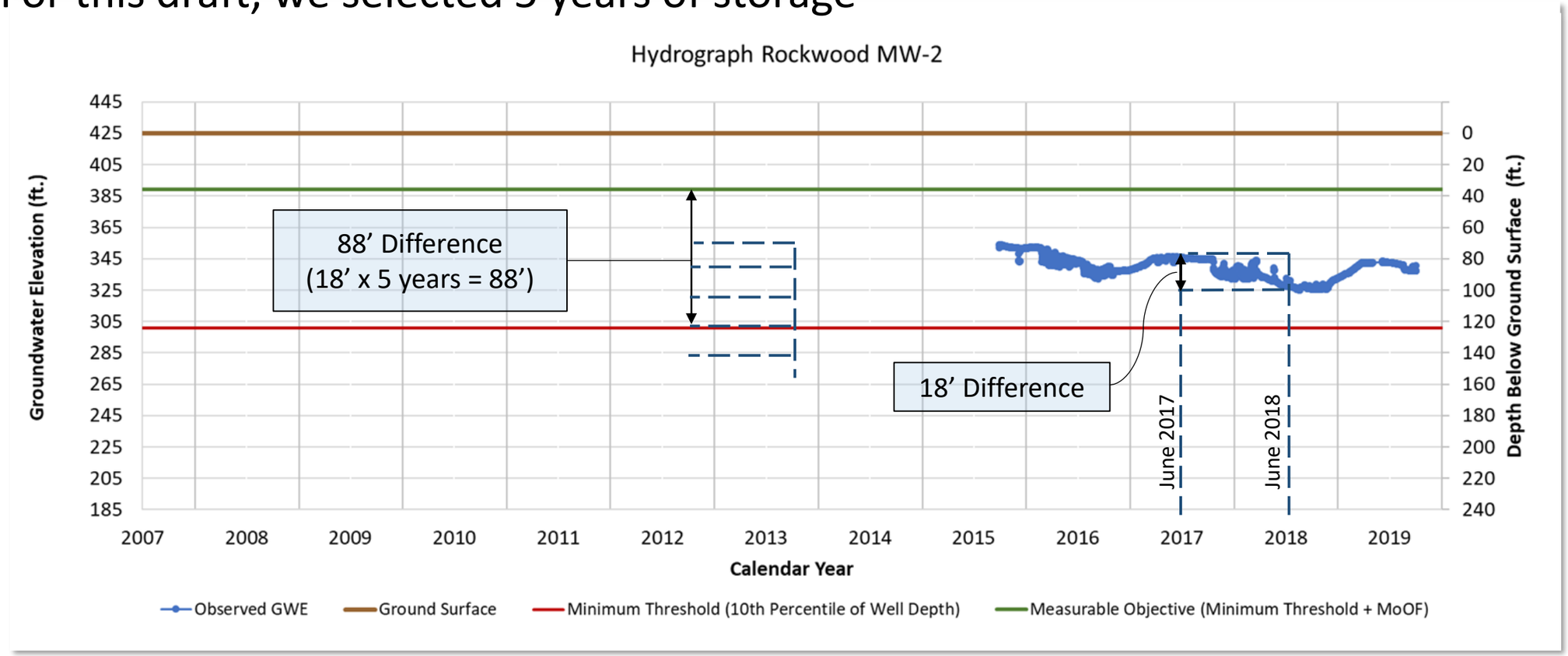
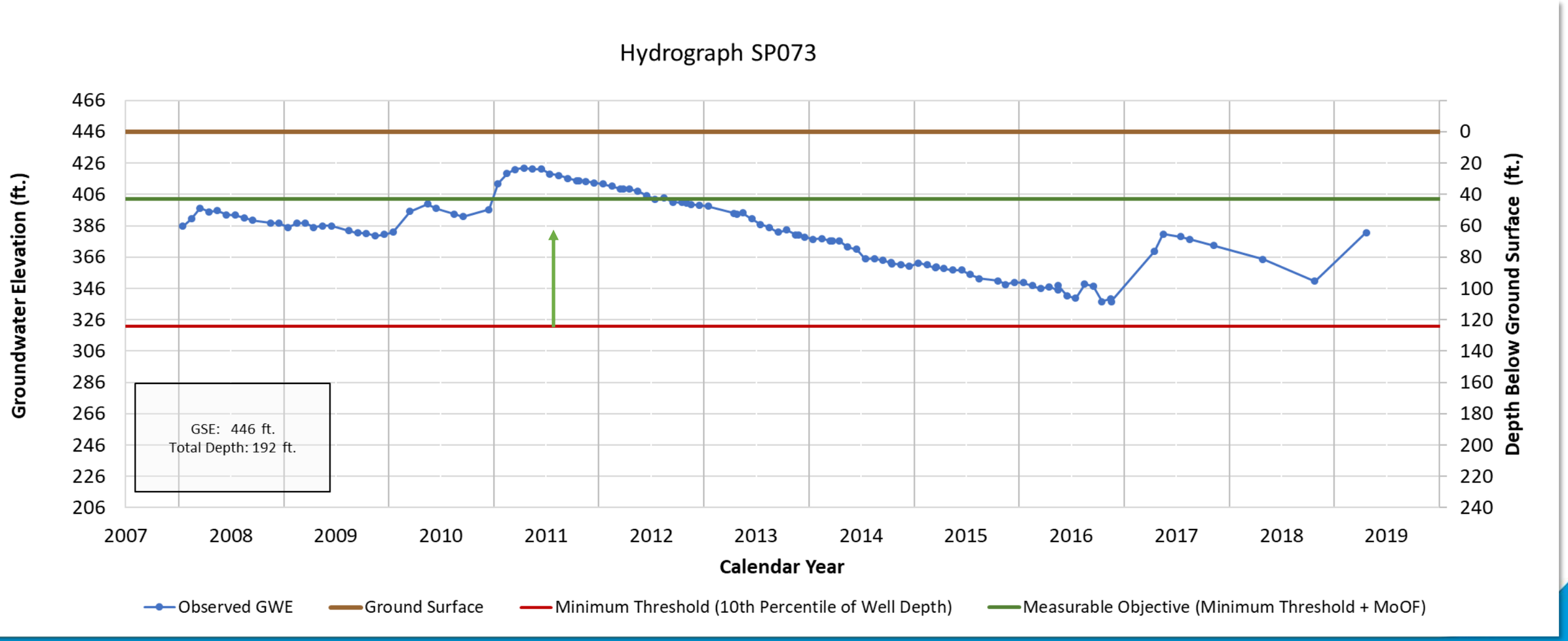


