

NGWA FAQ SHEET

DATA CENTERS AND GROUNDWATER: WHAT YOU NEED TO KNOW FOR YOUR COMMUNITY

What are data centers?

Data centers are facilities that house computer servers, data storage, and networking equipment. While data centers are not new, the exponential growth and incorporation of artificial intelligence (AI) into core infrastructure have created a great demand for data center operations.

Where are data centers located?

Data center locations are found across the United States, with thousands of listed facilities in 50 states, and continued rapid growth is predicted. Data centers come in all sizes, from single-server units the size of a refrigerator to large footprints (hyper-scale campuses) covering over a hundred acres. Site selection for larger data center campuses is influenced by power availability, fiber connectivity, land availability, water resources, regulatory considerations, and project economics.

What makes one site more suitable than another for data center development?

- Water availability
- Aquifer capacity
- Recharge
- Existing demand
- Water quality
- Drought vulnerability
- Regulatory framework
- Availability of non-potable sources

How do data centers use groundwater?

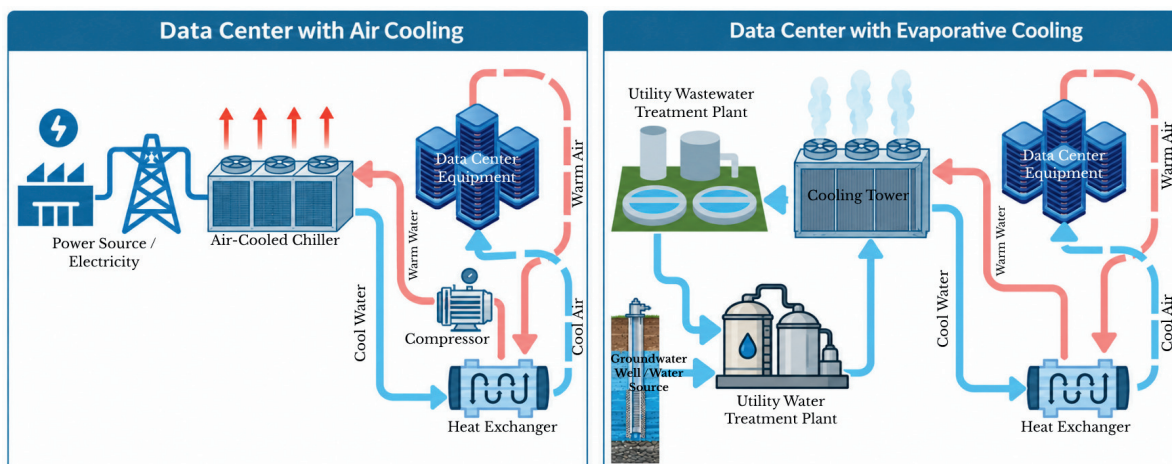
The total water footprint associated with a data center includes: (1) direct water use for cooling systems and human consumption; (2) water used to manufacture equipment and materials; and (3) water used in electricity generation that supports facility operations. While some of these sources can be from other alternative water types, groundwater may be used where it is locally available, suitable for intended use, and permitted under applicable regulations.

Are all data centers water-intensive?

No. Water use varies significantly depending on facility size, climate, cooling technology, and operational practices. Some facilities use relatively little water, while others may require substantial supplies.

How do data centers use water for cooling?

Data centers use several cooling methods to keep servers cool, prevent overheating, and failure of equipment. Modern data centers use a range of cooling approaches, from water-intensive evaporative cooling systems to advanced technologies that substantially reduce water use. Evaporative cooling removes heat by evaporating water, while air-cooling uses fans and ambient air to dissipate heat. Evaporative cooling generally uses more water but less energy, while air-cooling uses little or no water but may require additional energy depending on climate conditions.



Can data centers operate without groundwater?

Yes. Facilities may rely on municipal water, recycled wastewater, surface water, air-cooling technologies, or combinations of multiple water sources.

How much groundwater is being consumed by data centers?

Data center usage of water can range from minimal to millions of gallons per day. Actual groundwater usage from data centers varies by region, cooling technology, campus/facility size, and availability of alternative water sources.

Data center water consumption differs from water withdrawal because consumption refers to water that is not recycled or reused. In this case, the largest consumptive use is evaporation from cooling. The remaining water is discharged as wastewater to the sewer or treatment plant.

What technologies reduce freshwater use?

Data centers can reduce freshwater consumption through advanced cooling technologies, water recycling, reuse systems, and the use of non-potable water sources where available.

Can data centers use treated wastewater?

In many locations, treated municipal wastewater or reclaimed water can be used for cooling and other operational purposes, reducing reliance on freshwater resources.

What are the alternatives to groundwater use?

- Municipal water
- Surface water
- Recycled wastewater
- Reclaimed water
- Aquifer storage and recovery
- Hybrid supplies

Can data centers use groundwater sustainably?

Yes. Sustainability depends on local hydrogeology, groundwater availability, recharge, competing demands, and long-term management.

Do data centers impact water quality?

When properly designed, operated, and regulated, data centers can minimize risks to groundwater and surface water quality. Site-specific evaluations and monitoring programs help ensure water resources remain protected.

How are groundwater impacts evaluated before a project is approved?

Groundwater impacts are typically assessed through hydrogeologic investigations, pumping tests, water-demand analyses, groundwater modeling, and evaluation of nearby wells, streams, and ecosystems. These studies are often conducted during project planning and feasibility evaluations to help characterize local conditions and evaluate the potential effects of proposed groundwater withdrawals.

Will a data center cause wells to go dry?

