

# EMERGENCY WATER SUPPLY PROJECT UPDATE

# Agenda

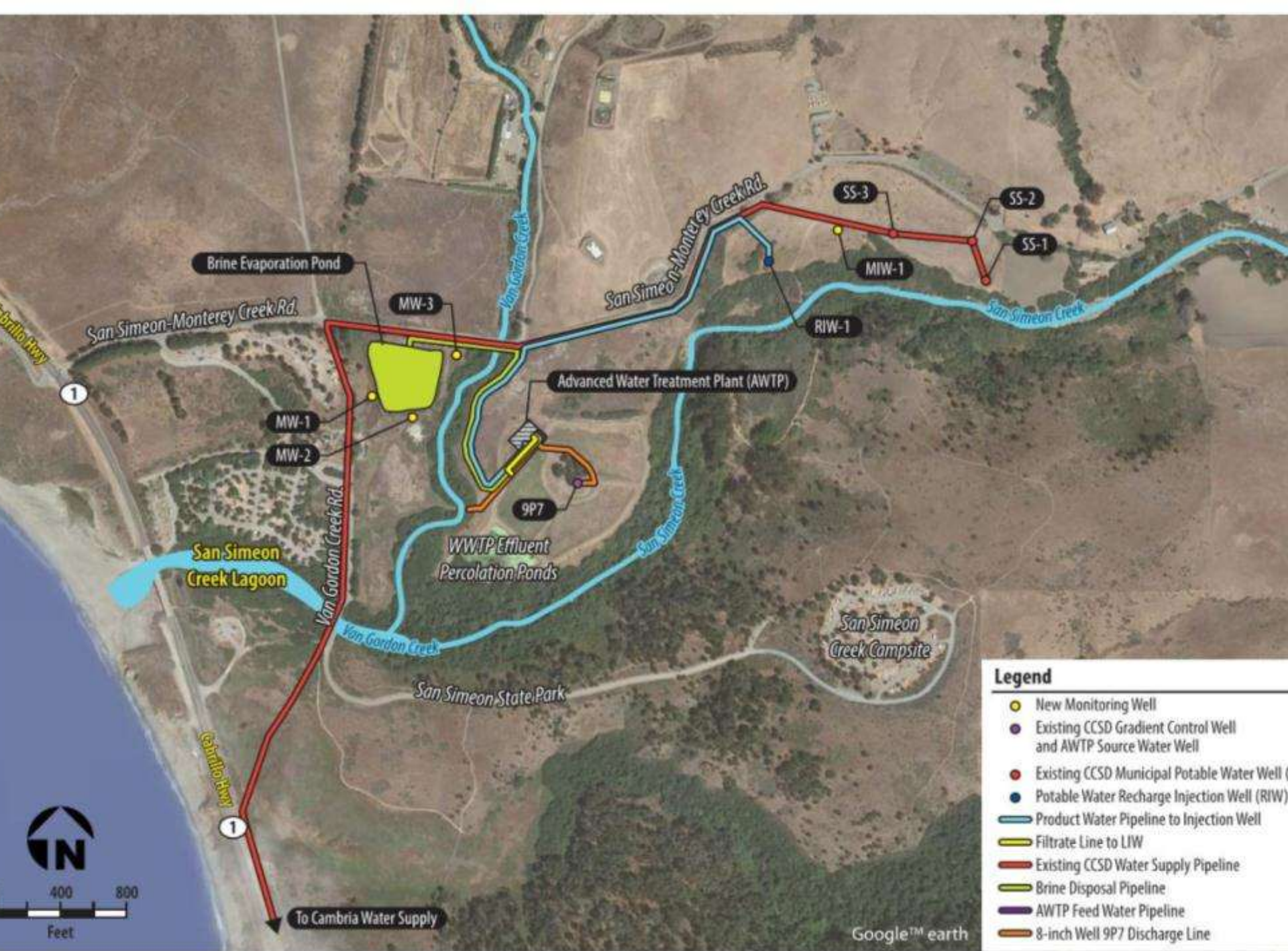
- Water Treatment Plant
  - What is the water source
  - How is it treated
  - How is the drinking water recovered
- Disposal of Brine
  - Evaporation/Brine Pond
  - Stormwater Outfall
- Ensuring Drinking Water is Safe
  - Tracer study
  - Long-term monitoring



# Introductions

- Project Manager – Sava Nedic, PE
- WTP Engineer – Greg Wetterau, PE
- Hydrogeologist – Mike Smith, PG
- Construction Manager – Randy Redmann
- Principal-in-Charge – Mari Garza-Bird



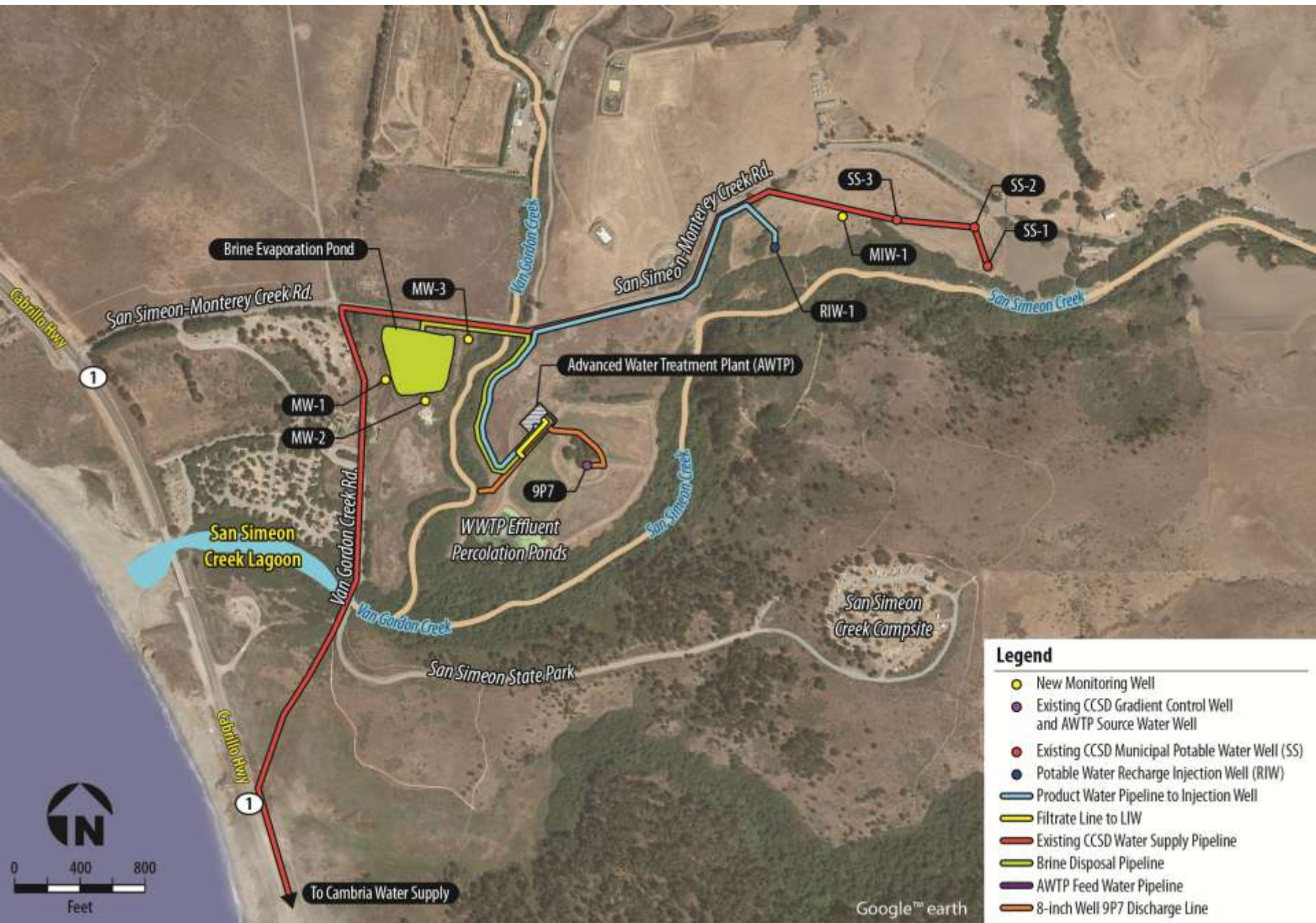


### Legend

- New Monitoring Well
- Existing CCSD Gradient Control Well and AWTP Source Water Well
- Existing CCSD Municipal Potable Water Well
- Potable Water Recharge Injection Well (RIW)
- Product Water Pipeline to Injection Well
- Filtrate Line to LIW
- Existing CCSD Water Supply Pipeline
- Brine Disposal Pipeline
- AWTP Feed Water Pipeline
- 8-inch Well 9P7 Discharge Line



