San Pasqual Valley Groundwater Sustainability Plan (GSP) Stakeholder Workshop

Management Action No 7 – Initial Surface Water Recharge Evaluation

Task 4 – Potential Recharge Strategies

Task 5 – Model Updates and Simulations

May 24, 2023

The City of SAN DIEGO

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Stakeholder Input Format

- This is a stakeholder workshop and anyone is welcome to ask questions or provide comments
- Public comment will take place at the end of each agenda item and at the end of the presentation
- Those wishing to speak should place their name and organization in the **Chat**; participants will be called on in the order received
- Follow-up comments and questions can be sent to **Staci Domasco (SDomasco@sandiego.gov)**

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Meeting Agenda

1. Welcome and introductions
2. Annual Report Summary
3. Scope of Project Management Action (PMA) No. 7: Initial Surface Water Recharge Evaluation
4. Task 4 - Potential Recharge Strategies: Strategy screening
5. Task 5 – Modeling Approach and Results: Status update
6. Public comment
7. Next steps and closing remarks

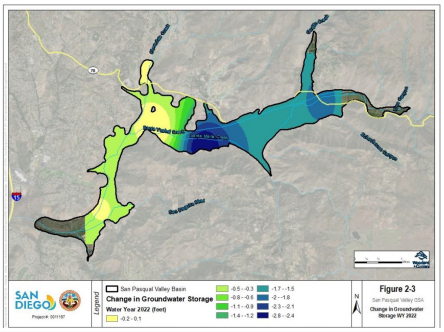
San Pasqual Valley GSP Stakeholder Workshop

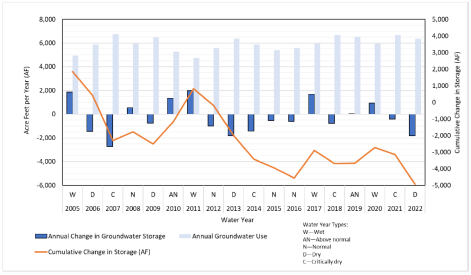
Summary of Annual Report and Submittal

The City of SAN DIEGO

San Pasqual Valley 2022 WY Annual Report

- Submitted to DWR in April of 2023
- Includes
  - Review of data collection over the last year (groundwater levels and groundwater quality)
  - Analysis to incorporate data into Basin conditions assessment
  - Updated hydrographs, chemographs, and groundwater conditions maps
  - Update on status of GSP implementation including Projects and Management Actions





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Annual Report Take-Aways

- Groundwater Levels, Interconnected Surface Waters, and Storage
  - Experienced drought conditions - "Dry" hydrologic year
  - Groundwater storage decreased by ~1,804 AF
  - Three wells reported dry or unable to take measurements in fall, one in spring, resulting in MT exceedances for those wells
  - One additional well was close to MT in fall
  - Two additional wells had PT exceedances in fall, one in spring
  - **No undesirable results triggered**

MT = Minimum Threshold PT= Planning Threshold

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Annual Report Take-Aways

- Groundwater Quality
  - Three wells exceeded Nitrate MT in both spring and fall
  - Two wells exceeded TDS MT in spring, one well in fall
  - One additional well could not be sampled for groundwater quality
  - **No undesirable results triggered**

MT = Management Threshold PT= Planning Threshold

Annual Report Take-Aways

- What we're watching for in the future:
  - Refinements to the representative monitoring network for both GWL and GWQ
  - How high precipitation events will impact GWL and GWQ in WY 2023 and assess if the Basin is trending towards undesirable results
  - Trends that indicate whether potential MT exceedances may occur
- Annual Report is available on GSA Website: www.sandiegocounty.gov/content/sdc/pds/SGMA/san-pasqual-valley.html

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Scope of Initial Surface Water Recharge Evaluation