Draft Work Product

Sustainable Management Criteria
Minimum Threshold and Measurable Objective

- Set Measurable Objective by adding the 5-year change to the minimum threshold



Draft Work Product

Sustainable Management Criteria
Minimum Threshold and Measurable Objective

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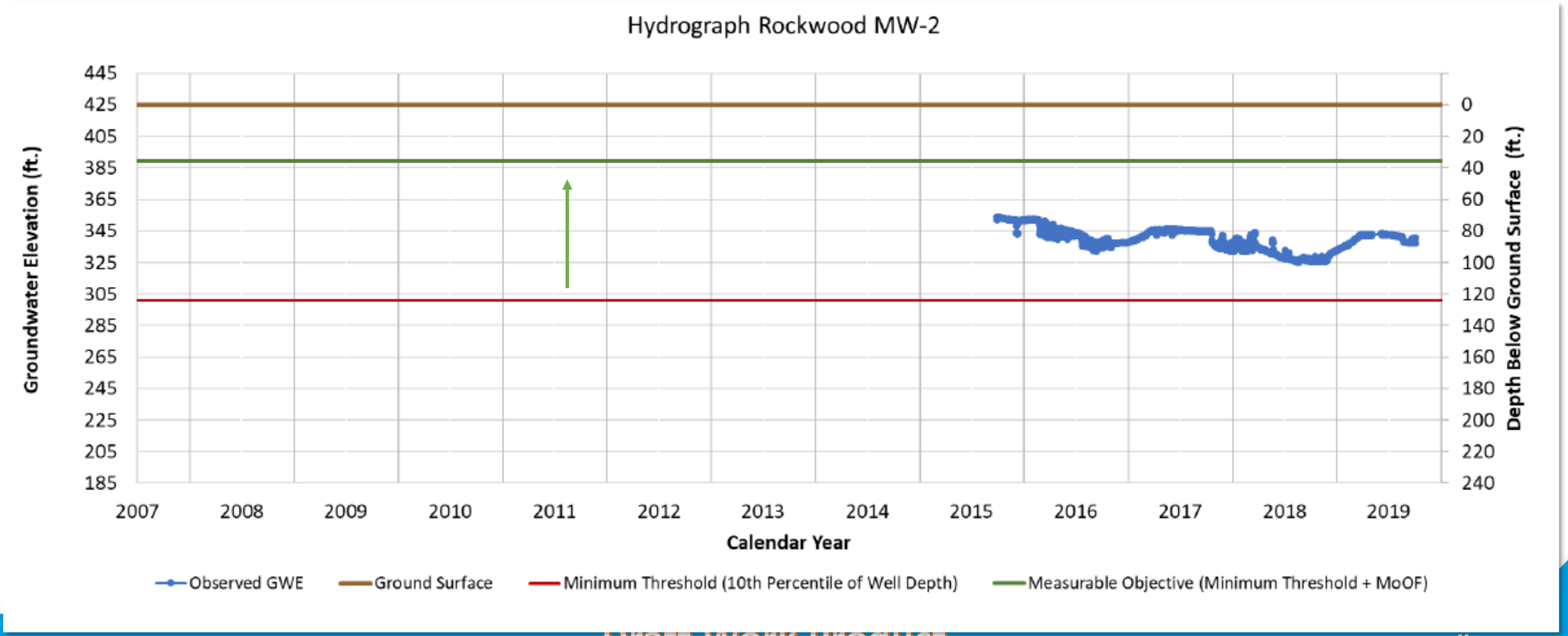


Draft Work Product

San Pasqual Valley GSP
Technical Peer Review Meeting

TECHNICAL INPUT – APPROACH
AC COMMENTS

Draft Work Product

The City of SAN DIEGO

San Pasqual Valley GSP
Technical Peer Review Meeting

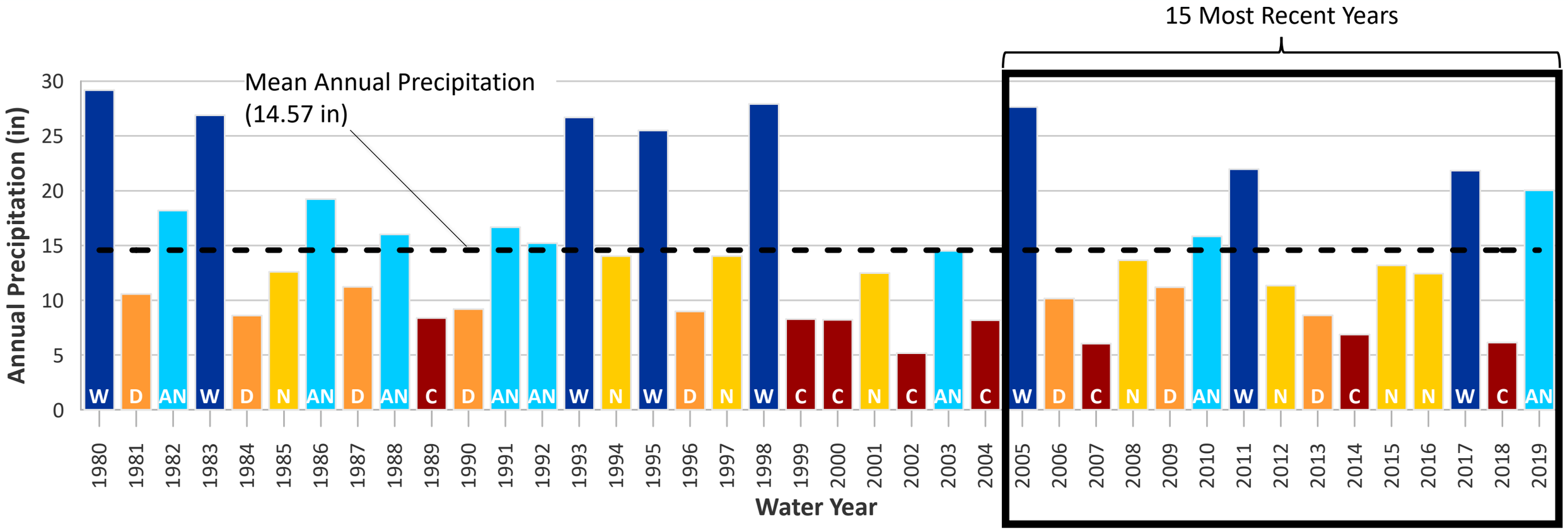
PRELIMINARY ANALYSIS RESULTS
Groundwater Model

Draft Work Product

The City of SAN DIEGO

Preliminary Analysis Results – Flow Model

Selected Calibration Period & Climate Year Analysis Using PRISM Precipitation Data



