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The Intersection of Data Center Development, Water Availability, and Environmental Justice in California

Santa Clara University

Santa Clara University Water & Climate Justice Lab

Environmental Justice and the Common Good

Santa Clara Markkula Center for Applied Ethics

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Abbreviations of units used in the report

MW - megawatt, a unit of power used to measure electricity generation or consumption

MWh - megawatt per hour, a unit of energy equivalent to 1,000 kilowatts (kW) of electricity used or generated continuously for one hour

TWh - terawatt-hour is a unit of energy equal to 10^{12} watt-hours, typically used to measure large-scale electricity generation or consumption.

mm/yr - millimeters per year, unit used to measure precipitation

in/yr - inches per year, unit used to measure precipitation

ft^2 - square feet

gal/d - gallons per day

gal/yr - gallons per year

$gal/ft^2/yr$ - gallons per square foot per year

AF – acre-feet, a unit to describe a water volume, equal to an acre (about the size of a football field) covered by one foot of water

AFY - acre-feet per year, a unit to describe a water volume generated or used over time

EXECUTIVE SUMMARY

Photo by Briana Guingona

In California, limited water resources are divided among competing urban, agricultural, and ecological uses through arguably the most extensive and complex water infrastructure system in the world, intersecting with an intricate web of water systems, water agencies, rights and regulations. While California is a region of great economic and ecological importance, decades of unsustainable rates of pumping have permanently reduced the amount of water that can be stored in aquifers. Such pumping has also made vulnerable groundwater basins dependent on surface water imports, and very careful management between years that are above and below normal precipitation to maintain current ground water levels is needed. Temperature increases and increases in the intensity and frequency of drought associated with climate change make the sustainable management of water more difficult across the state.

The water requirements associated with data center development and operation in the state add to the challenge. The advent of massive generative AI (GenAI) models, the multiplication of such models, and the rapid integration of generative AI throughout our digital world have led to an unprecedented boom in data center planning and construction. However, only recently has attention focused on the fact that generative AI and the hyperscale data centers that support it consume and pollute substantial amounts of water at nearly every stage of their supply chain.

This report assesses the intersection of direct water use by data centers with water availability and distribution in California, focusing on the potential impact of large-scale data center operations on local water resources. The report also evaluates how data centers might affect the water access and sustainability for communities located near these facilities, highlighting, through the concept of environmental justice (EJ), potential disparities in water access for particularly vulnerable communities. As part of this assessment, it offers a comprehensive database of California data centers, as well as newly developed metrics to evaluate water scarcity and community vulnerability, which are an integral part of the geospatial analysis.

For the vast majority of the data centers that we mapped, we were unable to find publicly accessible environmental planning documents or information on cooling systems or the type of water used – highlighting a broader challenge for communities, water providers, and researchers attempting to assess to what degree data centers affect water supplies. For our study, water sources were determined from information available from the water service providers for each data center.

We selected three existing data centers (in the City of Santa Clara, Sacramento County, and Los Angeles County), and two planned data centers (in the City of Gilroy and Imperial County) to serve as case studies to examine these issues more closely. Taken together, our case study analysis highlights the challenges of siting large data centers in areas with constrained water resources and socio-economically vulnerable populations. While water districts emphasize their planning for sustainability, closer examination indicates that recent hyperscale facilities have been constructed and are being planned in areas where groundwater or imported surface water is increasingly uncertain due to climate variability and regulatory limits, placing pressure on already fragile water systems. Meanwhile, data center developers are increasingly taking advantage of means to bypass environmental review processes. However, in at least one of the case studies, it appears that greater data transparency and an environmental review process have led to better outcomes for managing water resources sustainably on the local level.

Recent siting of data centers in socio-economically challenged and ethnically diverse communities raises equity concerns, as resulting water use may compete with other local needs while public oversight and environmental review are often limited. In light of data centers' high water and energy demands for cooling, our findings illustrate the need for careful planning, transparent reporting, and integrated management of water, energy, and other social impacts.

