

# APPENDIX A

## TAC Survey Results

# TAC Member Survey Results Summary

Presented By

Brandon Steets, P.E. & Adam Questad, P.E. | August 28, 2018

Geosyntec   
consultants

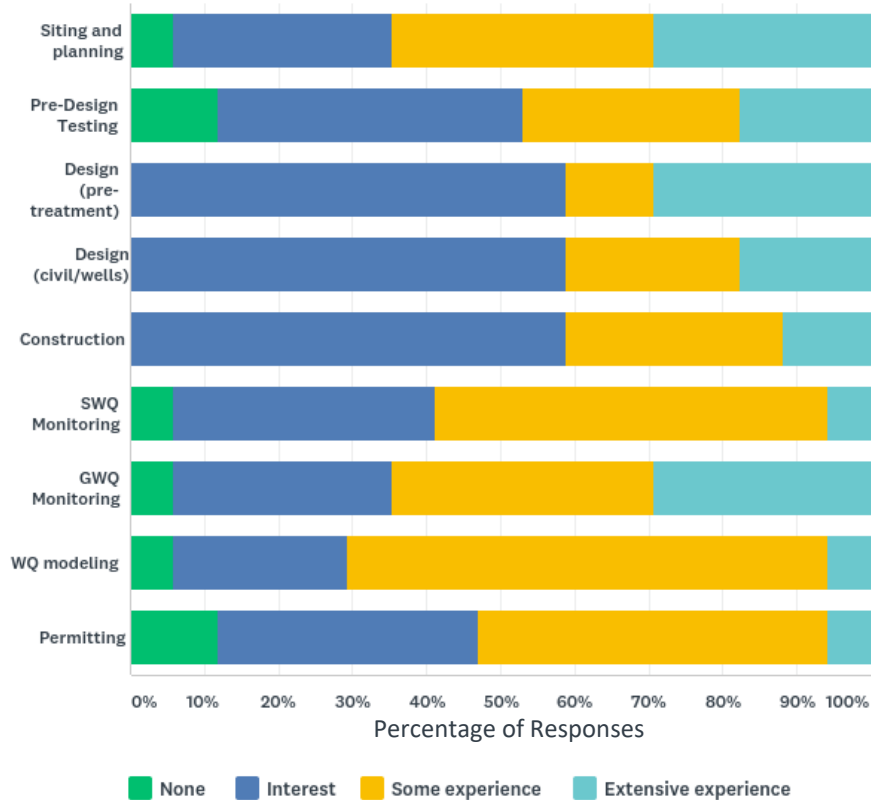


- **TAC member agencies/companies:**
  - State Water Resources Control Board
  - Regional Water Quality Control Board(s)
  - Office of Environmental Health Hazard Assessment
  - National Water Research Institute
  - Sacramento State Office of Water Programs
  - Torrent Resources
  - City of Los Angeles
  - California Department of Water Resources
  - University of California, Davis
  - Orange County Water District