Water Year Index

W	Wet
AN	Above Normal
N	Normal
D	Dry
C	Critical

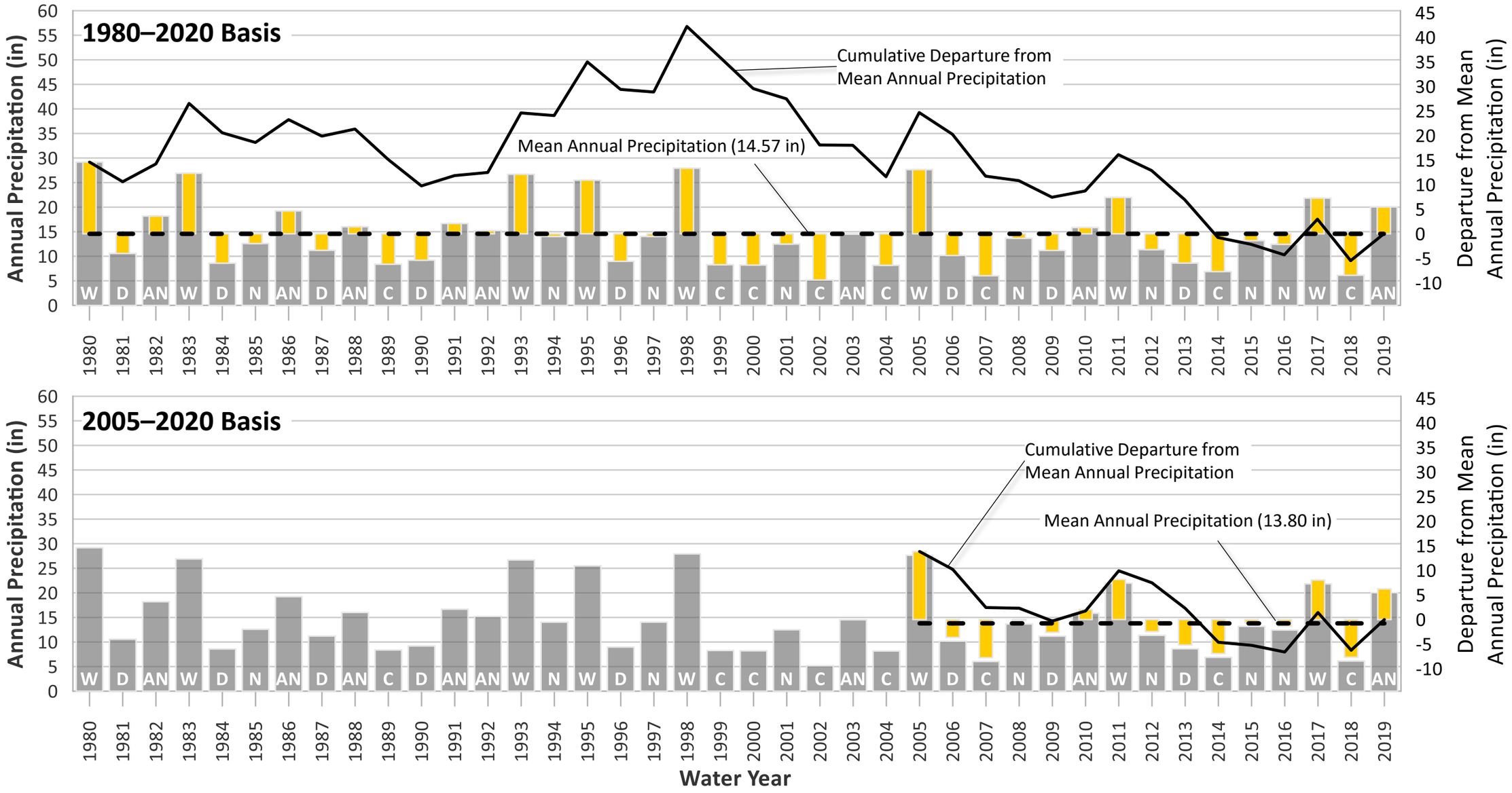
Selected Calibration Period →

Period	C	D	N	AN	W
2010–2020	2	1	3	2	2
2005–2020	3	3	4	2	3
1980–2020	8	8	8	8	8

Draft Work Product

Preliminary Analysis Results – Flow Model

Departures from Mean Annual Precipitation Using PRISM Precipitation Data

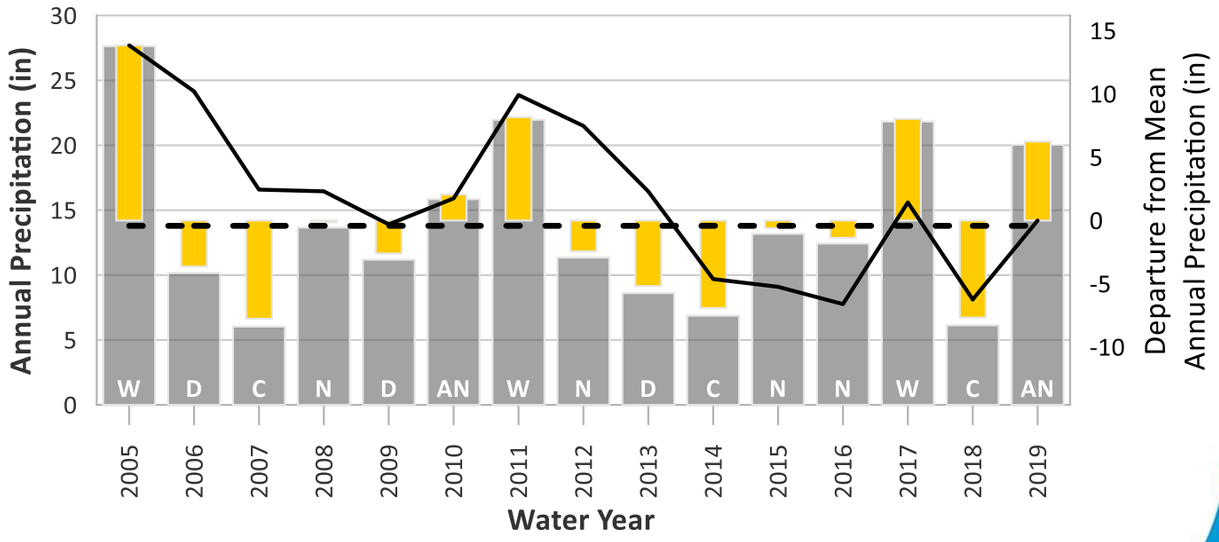


Draft Work Product

Preliminary Analysis Results – Flow Model
Basis for Selected Calibration Period

- GSP Regulations require a calibration period of at least the most recent 10 years
- We plan to use a 15-year calibration period from 2005–2020
  - Good representation of the five water year indices
  - 2005–2020 mean annual precipitation (MAP) is similar to long-term (1980–2020) MAP
  - Cumulative departure analysis indicates 2005–2020 period has reasonable balance of wet, normal, and dry conditions for calibration
  - Land and water use and other model input data are less reliable prior to 2005