Data centers are an integral part of our digital world, supporting many beneficial uses for individuals and communities. Determining where to locate them involves many factors and complex trade-offs; we have flagged some of those in our Ethical Analysis section. However, such trade-offs cannot be accurately assessed in the absence of accurate data about the centers' local impacts.

Table ES-1. Summary of Social Vulnerability and Water Scarcity Scores for Case Study Data Centers

Case Studies:	Santa Clara	Gilroy	Los Angeles	Sacramento	Imperial
Social Vulnerability Score (1-5)	1.8	2.8	2.6	3.4	3.8
Water Scarcity Score (1-5)	3.5	3.6	4.0	4.1	5.0

A score of 5 denotes the highest social vulnerability or water scarcity (see also Section V D)

Our main findings are summarized below:

1. Transparency regarding water use and environmental impacts is severely limited. Without accurate water use estimates, water providers cannot plan for effective and sustainable water distribution, especially under climate change. Communities that are already more vulnerable in terms of economic strength and water scarcity are likely to suffer the greatest impacts.

2. Water scarcity impacts extend beyond the footprint of any single data center, particularly when facilities rely on imported water or shared groundwater basins. Increased demand in one jurisdiction can contribute to basin-wide depletion, reduced drought resilience, and ecological or community water stress in distant source regions. This interconnectedness underscores the need for comprehensive, cumulative water supply assessments.

3. Data centers are expanding into more socially and hydrologically vulnerable regions. While early data centers in California were concentrated in urban tech hubs, newer hyperscale facilities are increasingly located in or proposed for locations that score higher on both the social vulnerability and water scarcity indices developed for this report—potentially indicating a broader shift toward siting in communities with fewer economic and water security buffers.

4. Water scarcity risk is highest in the Central Valley and Imperial Valley, where at least two new massive projects are being planned. These are also areas with particularly vulnerable communities, where environmental justice concerns already include contaminated water, dry wells, air pollution, and heat exposure.

5. Smaller and groundwater-dependent water systems face greater relative risk. Facilities located in smaller water districts rely heavily on groundwater or single-source imported supplies, and have less financial, rights-based, and hydrologic flexibility during drought. In contrast, larger metropolitan systems have more diversified portfolios, though they remain substantially dependent on imported water from stressed basins.

6. Many planned data centers depend on imported water from already stressed external basins. As a result, the water footprint of these data centers effectively shifts hydrologic risk to other regions that are simultaneously confronting scarcity and ecological strain, which is likely to increase with projected climatic changes.

7. The environmental review framework for data centers has gaps that may allow developers to avoid full regulatory scrutiny. Some data centers appear to proceed through ministerial approval or tiering, potentially avoiding full environmental impact and water supply assessments under CEQA. Current review processes may underestimate water impacts.