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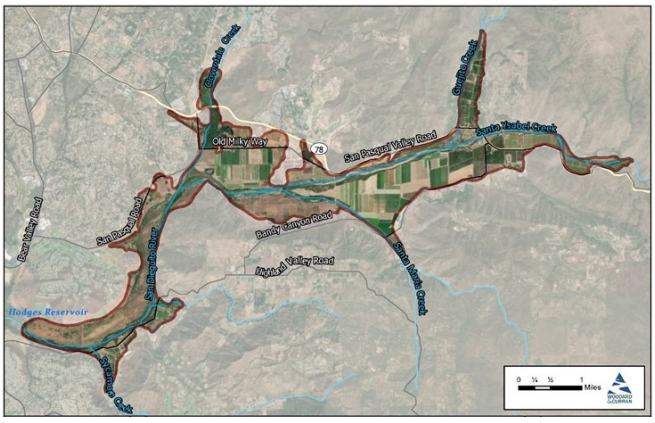
Surface Water Recharge Evaluation: Scope

A *Preliminary Feasibility Study* will be developed to summarize surface water recharge opportunities in San Pasqual Valley.

The *Preliminary Feasibility Study* will include the following sections:

- Development of Evaluation Criteria (**Task 1**)
- Streambed Investigation (**Task 2**)
- Water Sources for Potential Recharge (**Task 3**)
- Potential Recharge Strategies (**Task 4**)
- Model Simulations and Results (**Task 5**)
- Evaluate Benefits to GDEs (**Task 6**)



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Review of Technical Memoranda (TMs):

- **TM 1: Evaluation Criteria TM** – review of criteria and options for water recharge and basis for subsequent TMs.
- **TM 2: Streambed Investigation** – field data collection and modeling to provide site-specific data to update model and understand best options for surface recharge
- **TM 3: Water Sources for Potential Recharge** – evaluating options for where recharge water might come from
- **TM 4: Potential Recharge Strategies** – an evaluation of recharge strategies and their feasibility
- **TM 5: Model Updates and Simulations** – documentation of model refinements and simulation of selected recharge strategies
- **TM 6: Potential Benefits to GDEs** – an evaluation of potential effects of recharge strategies on groundwater dependent ecosystems

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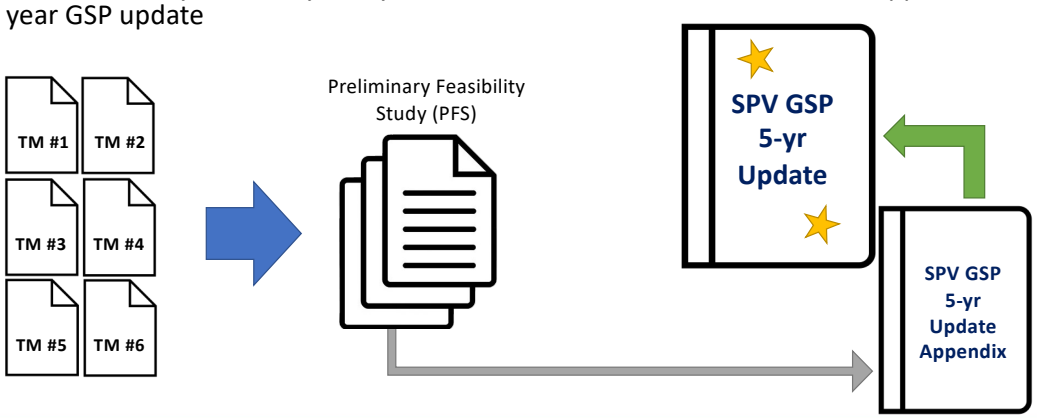
Relationship to GSP

- Current GSP and estimates show the Basin is sustainable
- If future Basin sustainability conditions change *and* GSA determines enhanced recharge strategies are needed, the *Preliminary Feasibility Study* may be used to help inform decisions on mitigation planning
- The *Preliminary Feasibility Study*, created from these TMs, will be a new appendix in the 5-year GSP update



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Surface Water Recharge Evaluation: Schedule