Period	C	D	N	AN	W
2010–2020	2	1	3	2	2
2005–2020	3	3	4	2	3
1980–2020	8	8	8	8	8



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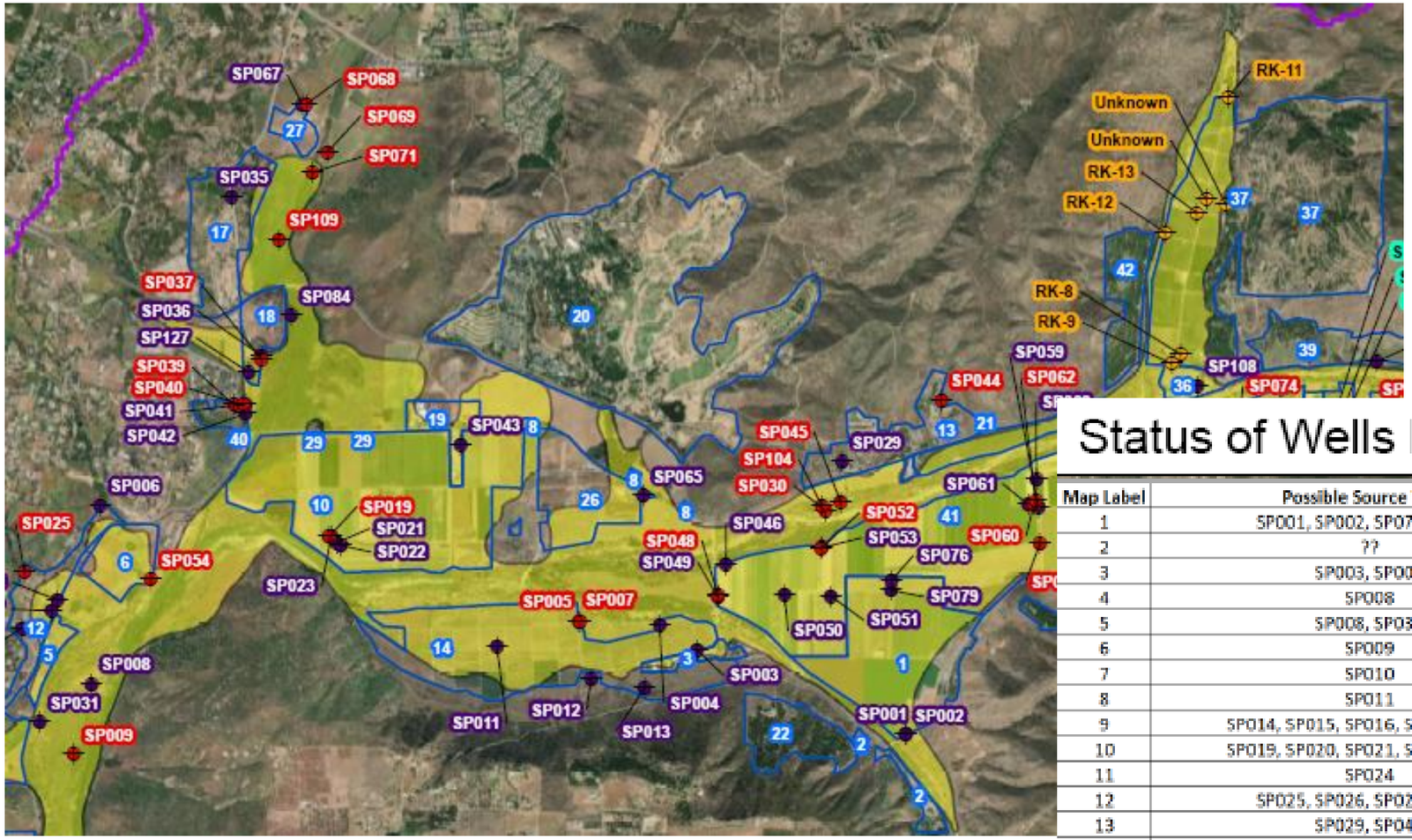
- **Purpose:** Assign wells that support irrigated uses within each parcel, so irrigation volumes from water balances can be attributed to specific groundwater (GW) wells in numerical flow model
  - "Ground-truthing" of pumping estimates will be conducted with actual pumping data, as available

Work Completed To Date

- Leveraged previous SNMP effort to map wells to parcels
  - Received confirmation and input from City of San Diego during the SNMP effort
- Updated SNMP data based on a recent map provided by City of San Diego
  - Included the addition of new wells and refined well-to-parcel relationships (see Handout #2)

Draft Work Product

Preliminary Analysis Results – Flow Model
Example Assignments of Wells to Parcels



Legend
Pumping Wells
- City of San Diego - Inactive
- City of San Diego - Active
- Rancho Guejito
- San Pasqual Academy
- Parcel with Well Designation
- SPV Groundwater Subbasin

Blue highlighted numbers represent the 'Map Label' presented in the table at the bottom right.

Status of Wells Represents Current Conditions (2020)

Map Label	Possible Source Wells	Map Label	Possible Source Wells
1	SP001, SP002, SP076, SP079	22	SP053
2	??	23	SP055, SP056, SP066, SP089, SP090
3	SP003, SP004	24	SP055, SP057, SP074, SP075, SP083, SP085, SP088
4	SP008	25	SP059, SP061, SP063
5	SP008, SP031	26	SP065
6	SP009	27	SP067
7	SP010	28	SP072
8	SP011	29	SP084
9	SP014, SP015, SP016, SP017, SP018	30	SP087
10	SP019, SP020, SP021, SP022, SP023	31	SP089, SP090
11	SP024	32	SP092
12	SP025, SP026, SP027, SP028	33	SP093, SP094, SP095, SP096, SP126
13	SP029, SP044	34	SP098
14	SP003, SP004, SP005, SP007, SP012, SP013	35	SP101
15	SP032	36	SP108
16	SP032, SP033, SP034	37	??
17	SP035	38	SP119
18	SP036, SP037	39	SP121
19	SP043	40	SP039, SP040, SP041, SP042
20	SP046 & Escondido Recycled Water	41	SP048, SP049, SP050, SP051, SP053, SP059, SP061, SP062, SP063
21	SP048, SP049, SP050, SP051, SP053	42	??

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San Pasqual Valley GSP
Technical Peer Review Meeting

PRELIMINARY ANALYSIS RESULTS
AC COMMENTS

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The City of SAN DIEGO

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REFINED ANALYSIS
Groundwater Dependent Ecosystems

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The City of SAN DIEGO

Groundwater Dependent Ecosystems (GDEs)

- GDEs are ecosystems that receive the majority of their water supply from groundwater
- For SGMA analysis, we reviewed the “Natural Communities Commonly Associated with Groundwater (NCCAG)” dataset
- Wetlands biologist reviews the dataset and compares it with other datasets, aerial imagery, and USGS mapping
- Wetlands biologist visited SPV to perform site visits to verify remote sensing analysis
- Wetlands biologist identifies areas as ‘potential GDEs’ or ‘potential non-GDEs’ after analysis

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Groundwater Dependent Ecosystems (GDEs)