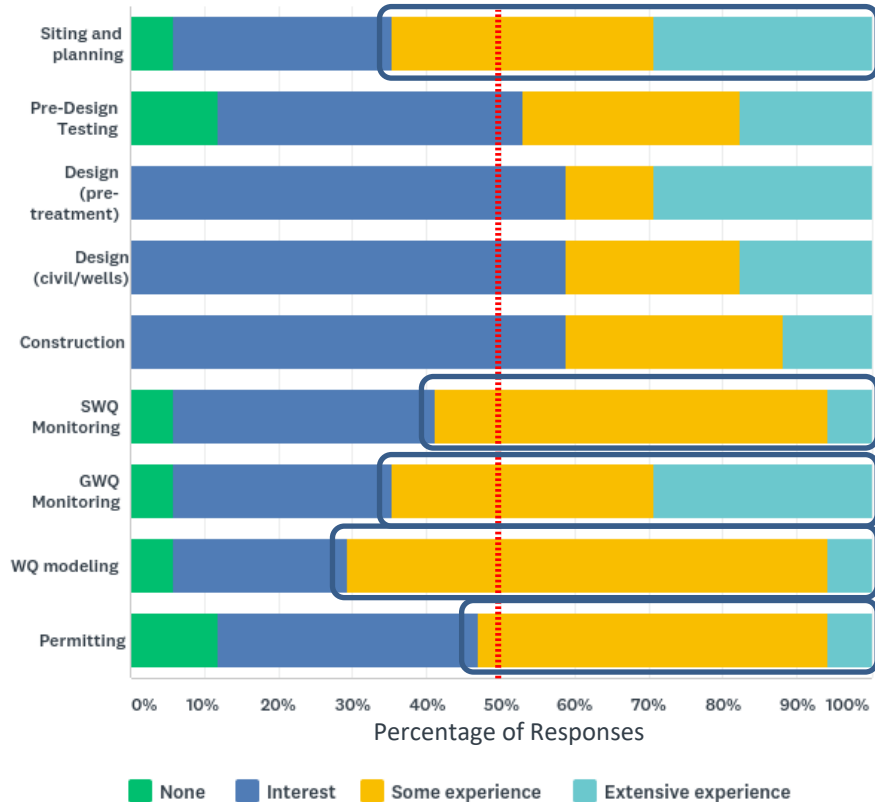
# Drywell Experience

Please rate your level of experience with drywells according to the following categories



# Drywell Experience

Please rate your level of experience with drywells according to the following categories

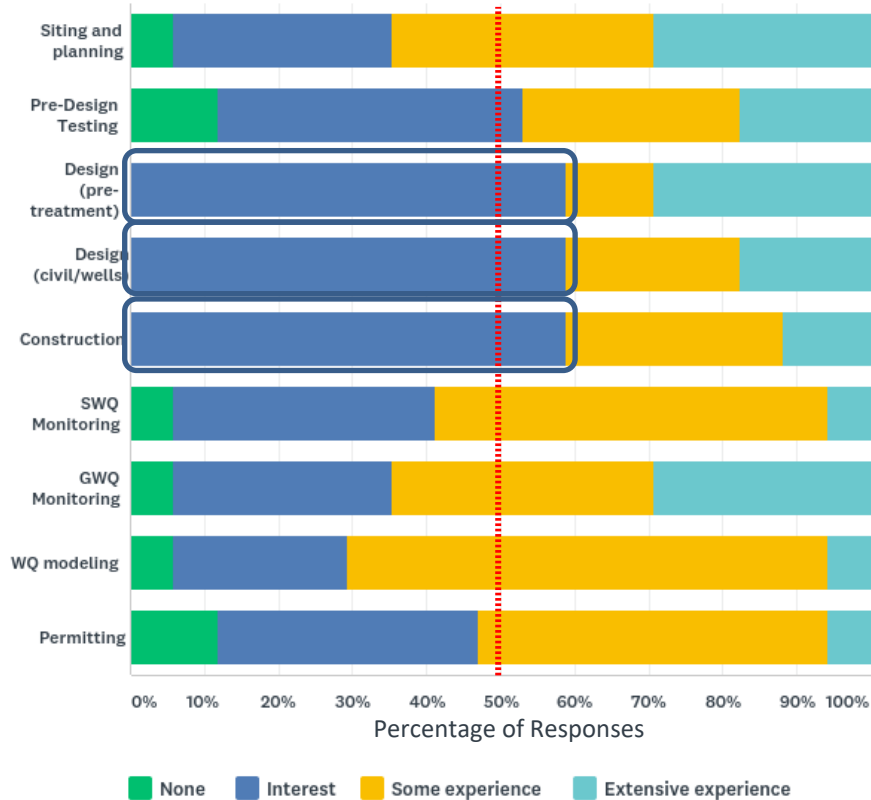


**Over 50% of responses show the following experience**

- Siting and planning
- Stormwater quality monitoring
- Groundwater quality monitoring
- Water quality modeling
- Permitting



Please rate your level of experience with drywells according to the following categories



**Over 50% of responses show the following interest**

- Design (pre-treatment)
- Design (civil/wells)
- Construction

# Existing Drywell Guidance Recommendations

What existing drywell guidance would you recommend following or building off of as a starting point for this project (multiple responses shown in parenthesis)?