Scope Task		2022											2023											2024	
#	Task	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Planning and Management Action No. 7 Initial Surface Water Recharge Evaluation																									
Task 1	*Development of Evaluation Criteria*																								
	Develop draft evaluation criteria and scoring				Δ																				
Task 2	*Reevaluate Streambed Characteristics*																								
	Oversee streambed infiltration testing at 15 locations											Δ													
Task 3	*Water Sources for Potential Recharge Projects*																								
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	Develop potential recharge strategies															Δ									
Task 5	*Model Simulations*																								
	Conduct SPV GSP Model simulations																		Δ						
Task 6	*Evaluate Benefits to GDEs*																								
	Assessment of GDE benefits for recharge alternatives																		Δ						
Task 7	*Preliminary Feasibility Study Report*																								
	Prepare draft Feasibility Study Report																								
	Public Review (45 days)																					Δ			
	Revised Feasibility Study + Responses (30 days)																								
	Prepare final Feasibility Study Report																								

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Task 4: Potential Recharge Strategies

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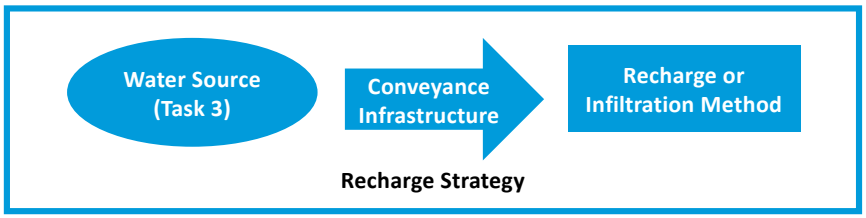
Task 4: General Approach



Recharge or Infiltration Method Characterization

Comprehensive Matrix of Potential Recharge Strategies

Screening and Selection of four Recharge Strategies

Development of Concept Site Maps and Preliminary Cost Estimate

REPRESENTATIVE RANGE OF POTENTIAL STRATEGIES

DOCUMENTATION

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Task 4: Potential Strategy Matrix Development

Water Source ↓ / Recharge Method →	A Existing Streambed	B In-stream Modifications	C Infiltration Basins	D Injection Wells	E Managed Flood Irrigation	F In-Lieu Recharge
1. Stormwater in Santa Ysabel Creek (SYC)	1A	1B	1C	1D	1E	1F
2. Controlled Releases from Sutherland Reservoir	2A	2B	2C	2D	2E	2F
3. Deliveries from Ramona MWD's Untreated Water System	3A	3B	3C	3D	3E	3F

Strategy = Water Source + Conveyance + Recharge Method

Screening Considerations:

- Yield (Efficiency of Recharge)
- Preliminary Cost
- Recharge footprint
- Timing
- Energy
- Reliability
- Flexibility
- Level of Complexity
- Pretreatment Requirements
- Operation & Maintenance (O&M) Frequency
- Permitting
- Environmental

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TM 4: Screening Outcomes

Recharge Strategy Code	Recharge Strategy Name	Yield	Cost	Recharge footprint	Timing	Energy	Reliability	Flexibility	Level of Complexity	Pretreatment Requirements	Operation & Maintenance (O&M) Frequency	Permitting	Environmental
1A	Existing Conditions												
1B	Enhancement of streamflow infiltration	1	5	5	4	5	1	2	4	5	4	2	4
1C	Infiltration basin - Stormwater	1	3	3	3	4	1	2	3	4	3	3	3
1D	Injection wells with Stormwater	1	2	4	2	3	1	2	2	1	2	2	4
1E	Managed Flood Irrigation with stormwater	1	4	5	3	3	1	3	3	2	2	3	3
1F	In-lieu Recharge with stormwater	1	4	5	2	3	1	3	2	1	2	4	3
2A	Increase of streamflow with Sutherland controlled releases	3	5	5	4	5	3	3	5	5	5	4	5
2B	Sutherland releases with enhancement of streamflow infiltration	3	5	5	5	5	3	4	4	5	4	1	4
2C	Sutherland releases with off-stream infiltration basin	4	3	3	3	4	3	4	3	4	3	2	3
2D	Sutherland releases with injection wells	4	1	4	2	3	3	4	2	1	2	1	4
2E	Sutherland releases used for managed Flood Irrigation	1	4	5	3	3	3	5	3	2	2	2	3
2F	Sutherland releases used for In-lieu Recharge	3	3	5	2	3	3	5	2	1	2	3	3
3A	Increase of streamflow with Ramona MWD deliveries	4	2	5	4	5	4	4	4	5	5	4	5
3B	Increase of streamflow with Ramona MWD deliveries and streambed modification	4	2	5	5	5	4	5	3	5	4	1	4
3C	Infiltration basin with Ramona RWD deliveries	5	1	3	3	5	4	5	4	5	4	2	3
3D	Injection wells with Ramona RWD deliveries	5	1	4	2	3	4	5	3	2	2	1	4
3E	Managed Flood Irrigation with Ramona RWD deliveries	1	4	5	3	4	4	5	4	3	3	2	3
3F	In-lieu Recharge with Ramona RWD deliveries	3	3	5	2	5	4	5	4	3	3	3	3