Natural Communities Commonly Associated with Groundwater (NCCAG) Dataset

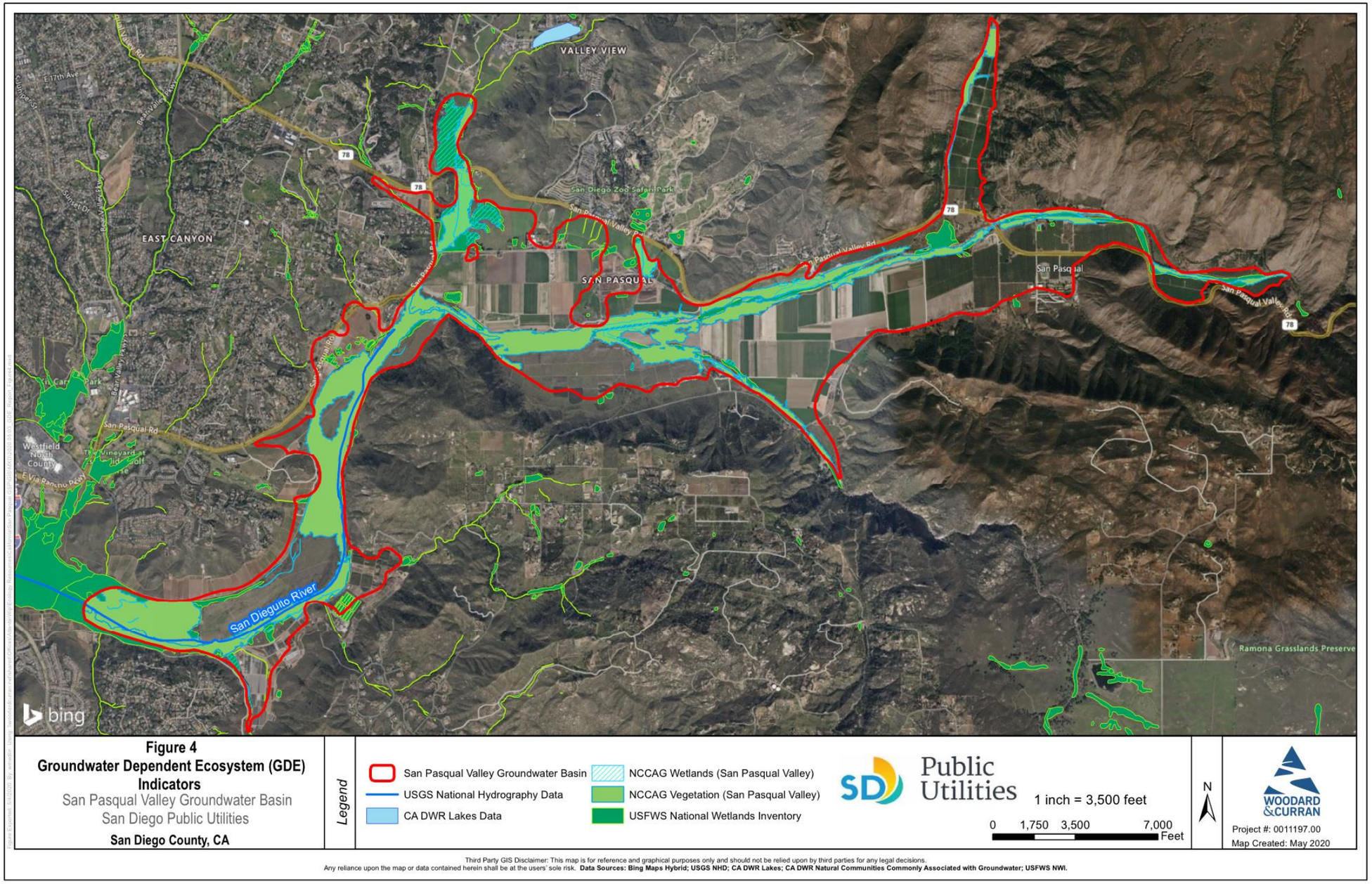


Figure 4
Groundwater Dependent Ecosystem (GDE) Indicators
San Pasqual Valley Groundwater Basin
San Diego Public Utilities
San Diego County, CA

Legend

- San Pasqual Valley Groundwater Basin
- USGS National Hydrography Data
- CA DWR Lakes Data
- NCCAG Wetlands (San Pasqual Valley)
- NCCAG Vegetation (San Pasqual Valley)
- USFWS National Wetlands Inventory

Public Utilities

1 inch = 3,500 feet

0 1,750 3,500 7,000 Feet

N

WOODARD &CURRAN

Project #: 0011197.00
Map Created: May 2020

Third Party GIS Disclaimer: This map is for reference and graphical purposes only and should not be relied upon by third parties for any legal decisions.
Any reliance upon the map or data contained herein shall be at the users' sole risk. **Data Sources: Bing Maps Hybrid; USGS NHD; CA DWR Lakes; CA DWR Natural Communities Commonly Associated with Groundwater; USFWS NWI.**

Groundwater Dependent Ecosystems (GDEs)