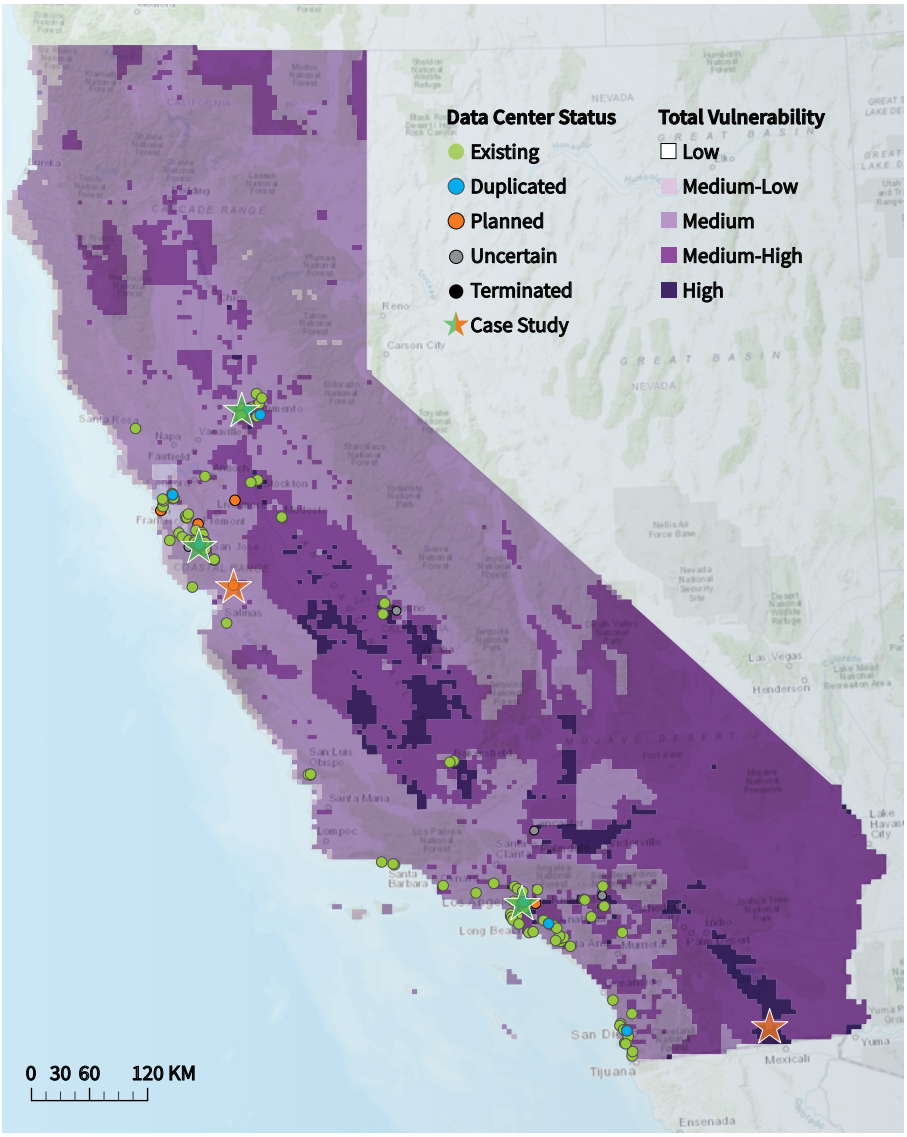
8. Socio-economic vulnerability and water scarcity relative to data centers intersect for large regions in California. A joint total vulnerability index with respect to social vulnerability, water scarcity, and data centers was developed by this study (Figure ES.1). In addition, social vulnerability and water scarcity scores for the case study data centers are summarized in Table ES.1 and underscore the above findings.

9. A lack of data leads to a lack of trust. A lack of data also hampers good legislation, consumer/user agency, technical innovation, and environmental justice. Working with communities in transparent ways could lead to more just and sustainable outcomes.