Qualitative Scale
1 = Least Favorable → 5 = Most Favorable

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TM 4: Selected Strategies

- Selection Objective: identify potentially feasible strategies considering all three sources and diversity of recharge methods
  - Selected three highest scoring strategies for each water source
  - Selected one mid-range strategy to provide diversity in recharge methods

Water Source ↓ / Recharge Method →	A Existing Streambed	B In-stream Modifications	C Infiltration Basins	D Injection Wells	E Managed Flood Irrigation	F In-Lieu Recharge
1. Stormwater in Santa Ysabel Creek (SYC)	1A	**1B**	1C	1D	1E	1F
2. Controlled Releases from Sutherland Reservoir	**2A**	2B	2C	2D	2E	2F
3. Deliveries from Ramona MWD's Untreated Water System	**3A**	3B	3C	**3D**	3E	3F
Note: Code in cells indicates water source (number) and recharge method (letter). Colored cells correspond to the selected strategies.						

- High favorability: > 39
- Mid-range favorability: 35 to 39
- Low favorability: 25 to 34

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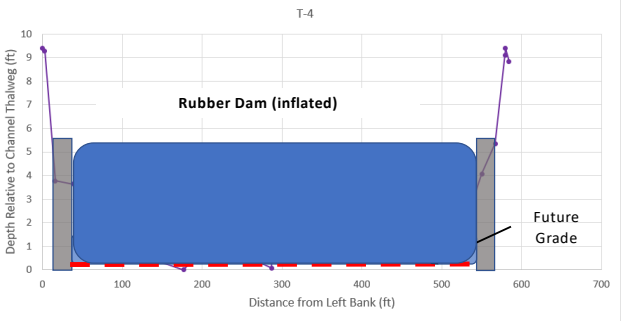
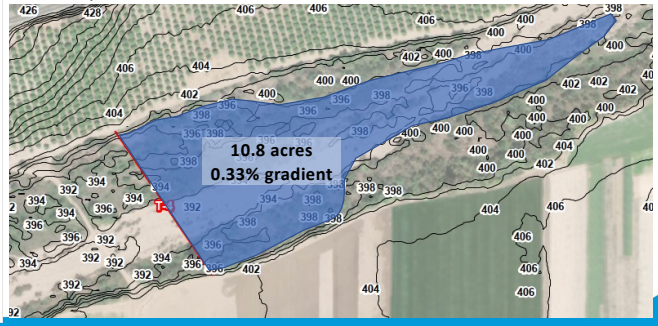
1B Enhance Streamflow Infiltration with In-stream Modifications

General Description:

Water Source	Conveyance	Recharge Method
"Excess streamflow" of stormwater that could occur across Ysabel Creek Road	Existing Santa Ysabel Creek	Permanent rubber dam across entire channel & floodplain

- Water source: "excess streamflow" frequency and magnitude based on simulated streamflow estimates
- Permanent 5' high dam spans entire 550' channel width
- Design options: semi-permanent or permanent berm, smaller floodplain