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### Legend

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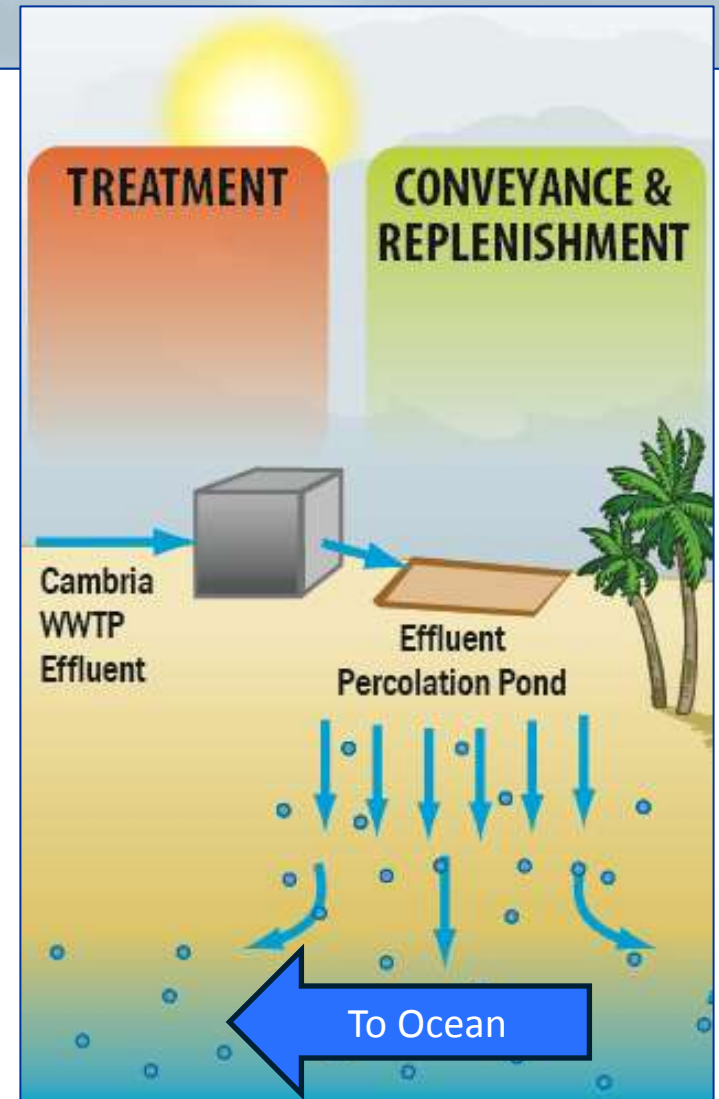
# How much water will be produced?

- 300 gpm of drinking water to CCSD customers
- 250 acre-feet of drinking water during the 6 month drought season

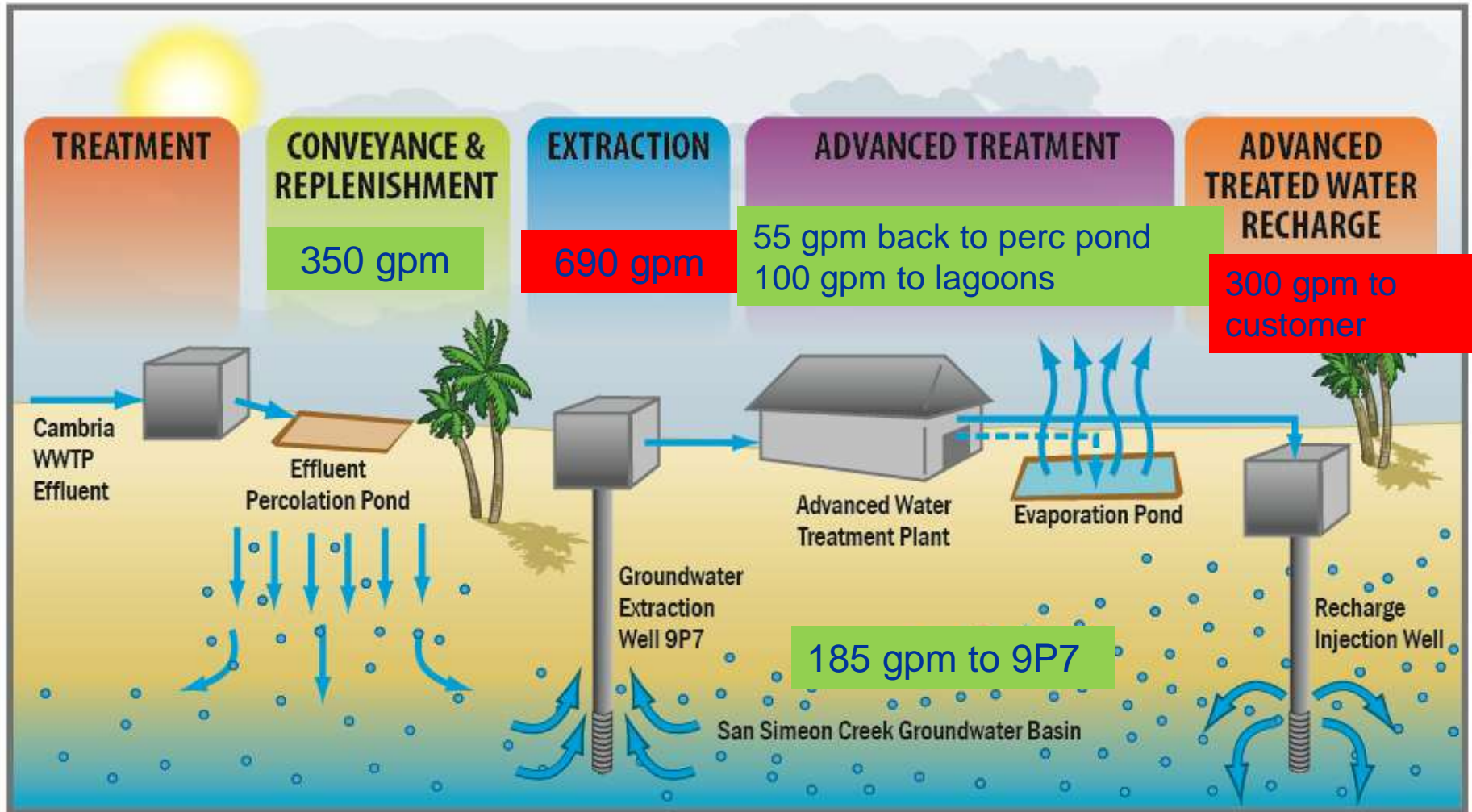


# What Happens to Our Water Now?

- 0.5 mgd wastewater treated at WWTP
- Treated water sent to percolation ponds near San Simeon State Park
- All water, including basin underflow, ultimately ends up in ocean (>45 acre-feet/mo)
- Emergency project will recover this water