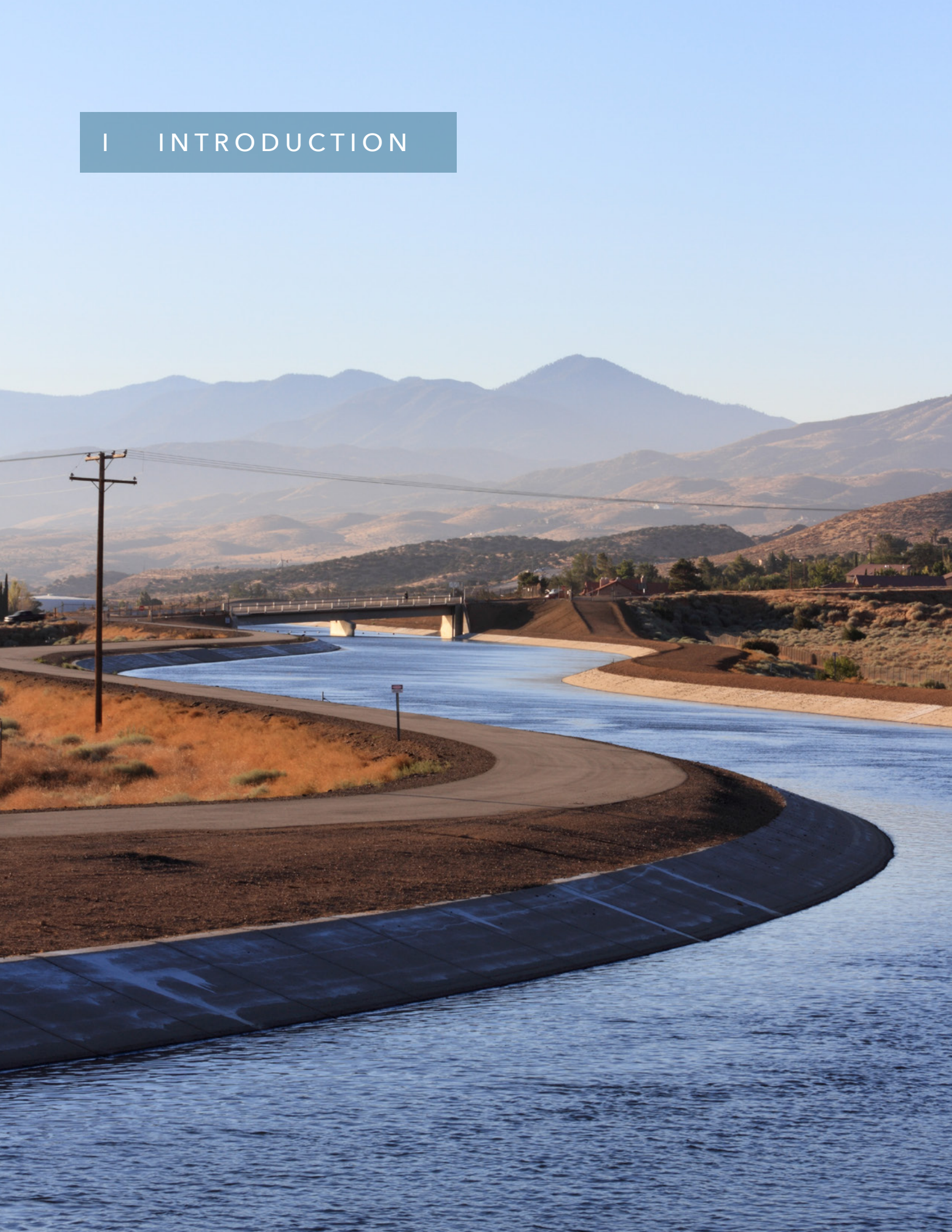
The report includes additional findings, as well as policy recommendations for relevant stakeholders.

It is important to note that this report is a snapshot of data centers' intersection with water issues in California. The situation is very much in flux—with new laws proposed; growing community opposition to the development of data centers in some areas; technical innovations in material development, cooling systems, etc.; climate changes and related challenges; and long-standing disputes like the one over the distribution of Colorado River water reaching inflection points. Even as conditions change, however, the intersection with environmental justice will require ongoing attention.

Figure ES-1. The Total Vulnerability Index and Data Centers in California. Case study locations considered in this report are indicated with a star symbol.



I INTRODUCTION



A. Water Scarcity in California

The issues of water accessibility and water distribution have long been contentious in California. In the state, limited water resources are divided between competing urban, agricultural, and ecological uses through arguably the most extensive and complex water infrastructure system in the world, and a complicated web of water rights and regulations [1]. Most water (nearly three-fourths) in California is generated in the northern part of the state, above the San Francisco Bay Area and in the Sierra Nevada mountains, but roughly two-thirds of the demand comes from the southern half of the state [2]. As a consequence, water is shipped hundreds of miles to the predominantly southern, agricultural and urban regions of the state through hundreds of reservoirs and dams and hundreds of miles of canals. In addition, about one-third of the water supply in Southern California is imported from the Colorado River Basin outside of California [3]. For many of the urban and agricultural regions in California, little surplus water is available after all water demands are satisfied, even in years with normal precipitation. Shortages are exacerbated during regularly occurring times of drought, which leads to rationing and water level declines [4].