Locations of Site Visits

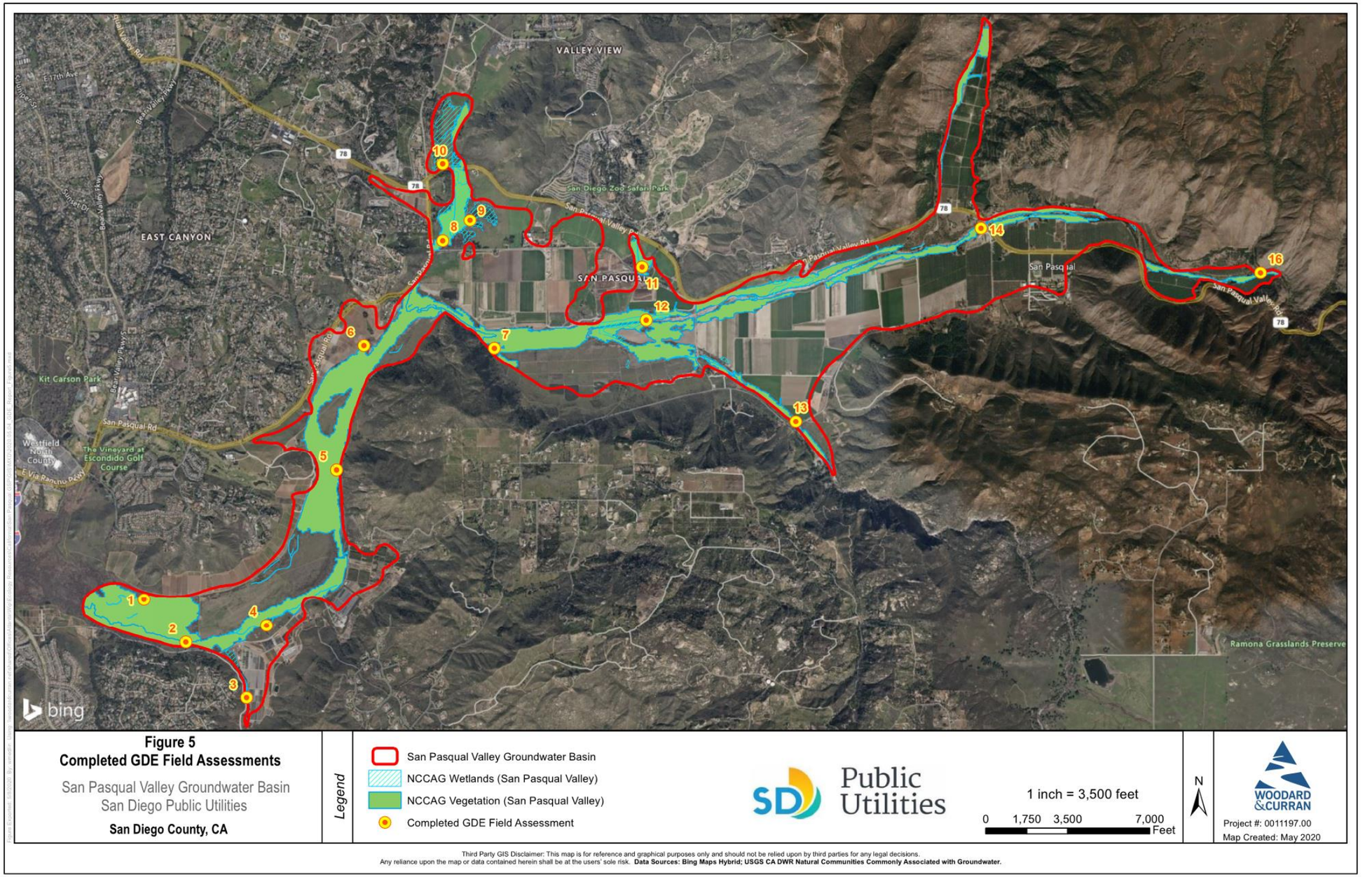


Figure 5
Completed GDE Field Assessments

San Pasqual Valley Groundwater Basin
San Diego Public Utilities

San Diego County, CA

Legend

- San Pasqual Valley Groundwater Basin
- NCCAG Wetlands (San Pasqual Valley)
- NCCAG Vegetation (San Pasqual Valley)
- Completed GDE Field Assessment

SD Public Utilities

1 inch = 3,500 feet

0 1,750 3,500 7,000 Feet

N

WOODARD &CURRAN

Project #: 0011197.00
Map Created: May 2020

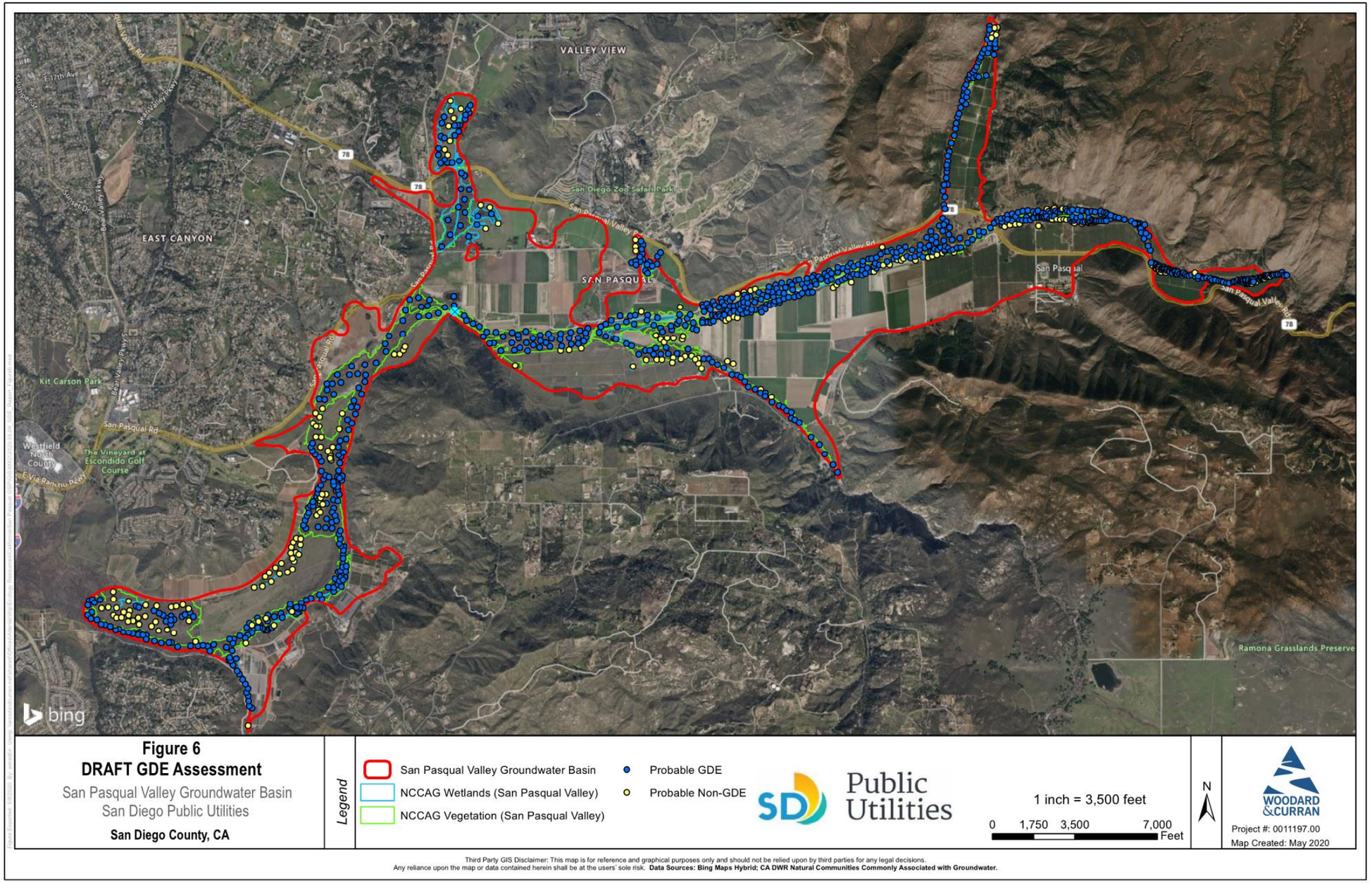
Third Party GIS Disclaimer: This map is for reference and graphical purposes only and should not be relied upon by third parties for any legal decisions.
Any reliance upon the map or data contained herein shall be at the users' sole risk. **Data Sources: Bing Maps Hybrid; USGS CA DWR Natural Communities Commonly Associated with Groundwater.**

Groundwater Dependent Ecosystems (GDEs)