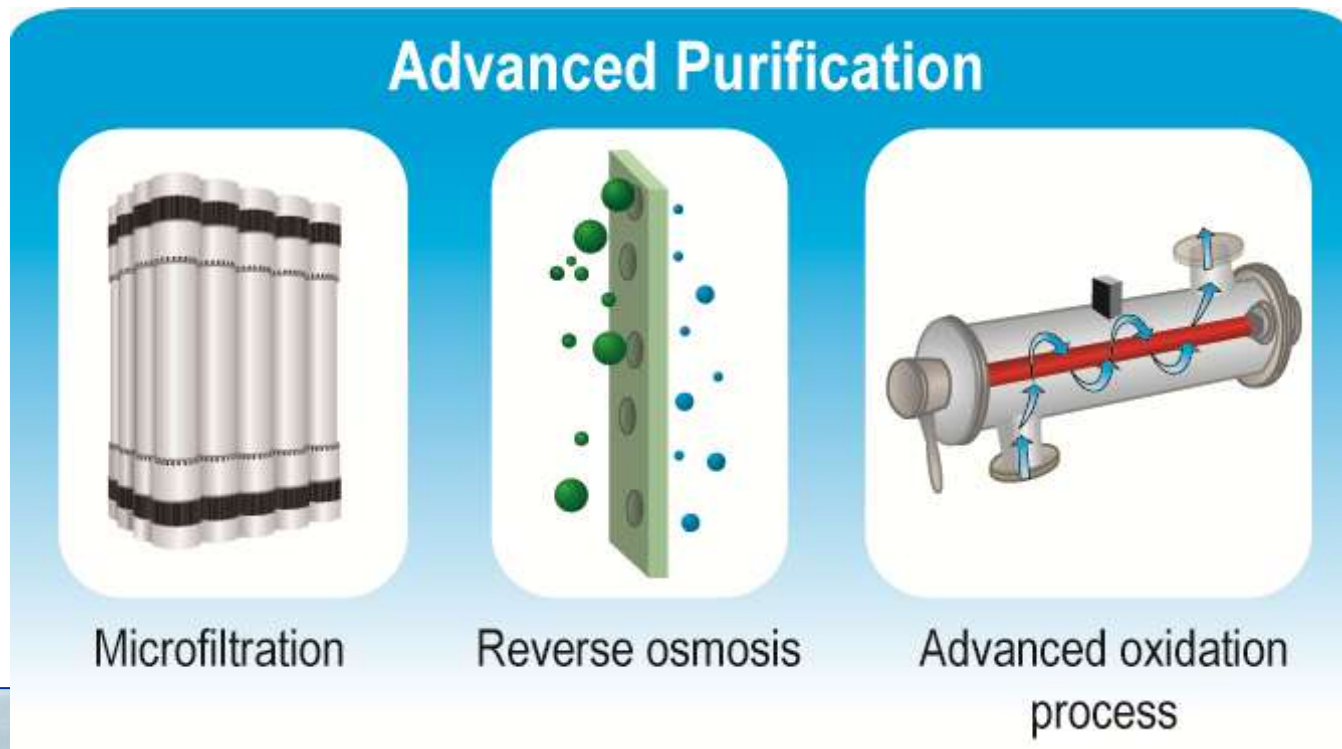
# What is Groundwater Replenishment?





# Advanced Water Treatment

- Will be located east of San Simeon State Park next to percolation ponds
- Treatment includes 3 primary barriers

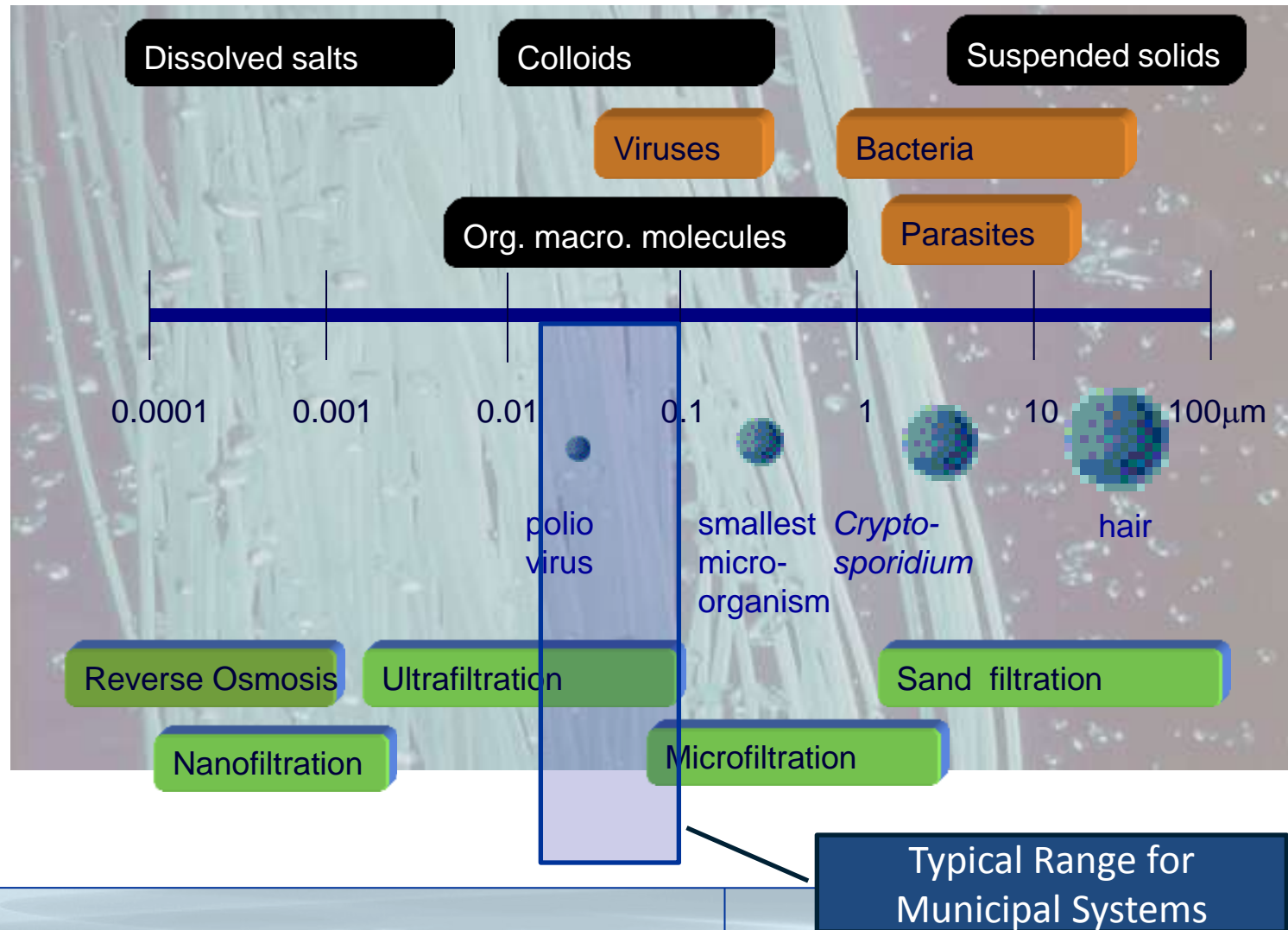


# Barrier #1: Membrane Filtration

- Hollow fiber membranes remove virtually all:
  - Suspended solids
  - Turbidity
  - Protozoa and bacteria
- Does not fully remove viruses or dissolved contaminants
- Used commonly for drinking water plants

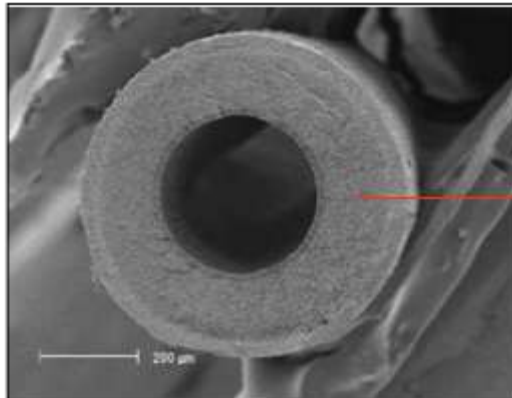


# Membrane Filtration

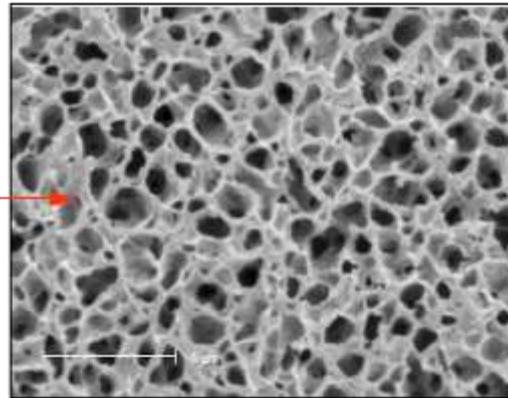


# Membrane Filtration

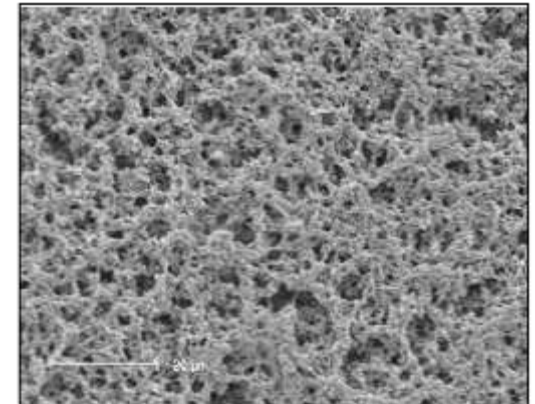
- Membranes built as hollow fibers, that look like tiny straws
- Water pushed through fiber walls
- Tens of thousands of fibers combined into membrane module