At the same time, California is a region of great economic and ecological importance, recognized as a global biodiversity hotspot [5], and an economic powerhouse, with larger agricultural outputs than any other state in the U.S. [6,7]. Both agriculture and biodiversity rely on the availability of water.

Systematic withdrawals under the current water management system have greatly altered the magnitude and timing of natural flows, such that many native species, such as salmon, have experienced critical population declines, and important riparian areas have been lost [5,8]. In addition, decades of unsustainable rates of extraction have moved groundwater production in the Central Valley and other agricultural regions past its peak [9], as communities contend with widespread contamination from agricultural and industrial activities, dry wells, and subsiding land. Furthermore, temperature increases associated with global warming, the extreme drought and precipitation events recorded over the past two decades, as well as forecasts for more frequent and more intense extremes outside of the historic range [10] have spurred increased caution in water management.

Water management in this context requires a delicate equilibrium of physical infrastructure, technical expertise, and financial resources to store, treat, and distribute water reliably across sectors and regions. In many large urban areas of California, such as the San Francisco Bay Area or the greater Los Angeles area, this balance has been achieved through both careful management and surface water imports from watersheds that may be hundreds of miles away—reducing the water available elsewhere. Yet historically marginalized communities, particularly those outside large, well-funded water districts, often lack access to such infrastructure and institutional capacity [11]. Instead, many depend on small water systems or private domestic wells that are lightly or not regulated, fragmented in governance, and have far fewer technical and financial resources to respond to groundwater depletion, contamination, and drought [12].

B. AI Data Centers and Water

Within this complex intersection of needs and interests, the water requirements of data centers add to the challenge. Data centers, the warehouse-like structures that house the servers which process our digital lives, have been rapidly increasing in size and capacity to a 'hyperscale',[1] and thus require rapidly increasing amounts of water.[2] Water is used as part of the cooling process for chips and servers and, indirectly, as part of the generation of energy required to power the centers. References to the "cloud," the entities in which computation happens, are really references to data centers. Such structures have been with us for decades and host and transmit all our electronic information and communications, including electronic medical records, searches for information, digitized archives, online courses, texts

1 There is no fixed definition for the term 'hyperscale', but in various contexts it has been used to denote the newest massive data centers that have been built as part of the advent of generative AI. IBM offers one definition: "A hyperscale data center differs primarily from traditional data centers by virtue of its sheer size. A hyperscale data center requires a physical site large enough to house all associated equipment—including at least 5,000 servers and quite possibly miles of connection equipment. As such, hyperscale data centers can easily encompass millions of square feet of space" [13].

2 According to a 2024 report from Lawrence Berkeley National Laboratory, "In 2014, data centers consumed 21.2 billion liters of water,.... Hyperscale data centers in 2028 are expected to consume between 60 and 124 billion liters" [14].

among family members, work emails, and social media distributed videos.

However, the advent of massive and ever growing generative AI (GenAI) models, the multiplication of such models, and the rapid integration of generative AI throughout our digital world have led to an unprecedented boom in data center construction [15]. Although federal regulations do not require data centers to register their operations and estimates vary among sources, there are currently close to 4,000 data centers operating or planned in the U.S [16]. And, according to a recent article in the IEEE Spectrum, designers of some of the new data centers "are rewriting their rule book to handle power, cooling, and network infrastructure at a scale that would've seemed ridiculous five years ago"—for example, by (in some cases) using concrete panels prefabricated for "floor loads up to 3,000 kilograms per square meter, which is more than twice the load international building codes normally define for manufacturing and industry," accommodating racks of new GPUs that are themselves growing heavier and more power-hungry [67]. Given the simultaneous rapid growth and lack of regulation requiring disclosure, estimating the true impact of hyperscale data centers on resources, the environment, and public health is exceedingly difficult and has given rise to increasing concerns.