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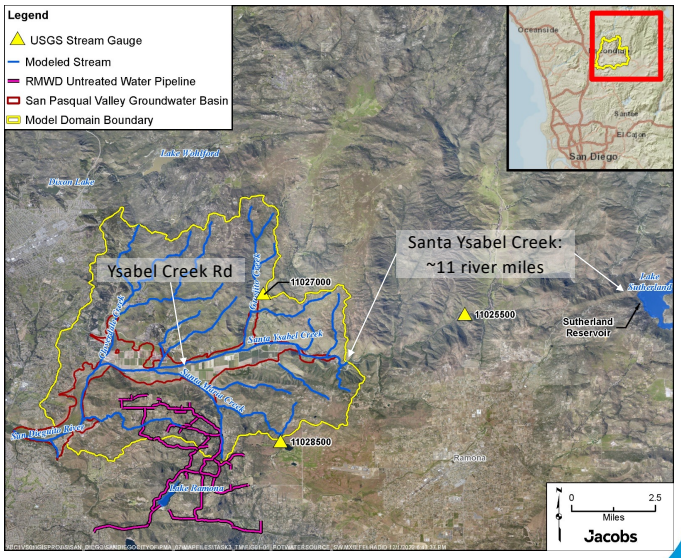
2A: Augment SYC Streamflow with Sutherland Controlled Releases

General Description:

Water Source	Conveyance	Recharge Method
Controlled releases from Sutherland Reservoir into Santa Ysabel Creek.	Inside basin, Santa Ysabel Creek used as conveyance feature. Conveyance losses from Sutherland Reservoir to Basin inlet are expected.	Existing Santa Ysabel Creek streambed

- Water source approach: Do not release more water than can be infiltrated in Basin upstream from Ysabel Creek Road (estimated at ~900 AFM)
- Santa Ysabel Creek and its streambed used as conveyance & recharge feature



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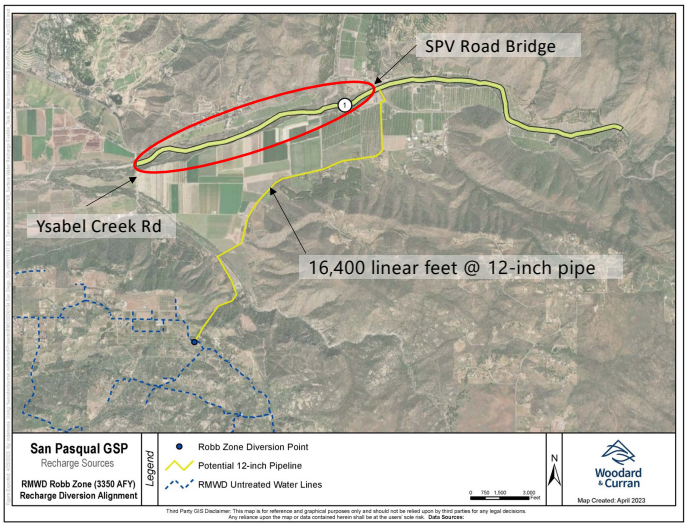
3A: Augment SYC Streamflow with Ramona MWD Deliveries



General Description:

Water Source	Conveyance	Recharge Method
Ramona MWD water deliveries from Robb Zone	New infrastructure required: pipeline from Robb Zone diversion to SYC near SPV Road bridge in eastern portion of Basin	Existing Santa Ysabel Creek streambed