**PVDF Fibre (M10V)**



**Cross-Section**



**Surface**



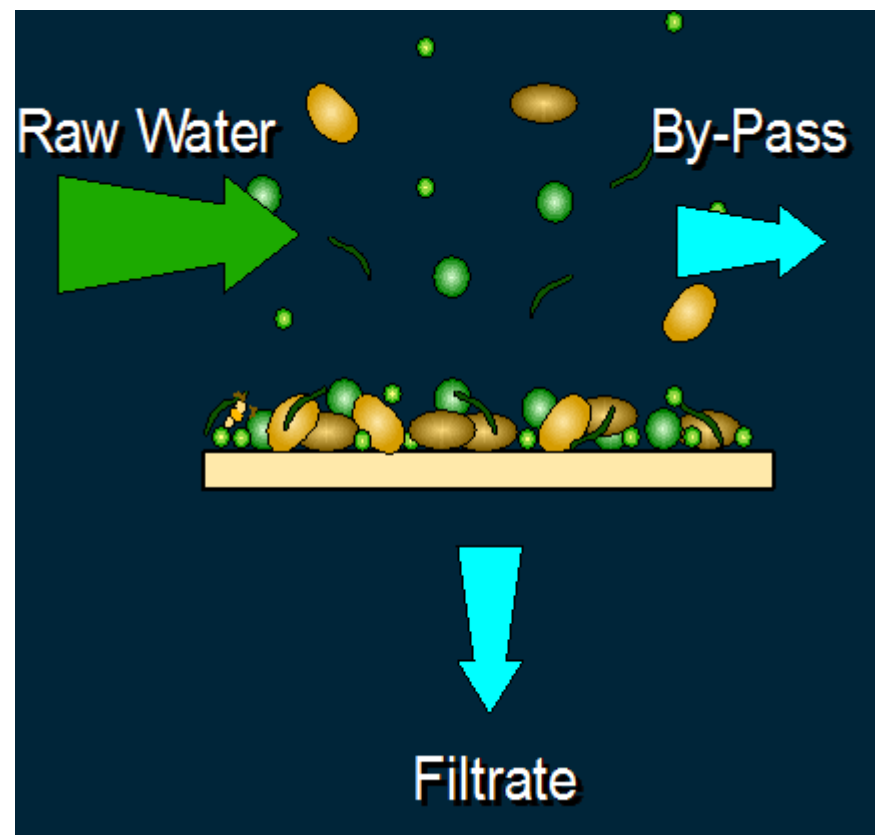
## Barrier #2: Reverse Osmosis

- Spiral wound RO membranes remove:
  - Viruses
  - Dissolved salts
  - Dissolved organics
  - Pharmaceuticals and personal care products
- Used commonly for treating seawater and brackish groundwater and at bottled water facilities



# Reverse Osmosis

- Pores in membrane too small to be measured, can remove particles as small as 0.1 nm
- Removes virtually all dissolved material except:
  - Dissolved gases ( $O_2$ ,  $CO_2$ ,  $Cl_2$ )
  - Some small organic compounds



## Barrier #3: Advanced Oxidation

- Concentrated UV light and hydrogen peroxide remove any organic compounds
- Additional barrier for pathogens
- Operates at around 10 times higher intensity than typical UV treatment at drinking water plants



# Brine Disposal Options

1. Evaporation Pond
2. Stormwater Outfall





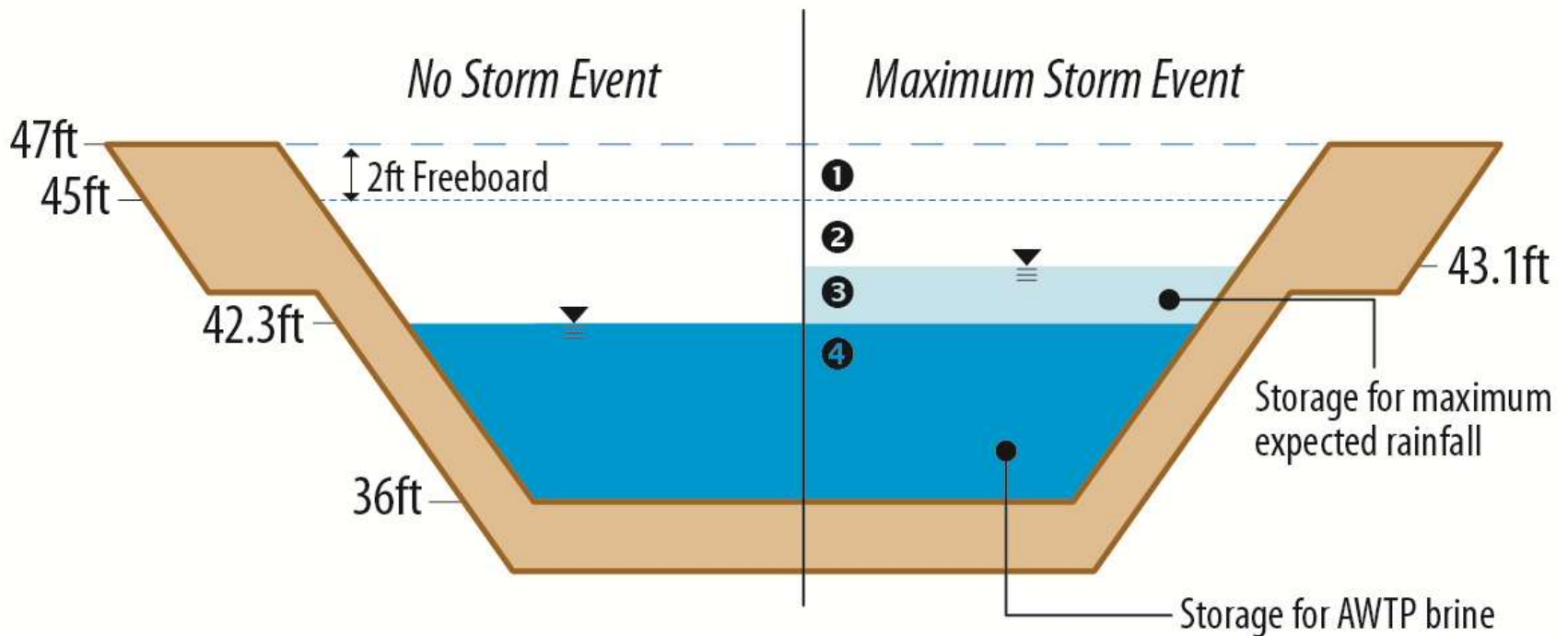
# Brine Disposal Option #1: Evaporation Pond

- Evaporation blowers will only operate during the day
- Sound proofing will be provided for the blowers