Research shows that data centers optimized for AI processing and the infrastructure required to support it negatively impact the environment in numerous categories, including carbon emissions, electricity and water consumption, air quality degradation, and land use changes [17]. For example, data centers require 24/7 electricity availability, which is difficult to provide via renewable power such as wind or solar. Some form of alternative supply is needed during periods when renewable sources are not generating, to power servers and maintain optimal temperatures via cooling systems [18]. This constant energy consumption strains energy grids and increases greenhouse gas emissions, since the energy powering data centers often relies on the burning of fossil fuels [19].

According to a report published by the International Energy Agency in April 2025, data centers in the U.S will account for nearly half of the growth in electricity demand between now and 2030, and "[b]y the end of the decade, the [U.S.] is set to consume more electricity for data centres than for the production of aluminium, steel, cement, chemicals and all other energy-intensive goods combined" [20]. The same report notes that on the global scale, data center electricity consumption is expected to account for nearly 80% of total growth, with China and the United States expected to experience the largest increase—around 240 TWh (up 130%) in the United States, as compared to 2024 levels [20].

In November 2024, Gartner Research made headlines with its prediction that 40 percent of AI data centers would be restricted by power shortages within three years. Less has been written about the connection between power shortages and water shortages, although media coverage has occasionally addressed the fact that data centers are being built in parts of the world that have been dealing with particularly hot temperatures and/or droughts, such that cooling systems that rely on water would pose particular challenges and potentially clash with the other water needs of local communities [21]. Only recently has attention focused on the fact that generative AI and the hyperscale data centers that support it consume and pollute substantial amounts of water at various stages of their supply chain [68, 69] – from mining rare earth elements and producing silicon chips with millions of gallons of ultrapure water, to cooling servers, generating electricity, and even constructing and landscaping data center facilities. And while the current federal administration, in aiming to promote the U.S.' "global AI dominance", has sought to restrict states from limiting data center development [77], the U.S. EPA 2027 Budget report implicitly acknowledges the associated impact on energy and water supplies and encourages the development of greater efficiencies [78].

The primary focus of our report is on water used for data center cooling, given its direct competition with other local water demands. In this context, the type of cooling system makes a difference. A 2025 report from the International Energy Agency notes that the share of data center power consumption varies, depending on the cooling system, from about 7% for efficient hyperscale data centers to over 30% for less-efficient ones [20]. Closed-loop systems, for example, often consume less water but use more energy (and thus potentially more water in the production of this energy). Another factor at play is that some facilities may use recycled water.

Growing AI needs are also changing the data centers themselves: in many parts of the country, the facilities now being built to meet the complex computational needs of generative AI are much larger and run much hotter than prior versions of data centers.

In California, however, while there are many data centers under construction or waiting to come online,[3] they are mostly not as massive as ones currently under construction or planned for Virginia, Louisiana, Ohio, or Texas, for example [22-25]. Still, California's data centers use substantial amounts of water, both directly for cooling and indirectly through the production of the energy needed to power them. In fact, a recent report noted that more than 90% of data center water consumption in California comes from power generation, often used to generate steam in natural gas power plants, rather than the cooling systems of the data centers themselves – though the numbers for both have been growing [17].

Geographic location and climatic conditions are critical determinants of data center water use. Cooler ambient temperatures reduce cooling demand, which has led to the construction of facilities in environments such as underwater sites, caves, and purpose-built bunkers [26, 27]. At the same time, levels of water stress vary considerably across regions and even within individual U.S. states, including California [28].

In addition, a recent report by the Kapor Foundation finds that more than 60% of California's data centers are situated in areas ranking in the highest quintile for poor water quality [29]. Water scarcity and water quality are closely interconnected, and both raise significant environmental justice concerns.