- Portland UIC (2)
- Oregon UIC (4)
- American River Basin SWRP (3)
- Orange County (3)
- City of Chandler, AZ, Dept. of Environmental Quality (2)
- US EPA guidance on UIC
- Washington State Department of Ecology (3)
- Nevada Department of Environmental Protection
- NCHRP Report 802, Groundwater Quality Appendix
- CA DWR Well Design
- Torrent Resources Drywell Design Standards

What are the primary strengths and weaknesses of the guidance identified?

- **Strengths**
  - Flexible, protective of groundwater, and follow common sense
  - Straightforward and well presented
  - Matrix to determine pretreatment needs based on input water quality and vadose zone treatment capacity
- **Weakness**
  - Lacking guidance following risk-based WQ impacts
  - Lack of consideration of the volume drywells can manage (i.e., can handle small but not large storms)
  - Lacking tools/models to simulate fate/transport of variety of pollutants (including organics)
  - Lack of science-based data to categorize subsurface treatment potential
  - Lack of monitoring guidelines/requirements
  - Arbitrary standards for characterizing the vadose zone
  - Lack of construction/monitoring guidance to prevent plugging, bio-fouling, and settling of lower sand/gravel material during initial rainfall



What critical data/information gaps exist and need to be filled in order for CA to establish statewide drywell guidance?

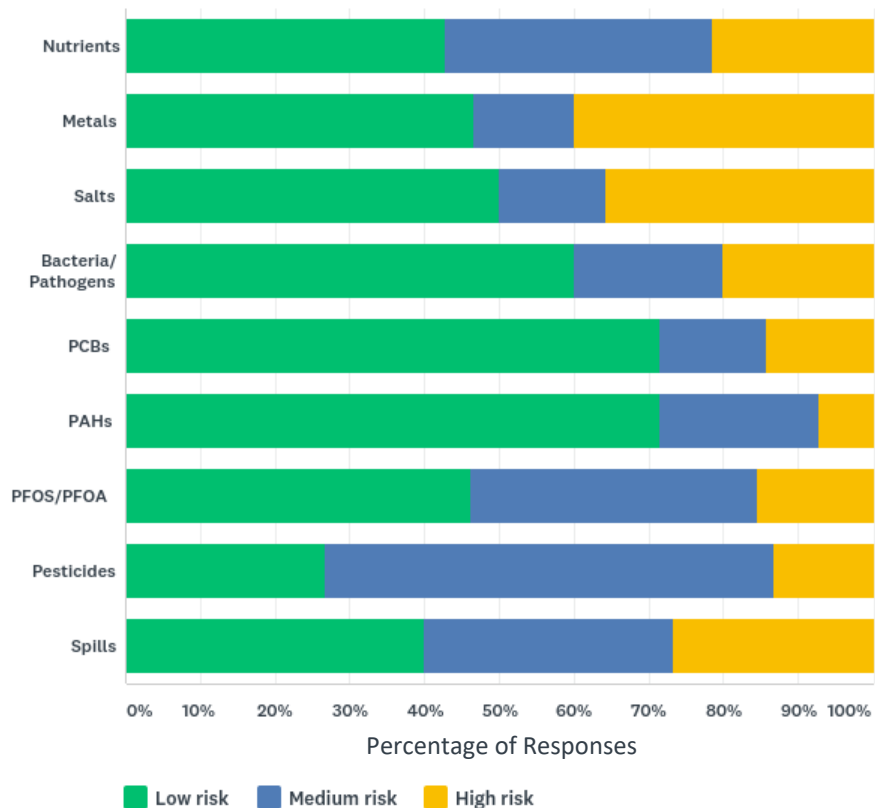
- **Decision Framework/Guidance for Drywell Implementation and GW Protection**
  - Decision process for when modeling is required and when site-specific monitoring/modeling is not required
    - Drywell site eligibility based on land use and WQ risk
  - Fate and transport modeling guidance for GW protection (suggestion: modify US EPA funded GIFMod for drywells)
  - Guidance to determine vadose zone treatment potential
    - Site-specific soil evaluation requirements
  - Proper use of drywells in consideration with other BMPs

What critical data/information gaps exist and need to be filled in order for CA to establish statewide drywell guidance?