# Evaporation Pond

## Brine Level After 6 Months of AWTP Operation



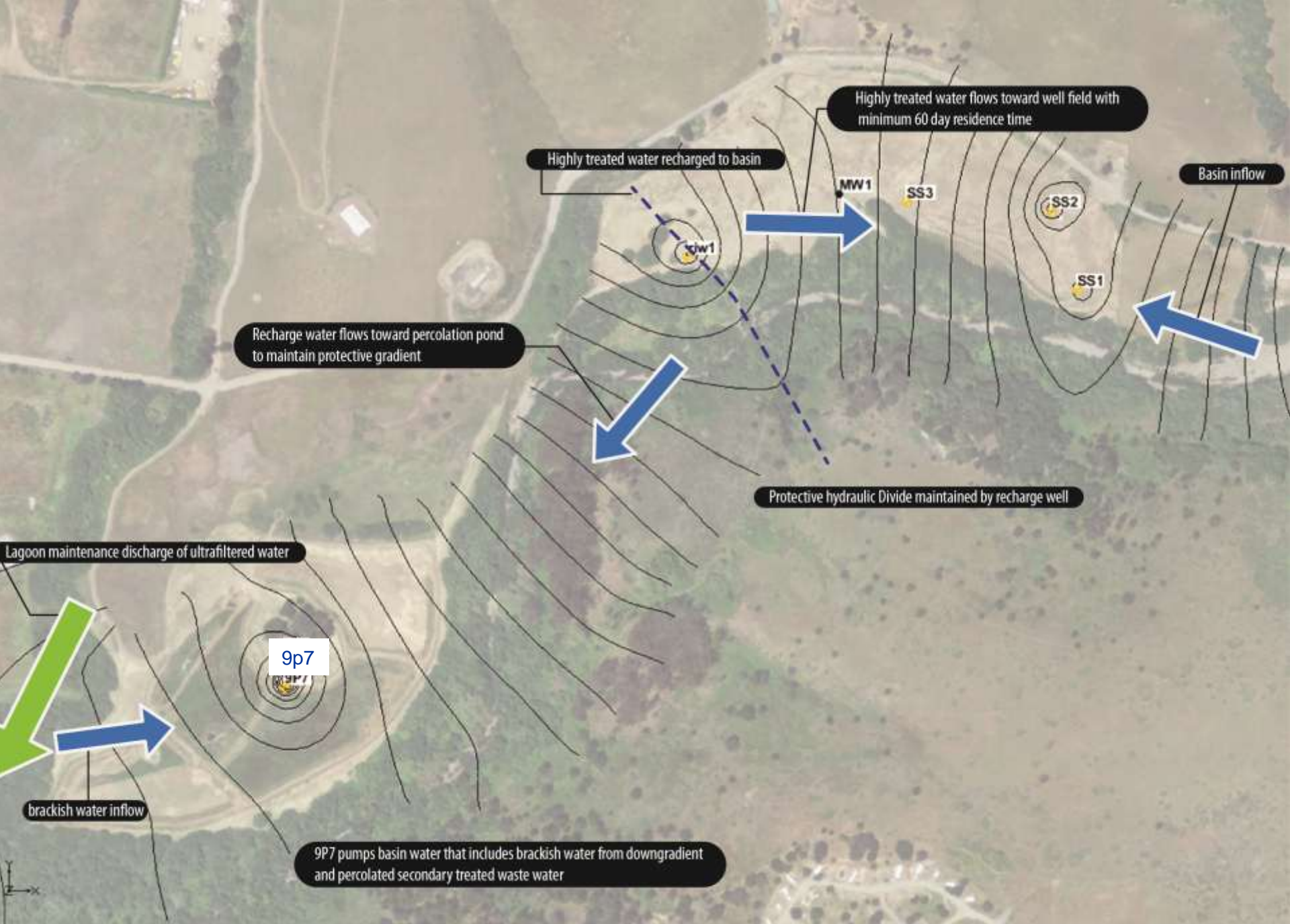
### Storage Volumes

1 6.2 acre-feet   2 5.4 acre-feet   3 2.1 acre-feet   4 9.6 acre-feet





Figure #



**Figure #**

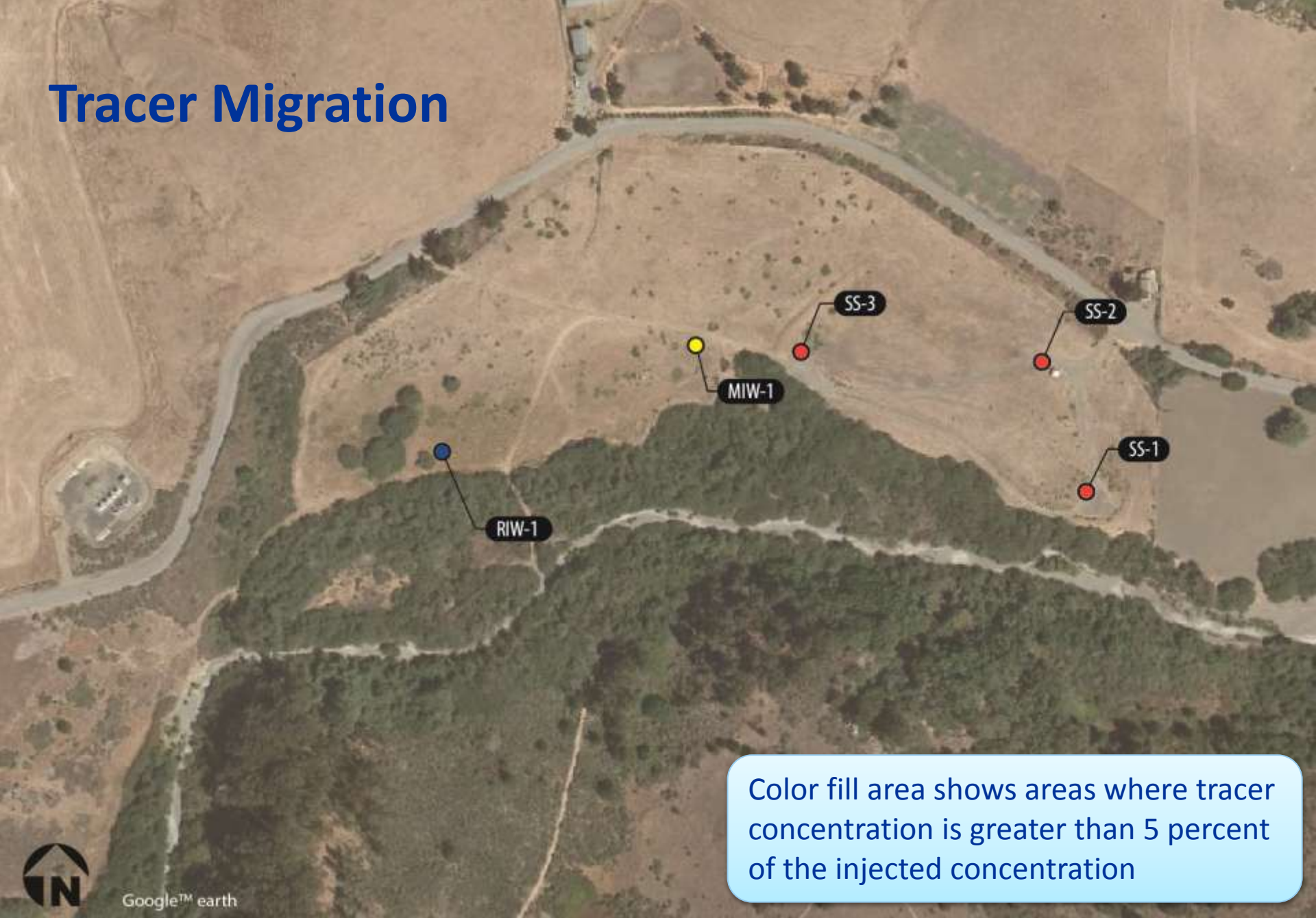
Emergency Water Supply Alternative During Extended Drought Conditions

# Tracer Test

- Pump SS1 and SS2 at a total of 454 gpm
- Inject at RIW-1 with addition of tracer
- Addition of tracer Bromide Salt at 10 ppm
- Cease addition of tracer after 30 days
- Total duration of test 67 days
- At end of test wells SS1 and SS2 continue producing at 454 gpm
- Gradient control pumping and discharge to lagoon not necessary during injection period