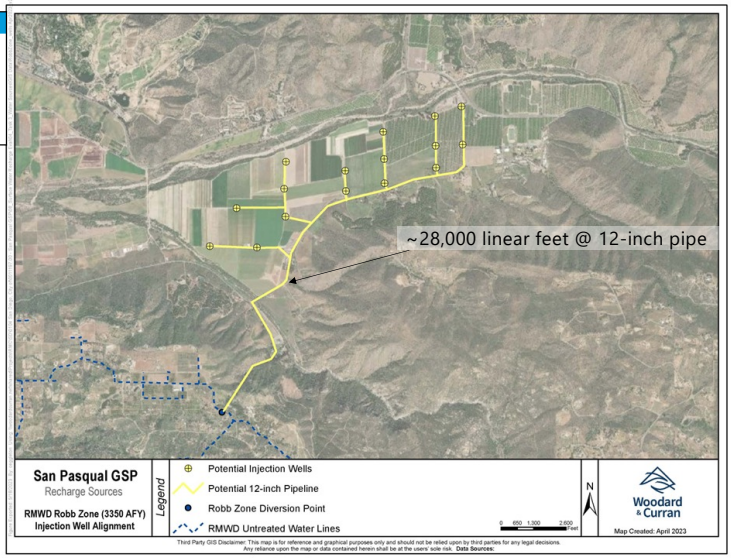
- Water source approach: Do not deliver more water than can be infiltrated in Basin between SPV Road bridge and Ysabel Creek Road (estimated at ~375 AFM)
- New conveyance infrastructure required:
  Robb Zone diversion → pipeline → SPV Road bridge
- No additional recharge infrastructure needed

3D: Injection Wells with Ramona MWD Deliveries

General Description:

Water Source	Conveyance	Recharge Method
Ramona MWD water deliveries from Robb Zone	New infrastructure required: pipeline from Robb Zone diversion to WTP to wellheads	Injection wells

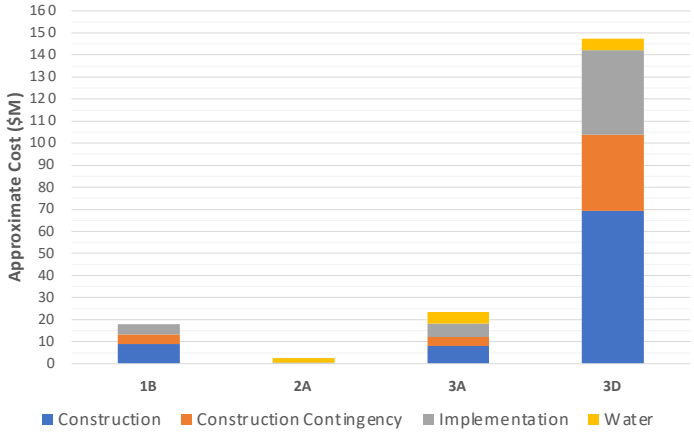
- Water source approach: Do not release more water than can be injected in Basin without adverse effects. Assumed 16 injection wells each capable of continuously injecting 130 gpm
- Untreated water would undergo filtration & disinfection per SWRCB Order 2012-0010 at WTP prior to injection
- New conveyance infrastructure:
  Robb Zone diversion → pipeline → WTP → pipeline → injection wells
- Refinements in approach are expected when this strategy is modeled as part of Task 5
- Also, strategy requires feasibility study (Phase I) and pilot project (Phase II) before determining ultimate injection well capacity and number of wells



Class 5 (conceptual-level) Costs

Recharge Strategy	Approximate Class 5 Cost*
1B. Enhance streamflow infiltration with in-stream modifications	$18M
2A. Augment SYC streamflow with Sutherland controlled releases	$2.5M
3A. Augment SYC streamflow with Ramona MWD deliveries	$23.5M
3D. Injection wells with Ramona MWD deliveries	$147.5M