Photos of potential GDEs from site visits

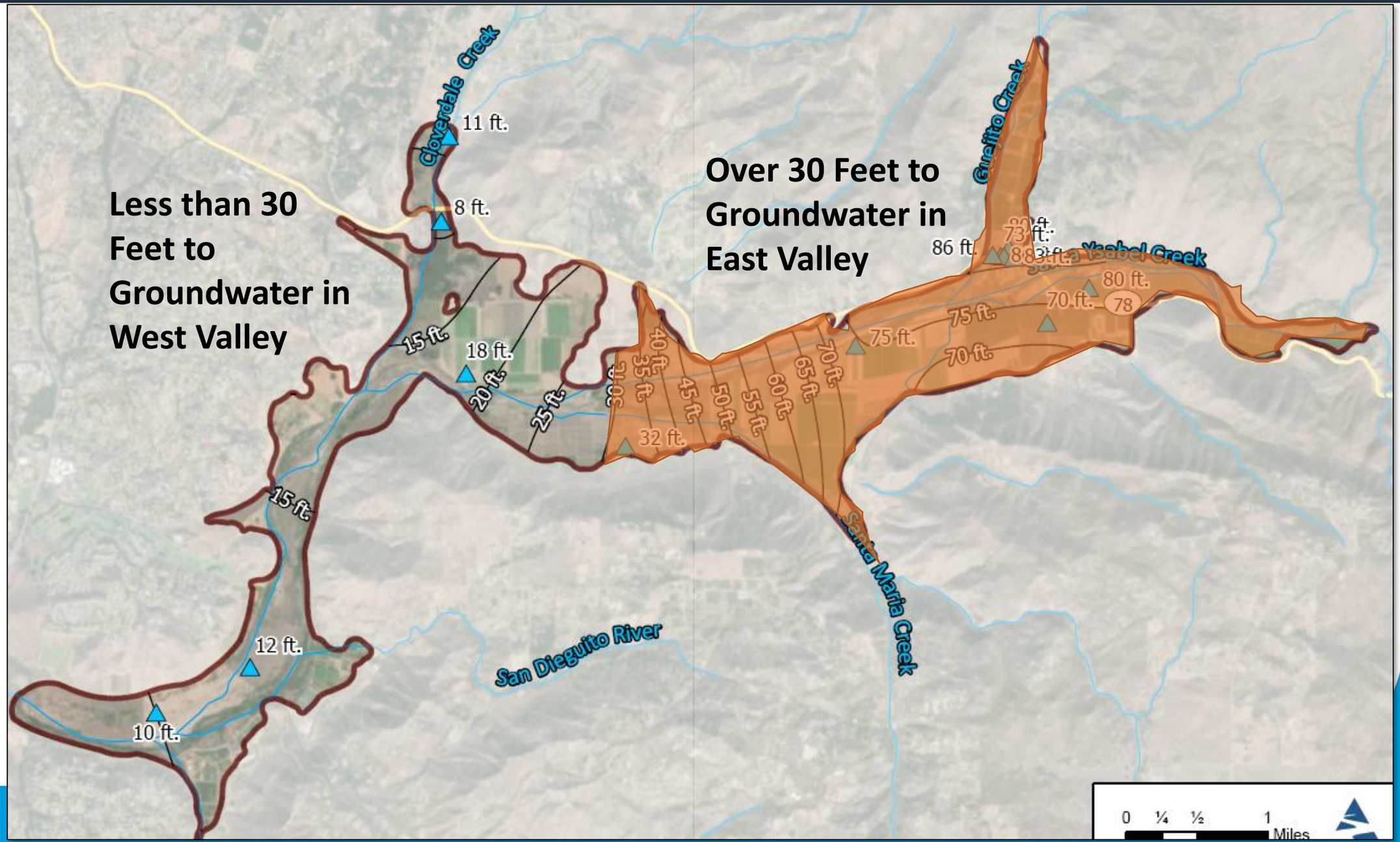
Groundwater Dependent Ecosystems (GDEs)

Areas with wetland or riparian habitat areas, based on surveys



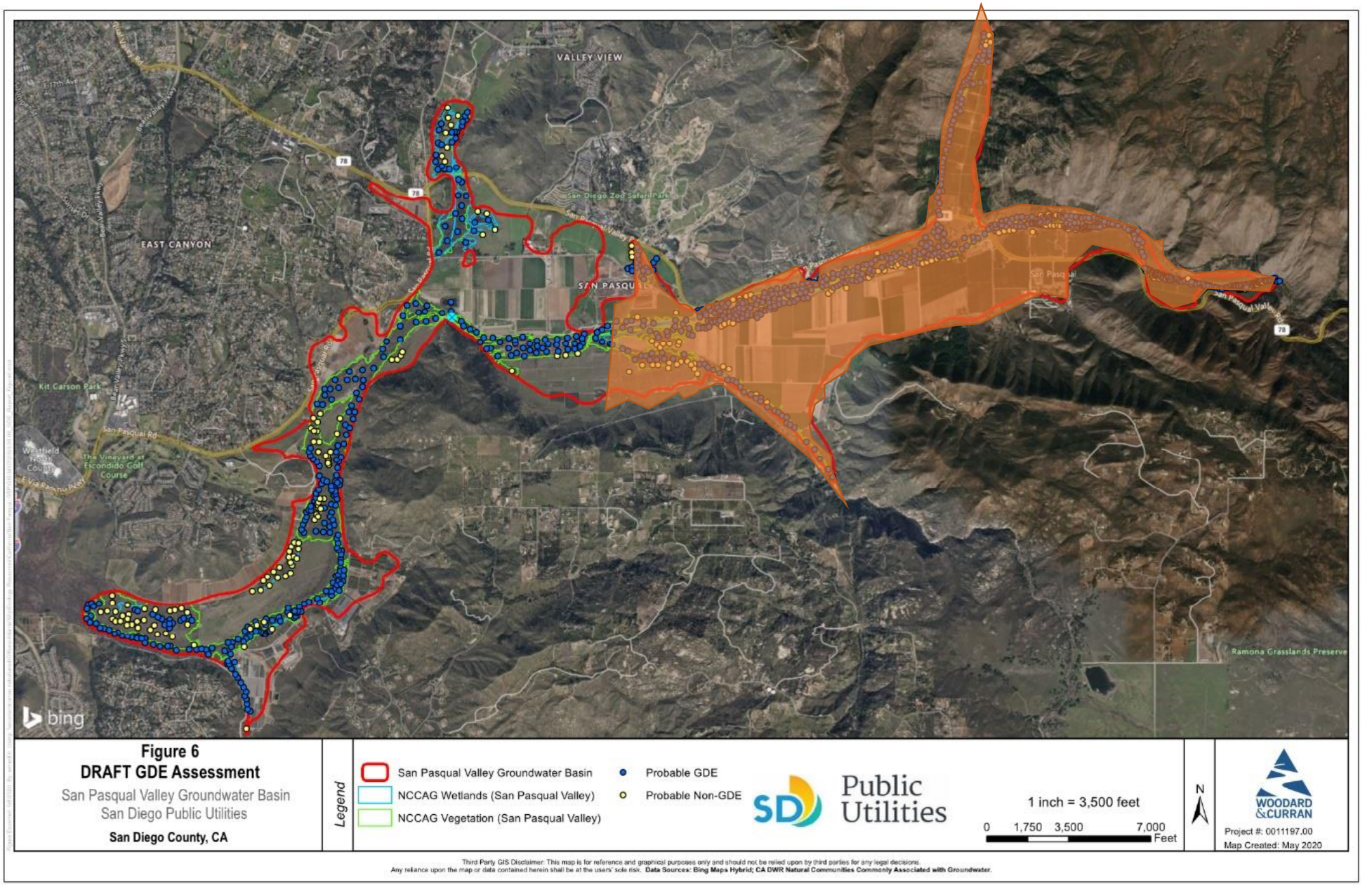
Groundwater Dependent Ecosystems (GDEs)