# Tracer Migration



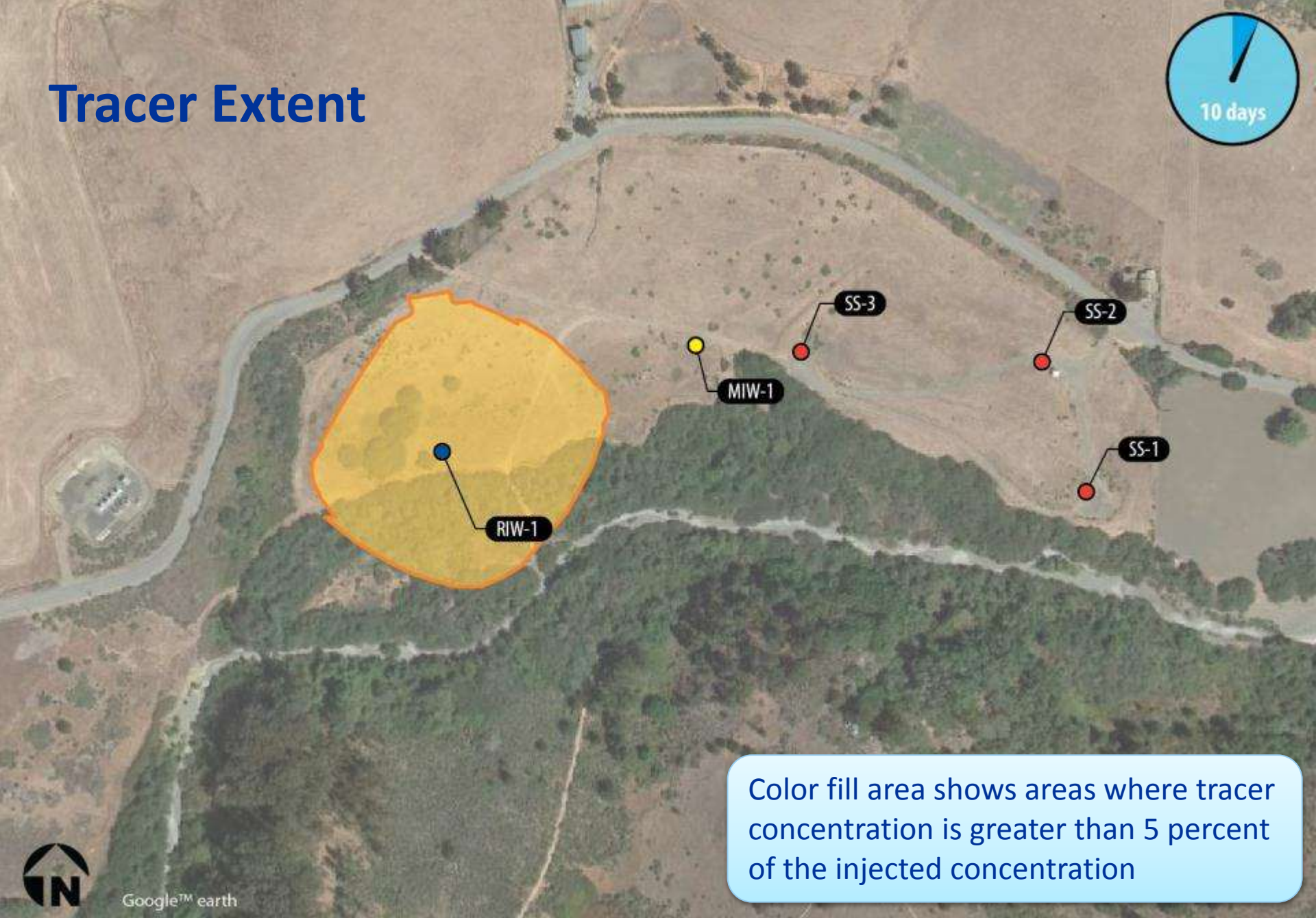
Color fill area shows areas where tracer concentration is greater than 5 percent of the injected concentration



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# Tracer Extent



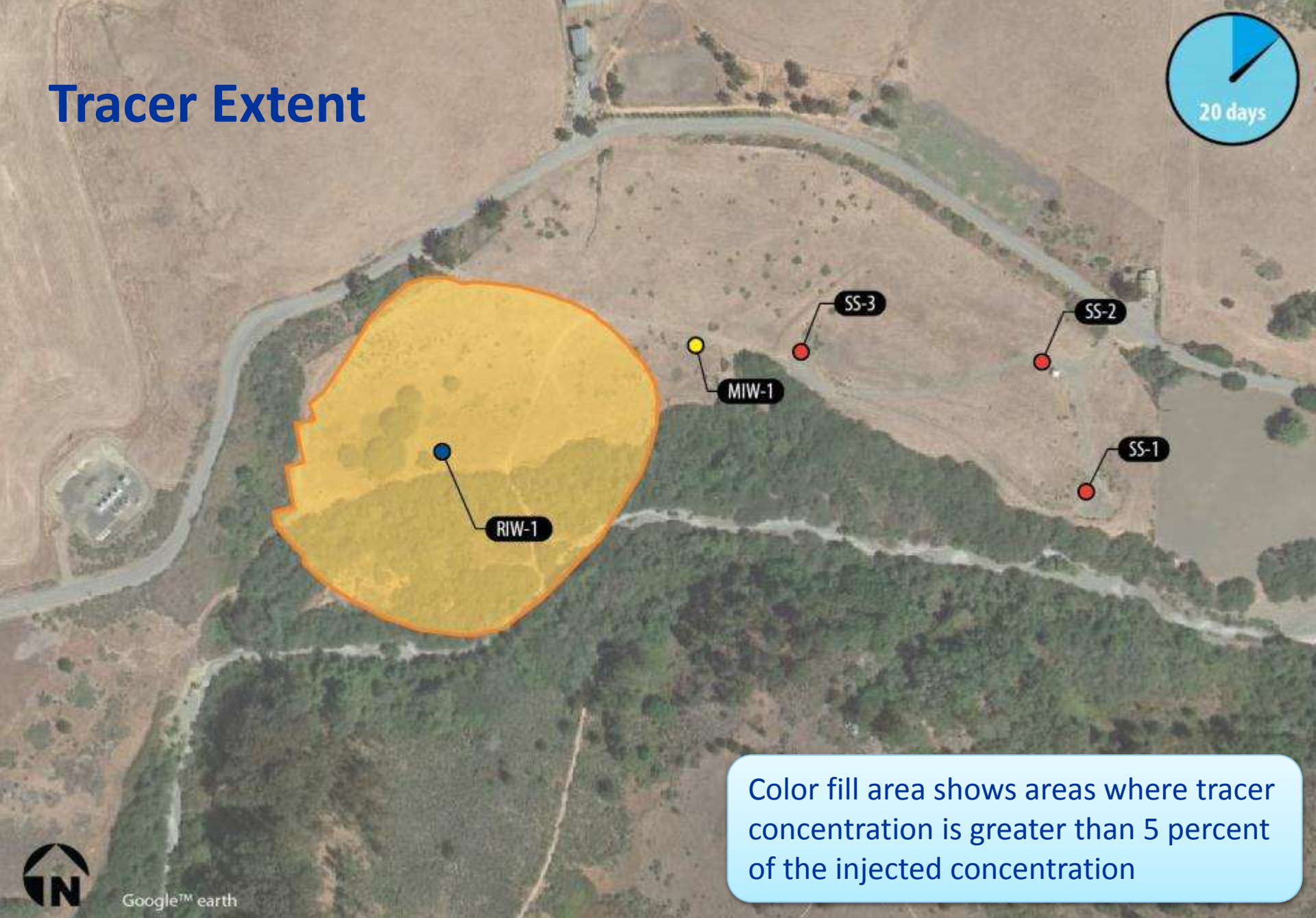
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# Tracer Extent



Color fill area shows areas where tracer concentration is greater than 5 percent of the injected concentration





# Tracer Extent – Tracer Feed Stopped



Color fill area shows areas where tracer concentration is greater than 5 percent of the injected concentration



# Tracer Extent



Color fill area shows areas where tracer concentration is greater than 5 percent of the injected concentration

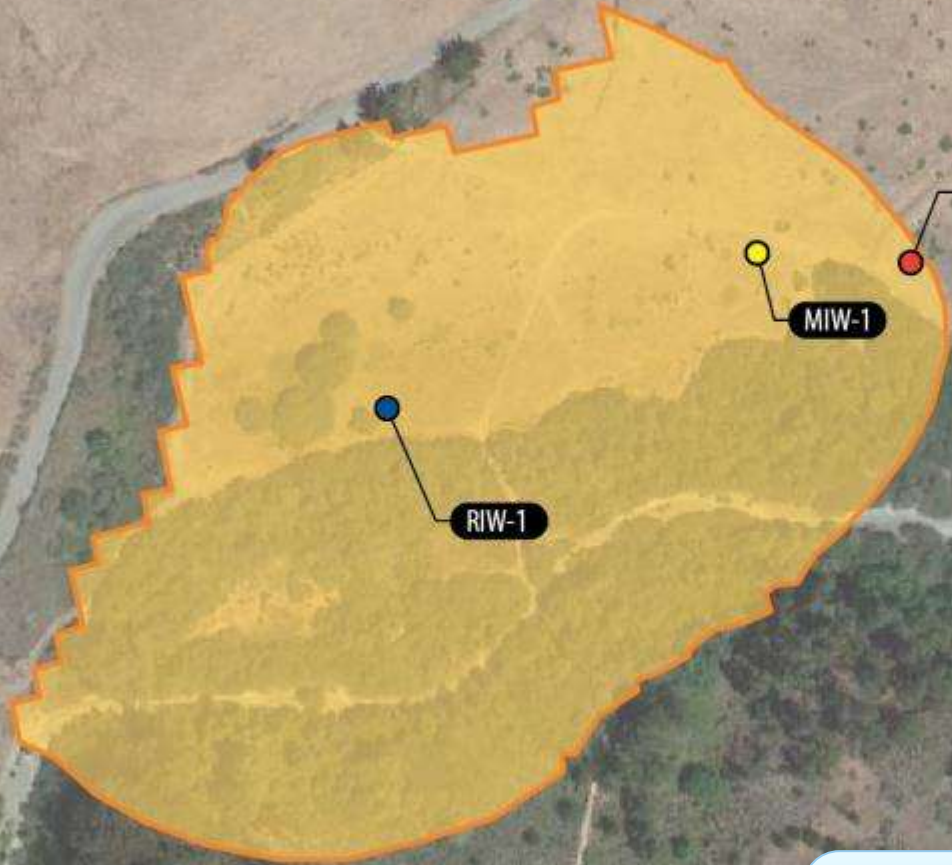


# Tracer Extent



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# Tracer Extent – RIW-1 Injection Stopped