* Class 5 cost estimate is -20% to -50% on low end and +30% to +100% on high end



50% construction contingency; 35% implementation cost allowance

Potential Benefits and Challenges

Recharge Strategy	Anticipated Benefits	Anticipated Challenges
1B. Enhance streamflow infiltration with in-stream modifications	• Minimal additional infrastructure needed • Flexible construction & operation • Stormwater as source would be "free" • Enhance recharge near representative monitoring wells	• Permitting a project within riparian area • Periodic maintenance needed in stream channel • Supply would depend on local weather
2A. Augment SYC streamflow with Sutherland controlled releases	• No additional infrastructure required • Conjunctive use of local surface water • Low O&M requirement	• Managing conveyance losses • Operational adjustments and agreements would be needed • New water delivery agreement would be needed • Supply would depend on local weather
3A. Augment SYC streamflow with Ramona MWD deliveries	• Would provide a new source of water to Basin • Flexible operation • Low O&M requirement • Potentially less dependent on local weather	• New water delivery agreement would be needed • Conveyance infrastructure construction permitting
3D. Injection wells with Ramona MWD deliveries	• Would provide a new source of water to Basin • Scalable method to diversify City water portfolio • Would provide direct recharge to local aquifer • More secure from an access perspective • Opportunity for remote monitoring • Potentially less dependent on local weather	• Expected high investment cost • Potential for high O&M frequency • Would need specialized staff for pretreatment and O&M • Permitting and regulatory coordination

Questions to Consider

- Are there other key criteria or considerations when determining feasibility of these four recharge strategies?
- Are there operational sensitivities or considerations we need to keep in mind as we move forward with the analysis of the four recharge strategies (e.g., siting, sizing, etc.)?
- Are there other benefits or challenges that weren't included in what was shared today?
- Of the four strategies, which one(s) do you favor?

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Task 5: Model Updates and Simulations

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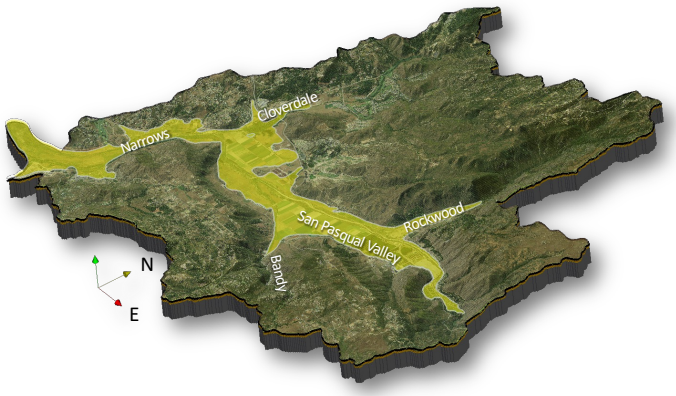
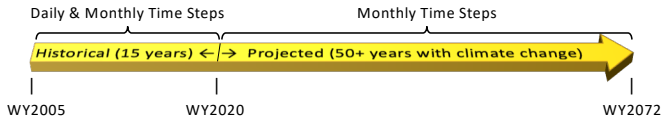
Model Updates Since the GSP Submittal in 2021

- Switched from rectangular stream channels to irregular channels
- Now have combination of daily and monthly time steps to better simulate streamflow events
- Recalibrated SPV GSP Model v1.0
  - Updated stream properties to using data from Task 2 (streambed investigation)
  - Updated depth to bedrock near mouth of Rockwood Canyon
  - Improved runoff routing assignments
  - Improved Basin GW responses to water levels in Hodges Reservoir
  - Referring to this recalibrated model as SPV GSP Model v2.0

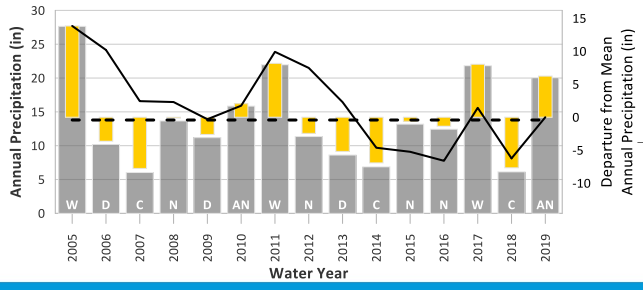


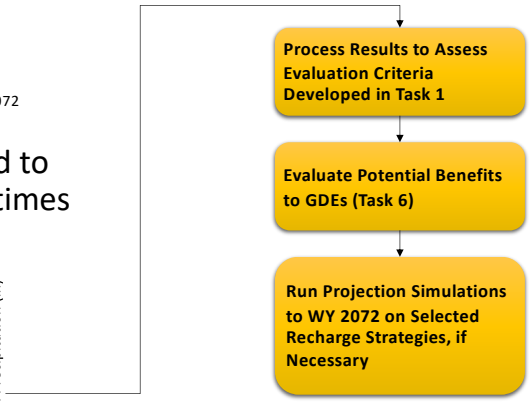
Approach for Projecting Recharge Strategies