Not necessarily. In some aquifers, excessive groundwater pumping can result in significant drawdown that may affect nearby wells. In other cases, groundwater withdrawals within sustainable pumping rates may have little or no measurable impact on neighboring wells. Site-specific hydrogeologic evaluations and ongoing monitoring of groundwater withdrawals and levels can help predict and manage potential impacts.

How will a data center affect my community's water supply?

Data centers can increase local water demand, but impacts depend on the facility size, cooling technology, available water sources, and local hydrogeologic conditions. As with other large groundwater withdrawal projects, potential impacts are generally influenced by pumping rates, pumping duration, aquifer characteristics, and existing groundwater demands. A site-specific evaluation should be conducted to determine whether water supplies can support the proposed development sustainably.

How much water use is too much?

There is no single water-use threshold that applies everywhere. A groundwater withdrawal that is sustainable in one aquifer may not be sustainable in another. Sustainability depends on local aquifer conditions, recharge, existing users, environmental requirements, drought vulnerability, and the availability of alternative water supplies. Site-specific hydrogeologic analysis is necessary to determine whether proposed withdrawals can be supported long term.

Can data centers lower groundwater levels?

Yes. Groundwater pumping can result in water-level declines, or drawdown, within an aquifer. The magnitude and extent of these changes depend on pumping rates, duration of use, recharge, existing groundwater demands, and local aquifer conditions. Depending on the scale of groundwater withdrawals and aquifer characteristics, water-level changes may be localized or extend across a larger area. Site-specific hydrogeologic evaluations and ongoing monitoring of groundwater withdrawals and water levels can help identify and manage impacts over time.

How are cumulative groundwater impacts evaluated?

Groundwater evaluations should consider not only the proposed facility but also existing and reasonably foreseeable future groundwater demands within the basin. Understanding cumulative impacts helps communities evaluate long-term sustainability and identify potential management actions before impacts occur.

What happens if groundwater impacts occur?

Permit conditions, regulatory requirements, and monitoring programs may require operational changes, mitigation measures, alternative water supplies, or additional management actions if unexpected impacts occur.

Can a data center pump unlimited groundwater?

No. Groundwater withdrawals are subject to applicable state and local laws and regulations, which vary across the United States. Requirements may include permits, water rights, monitoring, reporting, and other conditions intended to manage groundwater resources and protect other users.

Who regulates groundwater withdrawals for data centers?

Regulatory oversight varies across the United States and may involve state agencies, local governments, groundwater management districts, water utilities, and permitting authorities. Requirements may include permits, water rights, environmental review, monitoring, and reporting obligations.

How can communities learn about proposed data centers?

Information may be available through local planning processes, permitting agencies, public meetings, environmental reviews, and project-specific outreach efforts.

What information should communities ask for?

Communities should ask for information on projected water demand, proposed water sources, hydrogeologic studies, anticipated impacts to water resources, monitoring plans, drought planning and contingency measures, alternative supply evaluations, and proposed mitigation strategies.

What information should a community require before approving a data center project?

For rural areas where land is readily available, there is an opportunity for data center developers. It is important that landowners and local governments consider water stewardship, water quality, and ecosystem preservation for the sustainability of the aquifer, land, and community longevity. It has been established that many data centers utilize groundwater for cooling and other operations.

Each potential data center site presents unique hydrologic challenges. A hydrologic characterization of the site is highly recommended before data center construction, including projected impacts of water usage on the aquifer or surface water body, impacts to surface and aquifer quality, and impacts to biodiversity. Transparency from data centers to the community is vital to ensure a successful partnership in shared resources.

“Water risk” assessments have been developed and implemented as data-driven frameworks that evaluate local water availability, competing demands, environmental considerations, and potential mitigation measures. By using this structured approach, communities can utilize the results to evaluate risk, encourage responsible water management, and support informed decision-making. This framework should be periodically revisited to ensure accuracy.

Hydrogeologic Checklist for Communities

- ☐ Water demand projections, including average and peak demand
- ☐ Hydrogeologic assessment
- ☐ Groundwater model (when appropriate)
- ☐ Source-water evaluation
- ☐ Drought contingency plan
- ☐ Monitoring plan
- ☐ Alternative source evaluation

What Should Communities Monitor After Construction?

- Groundwater levels
- Pumping volumes
- Water quality
- Surface-water interactions
- Ecosystem indicators

How can communities determine whether a proposed data center's water use is sustainable?

Communities should evaluate whether the project's water demand is consistent with available supplies, aquifer conditions, existing users, environmental needs, and long-term water management objectives. Independent technical review may be appropriate for large projects.

Can data centers contribute positively to community water infrastructure?

Some data center developers are investing in water infrastructure and replenishment, including new aquifer storage and recovery (ASR) systems as well as other significant financial investments to cities for public water and wastewater infrastructure. Other examples of data center investment into communities include:

- Water reuse projects
- Aquifer Storage and Recovery (ASR) projects
- Distribution system upgrades
- Monitoring networks
- Water treatment facility improvements
- Regional resilience initiatives
- Desalination or alternative water supply projects, where appropriate

What role do NGWA members have in the planning and operating of data centers?

Qualified hydrogeologists and groundwater professionals should be involved in planning, siting, permitting, monitoring, and long-term management of groundwater resources associated with data center development.

The National Ground Water Association is a not-for-profit professional society and trade association for the global groundwater industry. Our members around the world include leading public and private sector groundwater scientists, engineers, water well system professionals, manufacturers, and suppliers of groundwater-related products and services. The Association's vision is to be the leading groundwater association advocating for responsible development, management, and use of water.

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