# **Agriculture Services**

With expertise in groundwater hydrology and soil science, DBS&A supports the agricultural community in developing sustainable water supplies, conjunctively managing surface water and groundwater, adapting to climate change, and interacting with regulatory agencies.

### Water Rights

DBS&A regularly provides clients with technical hydrologic analyses and expert testimony for water rights applications, transfers, and disputes. Technical analyses may include development of groundwater flow or solute transport models; identification or evaluation of the potential water resources and water rights available to support new or existing needs; hydrogeologic analyses to establish well yields, water quality, and operational sustainable yield of groundwater basins; and negotiation for purchase, lease, or transfer of water rights. Our staff have expertise working within the frameworks of state adjudication and administrative processes, interstate water compacts, pueblo and tribal water rights, and other operational protocols under which water rights are administered.

#### Water Quality Investigations and Treatment

DBS&A investigates chemicals in water supplies that negatively impact water quality, including pesticides and fertilizers. We have the expertise to evaluate the presence, source, transport, and optimal methods for treatment of chemicals impacting water resources to meet appropriate regulatory standards. Key services include:

- Water quality sampling, monitoring, and evaluation
- Drinking Water Source Assessment and Protection studies
- Contaminants of Emerging Concern studies
- Forensic geochemistry and contaminant source assessment
- Hydrochemical modeling
- Fate and transport analysis
- Bench- and pilot-scale testing
- Total Maximum Daily Load studies
- Surface water sampling; stormwater sampling
- Salt and nutrient loading evaluations

DBS&A evaluated the potential loading of sulfate, chloride, boron, nutrients (e.g., nitrate), and TDS to a planned rain garden and other on-site landscaping at Hollandia Produce's produce greenhouse facility in Ventura County.

# Hydrologic Analyses

A solid, scientific understanding of available water resources and their hydrologic framework is essential for informed decision-making. DBS&A's professionals routinely provide clients with quantitative hydrologic analyses of groundwater and surface water systems to ensure optimum and energy-efficient use of limited water resources. Studies we perform include:

- Water balance modeling
- Salt and nutrient management planning
- Irrigation return flow evaluation
- Water chemistry and water quality analyses
- Leaching studies
- Water blending
- Vadose zone modeling
- Watershed runoff hydrology and pollutant load modeling
- Groundwater and surface water modeling
- Recharge and infiltration studies
- Seepage studies
- Statistical analyses





#### Water Recycling and Reuse

Water can be recycled by reusing treated wastewater for beneficial uses, such as scheduled irrigation. DBS&A is familiar with State Recycled Water Policies and offers proven strategies and the resources necessary to successfully overcome regulatory hurdles.

#### Water Resources Planning

DBS&A assists farmers and ranchers, state and local governments, water agencies, and private water companies in making the best use of available water resources. Our scientists develop state, regional, and local water plans and programs to enhance water supply, quality, and sustainability. We write critical hydrologic analyses that support the Environmental Impact Report (EIR) process and permitting for complex development and water use projects, including water supply assessments and water rights analyses to secure sustainable water supplies. We also conduct public involvement and stakeholder participation processes.



#### Water Supply Development

Combining practical scientific knowledge with standard engineering principles, DBS&A provides water supply development assistance to the agriculture industry with water well siting, design, and construction services. DBS&A assists its client by optimizing the design of water supply wells and other supply infrastructure, obtaining permits, supporting funding acquisition, and providing the hydrologic technical support needed to acquire and manage water rights.

From shallow, small-capacity wells to deep, high-capacity well fields, our key services in water supply development include:

- Geophysical logging oversight and analysis
- Exploratory drilling and hydrogeologic characterization
- Aquifer testing
- Identification of production zones
- Municipal well and well field design and development
- Permitting
- Construction oversight
- Water rights analysis and acquisition
- Conjunctive use studies
- Water quality sampling, evaluation, and prediction

DBS&A provides water supply development assistance to the agriculture industry with water well siting, design, and construction services.

## Permitting and Regulatory Compliance

Our hydrologists assist clients in navigating regulations and providing environmental impact report support for compliance with state and federal programs. Our experience includes development and implementation of soil, vadose zone, and groundwater monitoring programs to achieve compliance with regulatory requirements while optimizing agricultural methods. DBS&A staff perform all aspects of air, water, and waste permitting and are well-versed in performing the audits, inventories, and impact analysis of salt and nutrient leaching, groundwater mixing models, groundwater flow, and transport models.

#### Nitrate and Selenium Treatment

DBS&A's extensive experience with trace inorganic treatment extends to the biological removal of nitrate and selenium. Both compounds are utilized by similar anaerobic bacteria as an end electron acceptor. This means that the anaerobic bacteria use nitrate and selenate in a similar way that we use oxygen. In a very simple treatment process, nitrate and selenate can be removed using a relatively new technology called anaerobic membrane bioreactor (AnMBR). DBS&A pioneered the AnMBR process for nitrate and selenate removal and recently applied it in a power plant application.