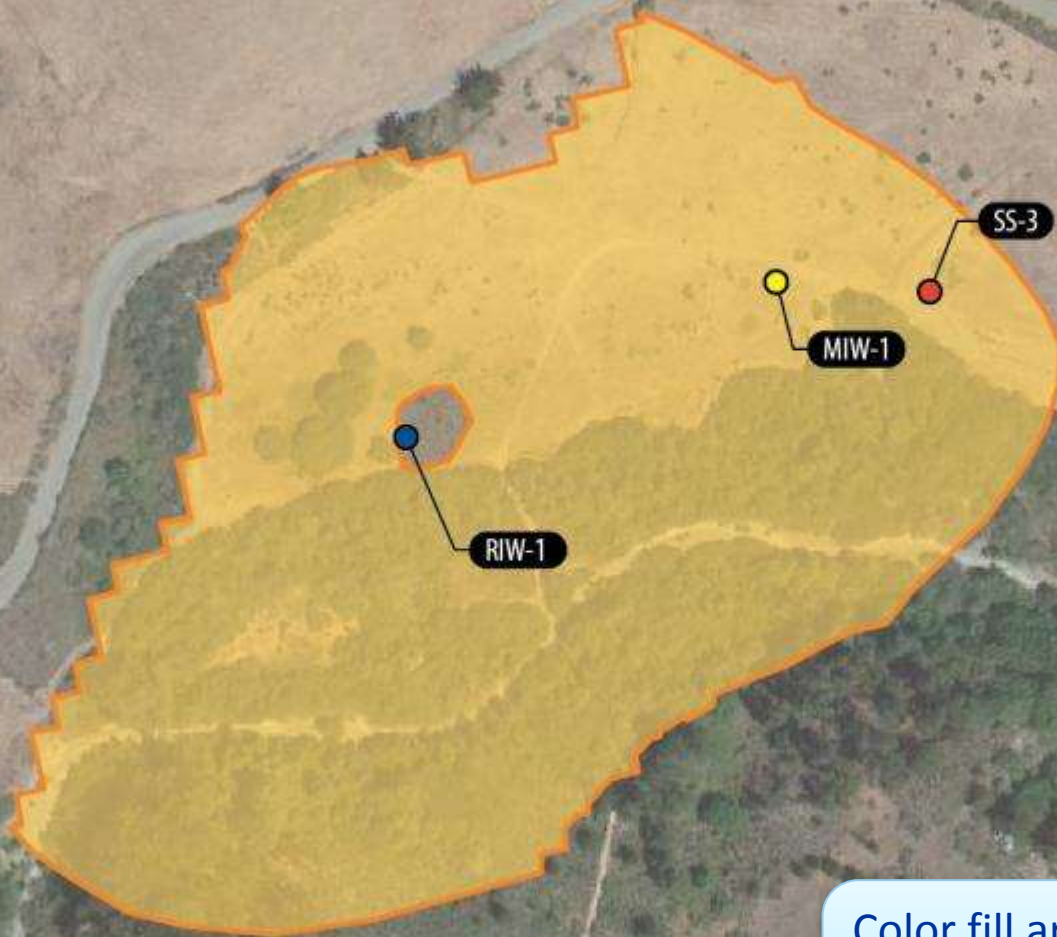


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# Tracer Extent

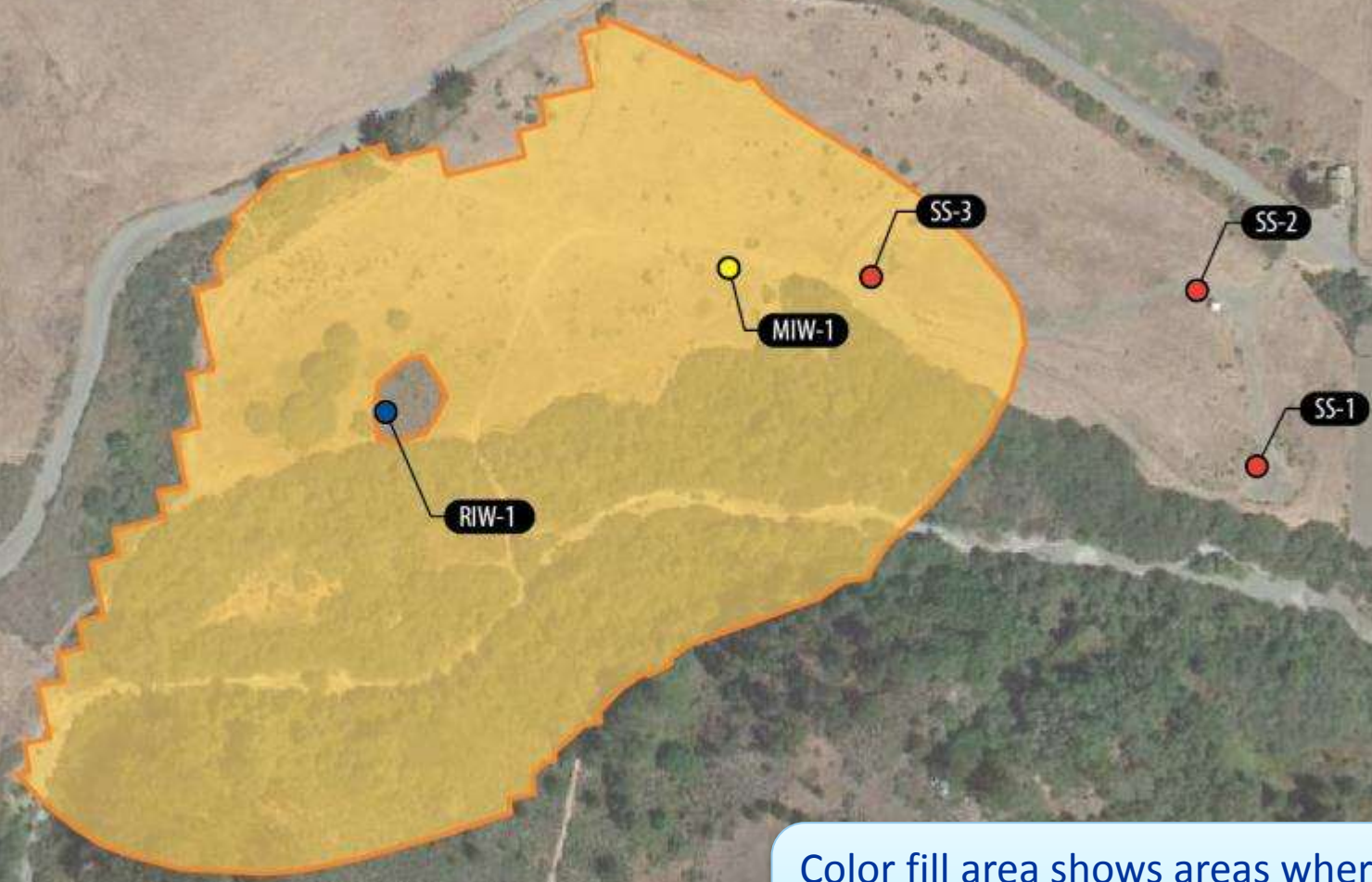
80 days



Color fill area shows areas where tracer concentration is greater than 5 percent of the injected concentration



# Tracer Extent



Color fill area shows areas where tracer concentration is greater than 5 percent of the injected concentration