- Using GSP simulation periods for recharge simulations



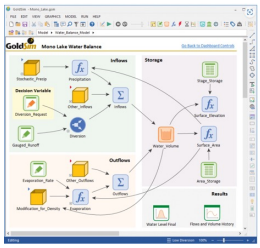
- Focusing initial simulations on historical period to streamline workflow and minimize model runtimes



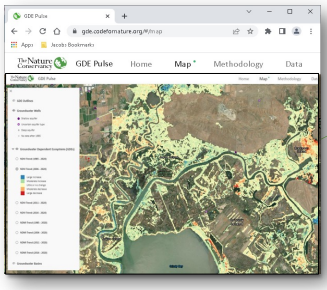


Evaluation Criteria Data Sources

GoldSim Model

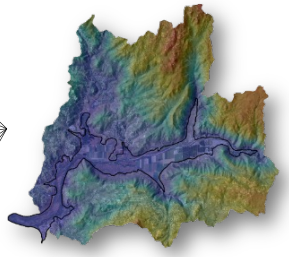


GDE Pulse



- **Criterion 1:** Reduction of Modeled Deficit in Cumulative GW Storage
- **Criterion 2:** Maintenance of Shallower GW Levels in the Basin
- **Criterion 3:** Reduction of Projected GW Levels Below MTs
- **Criterion 4:** Efficiency of Recharge
- **Criterion 5:** Improvements in GW Quality
- **Criterion 6:** Benefits to GDEs
- **Criterion 7:** Cost of Implementation & Maintenance
- **Criterion 8:** Feasibility of Implementation and Maintenance

SPV GSP Model v2.0



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PUBLIC COMMENT

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NEXT STEPS & CLOSING REMARKS

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Next Steps

- **Stakeholder comments on TM 4 requested by June 9 to SDomasco@sandiego.gov**
- Use SPV GSP Model v2.0 to run simulations of four retained recharge strategies from Task 4
- Prepare Draft TM 5 to document model updates and simulations
- Next workshop in August focuses on Task 5 (model updates & simulations)
  - Final calibration of SPV GSP Model v2.0
  - Findings from simulations of four recharge strategies

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Surface Water Recharge Evaluation: Schedule

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SPV GSP Implementation

Status of Management Action (MA) Implementation:

- **MA 3 –** Support Water Quality Improvement Plan (WQIP) Actions – *Continuous*
- **MA 4 –** Coordinate/Collaborate Regionally with Other Entities to Perform Monitoring & Implement Regional Projects – *Continuous*
- **MA 5 –** Education & Outreach for TDS & Nitrate – *Emailed to Stakeholders and posted online*
- **MA 6 –** Coordinate with City on Hodges Watershed Improvement Project – *Continuous*
- **MA 7 –** Initial Surface Water Recharge Evaluation – *Underway!*
- **MA 8 –** Study GDEs*, Phase I Desktop Study – *Just began*

*GDEs = Groundwater Dependent Ecosystems

GSP Resources

- San Pasqual Valley GSP Website
  - https://www.sandiegocounty.gov/content/sdc/pds/SGMA/san-pasqual-valley.html
- San Pasqual Valley GSP
  - https://sgma.water.ca.gov/portal/gsp/preview/75
  - Annual Report for Water Years 2020, 2021, and 2022
  - https://sgma.water.ca.gov/portal/gspar/preview/140
- San Pasqual Valley GSP Data Management System (Opti)
  - https://opti.woodardcurran.com/sanpasqual/login.php

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THANK YOU!

The City of SAN DIEGO