- **Monitoring/Modeling Studies**
  - Long term groundwater monitoring to assess impact from various drywell designs at different locations throughout the State
  - Consider how the water table will fluctuate in smaller/perched aquifers
  - Explore emerging contaminants including antibiotic resistant genes (ARGs)
- **Regulatory**
  - Clarify how DWR views dry wells in reference to the State Water Well Standards (Bulletins 74-81 & 74-90) to reduce overlay and treat drywells as a stormwater BMP
  - Harmonize dry well standards with the Industrial General Permit
  - Acceptance of drywells by the regulatory agencies as an appropriate means of storm water infiltration

# Pollutants of Concern Risk

What are the relative risks of the following pollutants of concern?



# Pollutants of Concern Risk

## Comments

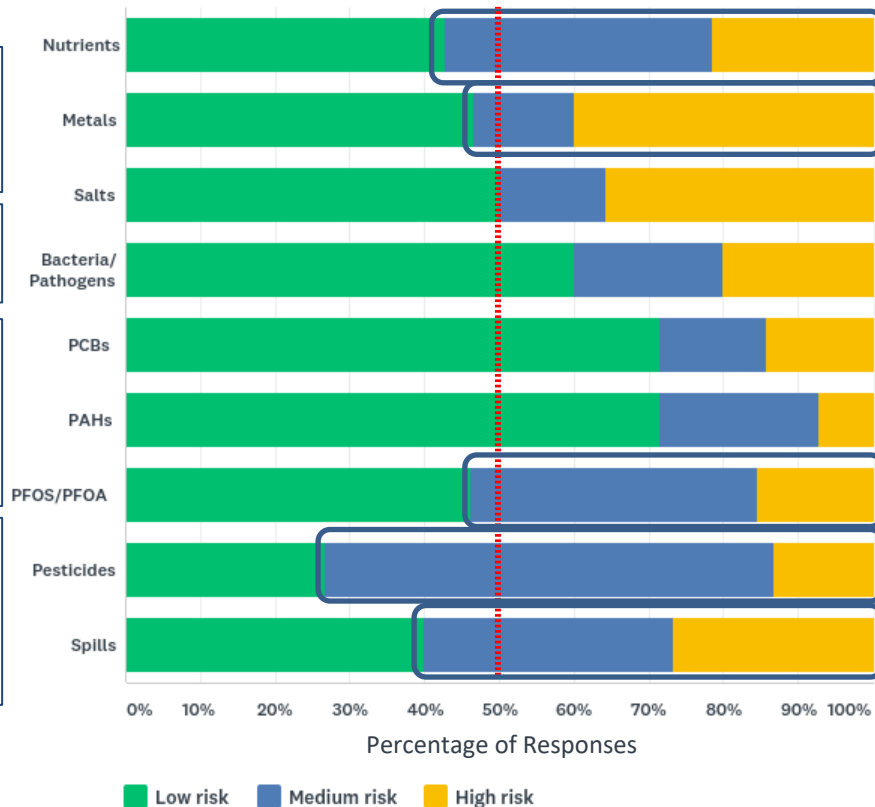
Risk dependent on depth to GW and sensitivity/quality of GW

Antibiotic resistant bacteria and genes

Risk dependent on availability of organic soils/amendments in order to absorb organics

Water soluble contaminants and NAPLs are the major risks to groundwater

What are the relative risks of the following pollutants of concern?



## Highest POC Risk

- Nutrients
- Metals
- PFOS/PFOA
- Pesticides
- Spills

What are the most important elements for CA's drywell guidance to evaluate and address?

- **Siting based on:**
  - Underlying GW quality
  - GW separation (especially for agricultural runoff contributing nitrates)
  - Distance from drinking wells
  - Setbacks from contaminated sites
  - Consideration of contamination plumes and GW contamination
  - Consideration of stormwater sources and GWQ standards to determine contamination risk

What are the most important elements for CA's drywell guidance to evaluate and address?

- **Design**
  - Guidance
    - Based on depth to GW, soil type, and GW fluctuation
    - Include suggested sizing calculations/assumptions
    - Recommendations to minimize clogging
    - Recommendations to determine drywell/pretreatment size to maintain treatment standards
    - Consider “time to clogging” based on pretreatment, source area, and factor of safety

What are the most important elements for CA's drywell guidance to evaluate and address?