# Tracer Extent



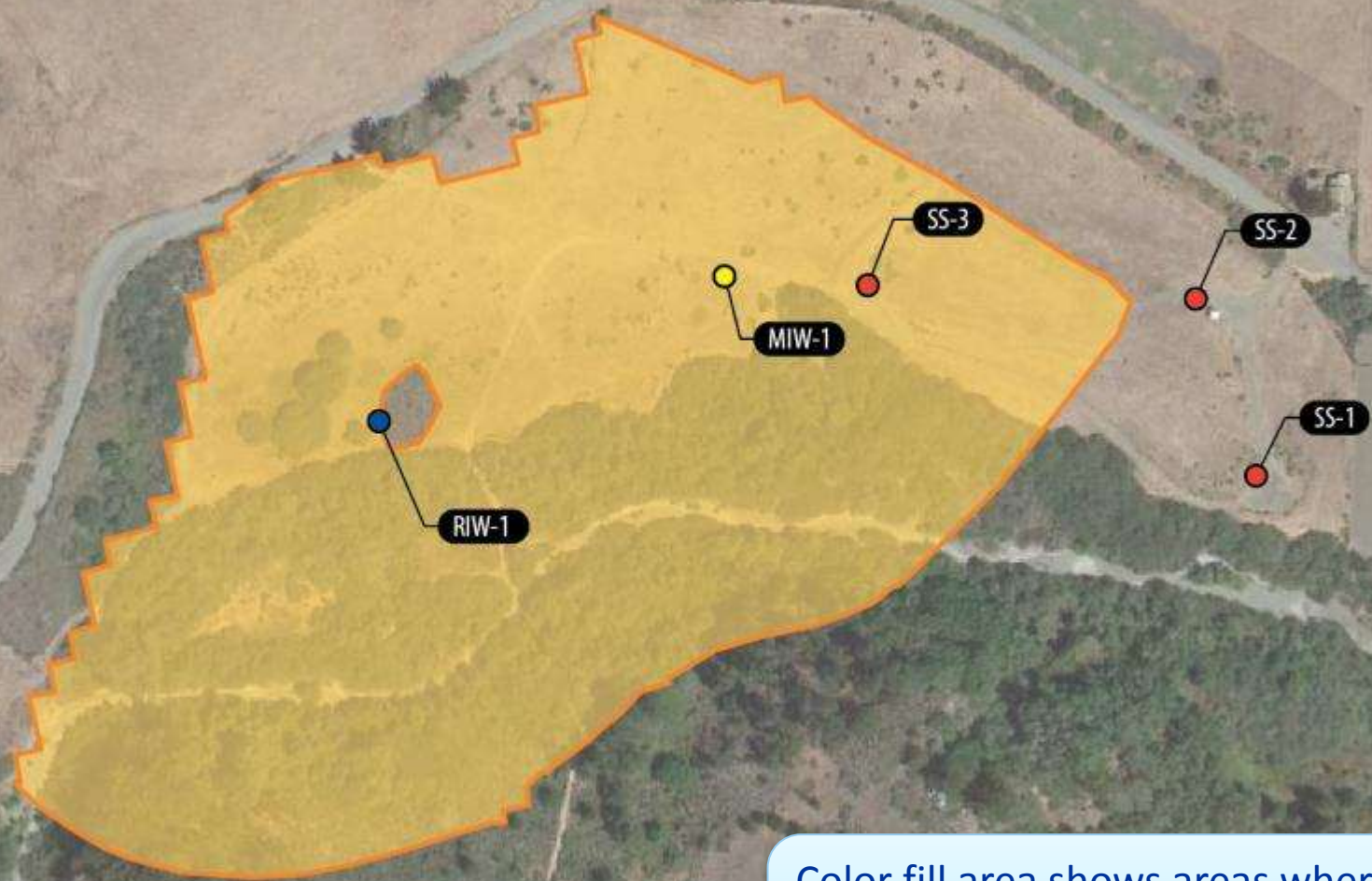
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# Tracer Extent

110 days



Color fill area shows areas where tracer concentration is greater than 5 percent of the injected concentration

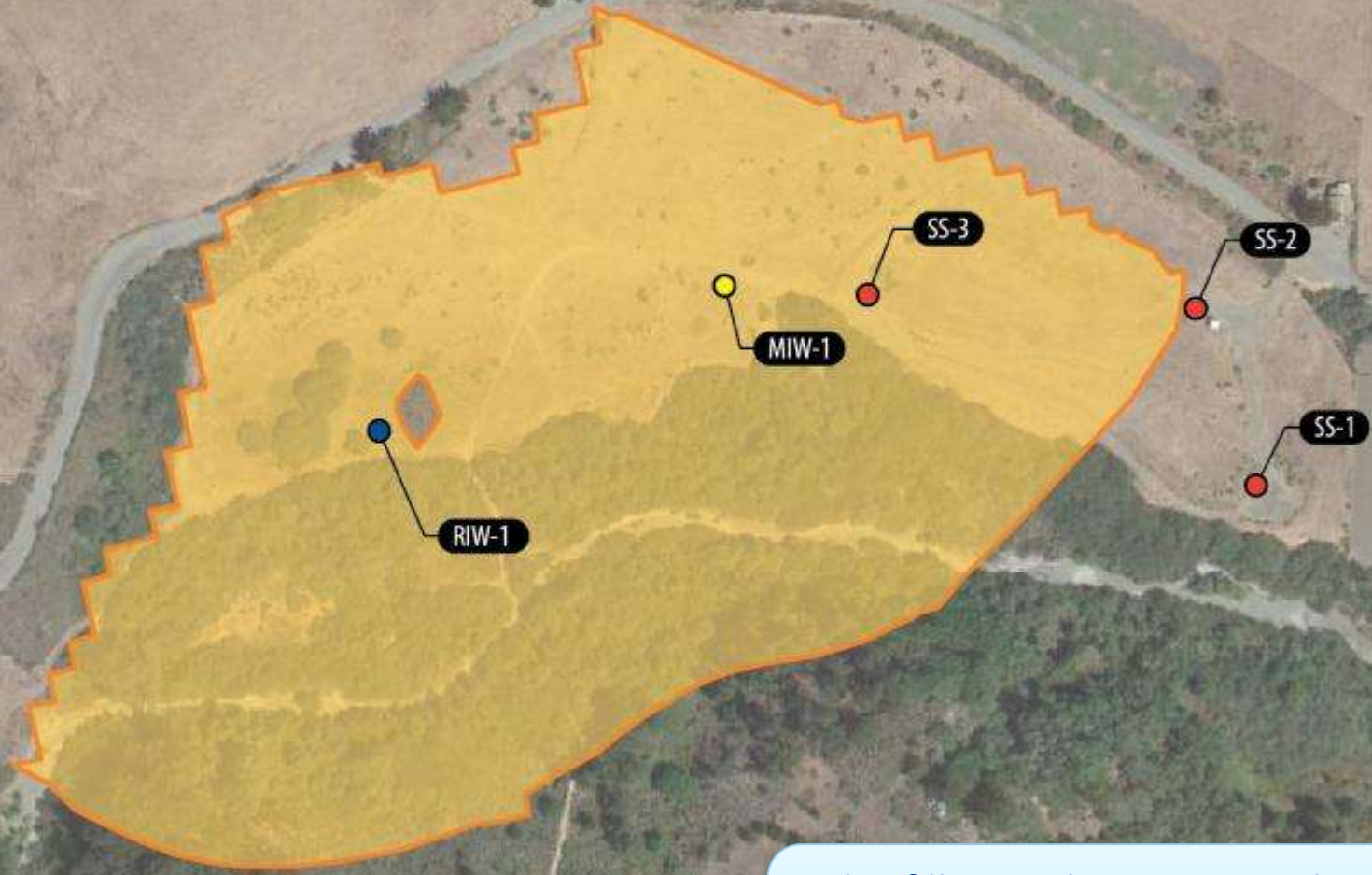
# Tracer Extent



Color fill area shows areas where tracer concentration is greater than 5 percent of the injected concentration



# Tracer Extent



Color fill area shows areas where tracer concentration is greater than 5 percent of the injected concentration



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# Tracer Extent

140 days



Color fill area shows areas where tracer concentration is greater than 5 percent of the injected concentration



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# Tracer Extent



Color fill area shows areas where tracer concentration is greater than 5 percent of the injected concentration



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# QUESTIONS