Depth to Water Contour Map



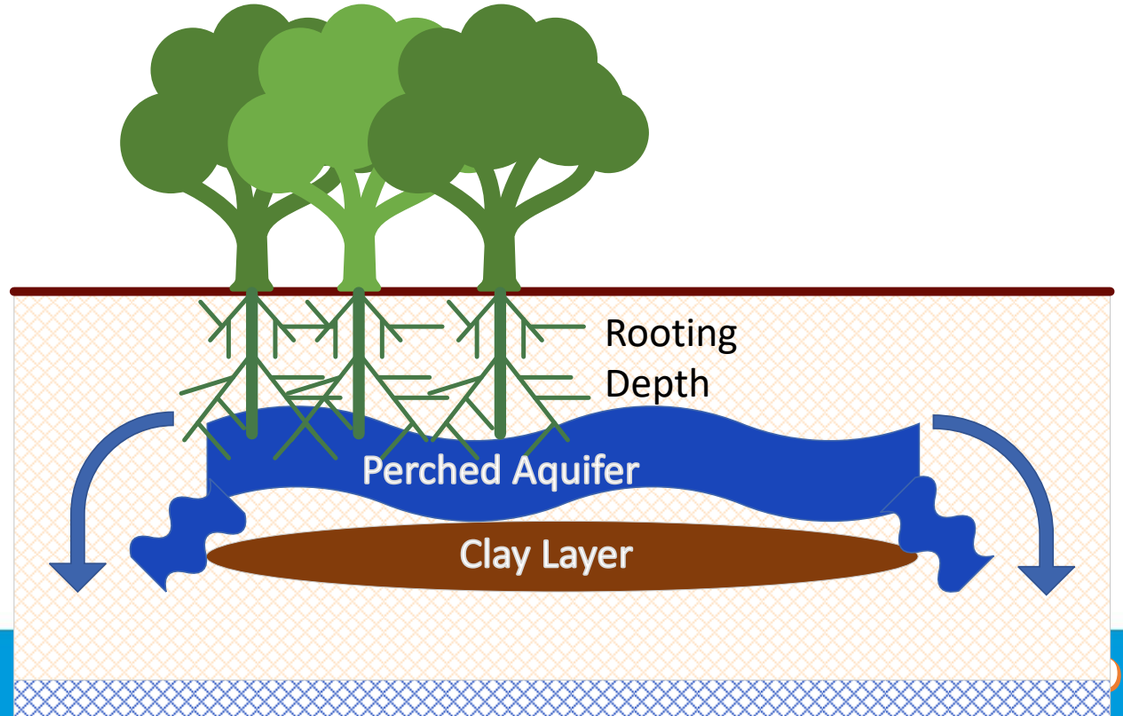
Groundwater Dependent Ecosystems (GDEs)

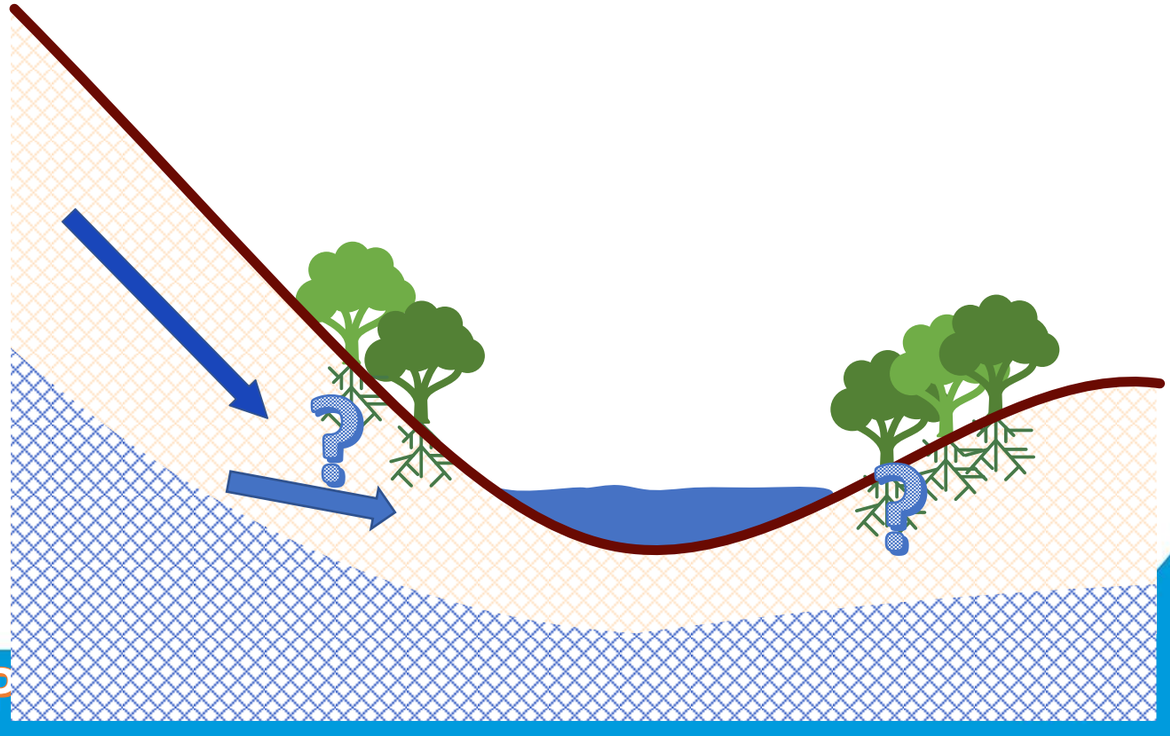
Areas where the regional groundwater aquifer is 30 feet or more below ground surface



Groundwater Dependent Ecosystems (GDEs)

- Potential GDEs identified in a large area where depth to the aquifer is greater than 30 feet, which is the depth the Nature Conservancy uses for GDE roots
- If potential GDEs are present, and not reaching the aquifer – how are they getting water?
  - Potentially surface water
  - Potentially shallow perched water
  - Potentially mountain-front recharge





San Pasqual Valley GSP
Technical Peer Review Meeting

REFINED ANALYSIS RESULTS
AC COMMENTS

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San Pasqual Valley GSP
Technical Peer Review Meeting

FIELD PROGRAM UPDATE

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Field Program Update

- The City is working with Kleinfelder to investigate construction of Well 129
- Aquifer testing is still on hold
- Isotope testing has been completed and is being finalized
- Aquifer Recharge Assessment report is being reviewed by the City

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Technical Peer Review Meeting

FIELD PROGRAM UPDATE
AC COMMENTS

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PUBLIC COMMENT

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San Pasqual Valley GSP
Technical Peer Review Meeting

NEXT STEPS & CLOSING REMARKS

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The City of SAN DIEGO

Next Meeting

- Next meeting:
  - Thursday October 8, 2020, 9-11:30am
- Public Notices are at:
  - Online: https://www.sandiegocounty.gov/content/sdc/pds/SGMA/san-pasqual-valley.html

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- For additional information, please contact:

Sandra Carlson at (619) 533-4235
carlsons@sandiego.gov

Thank You!

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