- **Siting based on:**
  - Underlying GW quality
  - GW separation (especially for agricultural runoff contributing nitrates)
  - Distance from drinking wells
  - Setbacks from contaminated sites
  - Consideration of contamination plumes and GW contamination
  - Consideration of stormwater sources and GWQ standards to determine contamination risk

What are the most important elements for CA's drywell guidance to evaluate and address?

- **Siting based on:**
  - Underlying GW quality
  - GW separation (especially for agricultural runoff contributing nitrates)
  - Distance from drinking wells
  - Setbacks from contaminated sites
  - Consideration of contamination plumes and GW contamination
  - Consideration of stormwater sources and GWQ standards to determine contamination risk



What are the most important elements for CA's drywell guidance to evaluate and address?

- **Design Cont.**
  - Testing
    - Evaluate percolation test results for soil types in CA
    - Recommend capacity testing of completed drywells
  - Standards and design components
    - Develop pretreatment standards/design guidance
    - Develop standard details and specs
    - Recommend/Require shutoff mechanisms

What are the most important elements for CA's drywell guidance to evaluate and address?

- **Installation**
  - General consensus = lower priority
  - Include in-situ full-scale testing to determine if reduction in total # of wells is appropriate
  - Control the materials used
  - Drilling method should allow strata continuous sampling (coring) and detection of GW (aquifer or perched/seasonal)
  - Provide guidance on preventing sidewalls from invading drywell after construction

What are the most important elements for CA's drywell guidance to evaluate and address?

- **O&M**
  - Routine inspection frequency/type
  - Procedures to minimize clogging
  - Periodic rehabilitation recommendations
  - Efficiency of pretreatment system
  - Consider O&M in system setup/design to allow for drywell modification, simplicity, and low cost maintenance
  - Address bio-fouling and sediment trap cleanout

What are the most important elements for CA's drywell guidance to evaluate and address?

- **Monitoring**
  - Include priority pollutants
  - Consider which bacterial indicators are appropriate and whether ARG/ARB are identified separately
  - Monitor groundwater elevation (monitoring wells)
  - Consider that extensive monitoring may make drywells unattractive to designers; could apply similar standard to all infiltration devices
  - Include sufficient # of wells up/downgradient to capture GW quality
  - Recommendations should include selecting monitoring levels/locations accounting for changes in GW flow direction/elevation

# Pretreatment Criteria

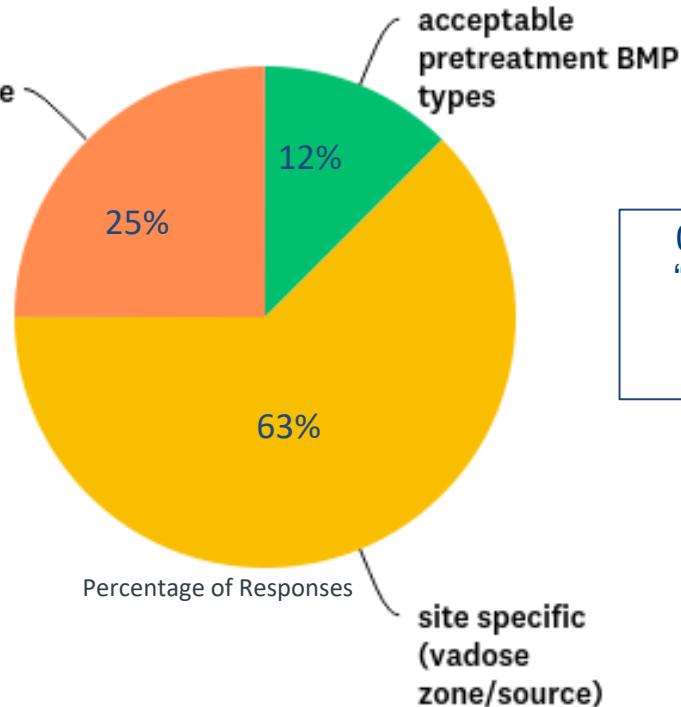
With respect to pretreatment criteria, would you prefer to see:

Protect drywell from fine sediments and plugging

Framework based on site-specific input including hydrogeologic info, stormwater source area, and GWQ standards

Site-specific requirements and effluent concentration requirements

Other (please specify)



0 responses selected "desired pretreatment BMP effluent concentrations"