3 In July 2025, PG&E (the Pacific Gas and Electric Company, which serves a large swath of Northern and Central California, announced that it would be providing power to 17 new data center projects projected to begin operations between 2026 and 2030; its announcement noted that most of them "are in San Jose, Silicon Valley and the greater San Francisco Bay Area, but some are also in the Central Valley and Sacramento" [70].

II OBJECTIVES

This report seeks to assess the intersection of direct water use by data centers with water availability and distribution in California, focusing on the potential impact of large-scale data center operations on local water resources. The report also evaluates how data centers might affect the water access and sustainability for communities located near these facilities, highlighting potential disparities in water management and resource distribution. In the process of this assessment, we developed a comprehensive database of California data centers, as well as metrics to evaluate water scarcity and community vulnerability, all of which supported the geospatial analysis.

Photo by Briana Guingona

III KEY CONCEPTS

A. Environmental Justice (EJ)

This study investigated the intersection of data centers and vulnerable communities in California through the concept of environmental justice (EJ). We are basing our understanding of EJ on the U.S. EPA's 2024 definition, namely that "Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. [...] It will be achieved when everyone enjoys the same degree of protection from environmental and health hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, and work." An environmental justice (EJ) perspective rests on the principle that all people are entitled to equal protection from environmental harms and equal access to environmental benefits. EJ is commonly understood as encompassing four interrelated dimensions: distributional, procedural, recognitional, and transformational justice. These dimensions correspond, respectively, to the normative questions of who receives environmental benefits and burdens, who participates in decision-making, whose identities and experiences are acknowledged and valued, and what structural changes are required, and by what means, to redress inequities [30, 31]. In the context of the very recent and rapid expansion of AI data centers, questions of justice and equity might be overlooked, yet they demand careful and explicit consideration.

B. Water Scarcity

Water scarcity occurs when insufficient freshwater resources are available to meet the human and environmental demands of a given area. Water scarcity is inextricably linked to human development, human rights, water rights, and ecological limits, and may occur on local/neighborhood to regional scales. Sufficient access to safe drinking water is a priority for global development and is guaranteed by the declaration of a human right to water established by law in 2011 in the State of California. Water scarcity can affect both human communities and ecosystems. In very seasonal climate regions, such as California, where essentially all precipitation arrives between the months of October and March, water scarcity is the most intense at the end of the dry season (for the months of July, August, and September) and during periods of drought.

C. Communities Vulnerable to Water Scarcity in California

The vulnerability of communities to water scarcity is shaped by the intersection of climate, the type of water source that the community relies on, and the size of the community's water system. A number of factors increase vulnerability to water scarcity:

1. Dependence on groundwater, especially shallow groundwater
    - Groundwater is often pumped out of the ground at much faster rates than it can recharge [32]. Once an aquifer loses a sufficient amount of water, it starts to compress and cannot be replenished to the same degree, even when water is available [33].
    - Shallow groundwater is more prone to become polluted from industrial or agricultural activities on the surface. Contamination in groundwater is exceedingly difficult and expensive to clean up, de facto reducing the amount of available potable water.
    - Shallow wells are susceptible to drying out when aquifers are over-pumped during droughts. Individuals or water systems dependent on shallower wells are more vulnerable to wells running dry.
2. Dependence on smaller water systems or individual domestic wells for potable water
    - Water systems that are not connected to large distribution systems, such as smaller water systems or domestic wells, are often more or exclusively reliant on groundwater.
    - Smaller systems often lack funds for upgrades or treatment facilities, and battle aging or inadequate infrastructure.
    - Smaller systems or well owners mostly lack surface water rights in times of drought or scarcity.
    - In areas served by smaller systems, financial resources for monitoring water quality and future planning are limited.
    - Smaller systems or well owners lack the resources and political clout to obtain alternative water supplies if a water source is temporarily or permanently depleted.

3. Arid and semi-arid climate
    - Areas with arid and semi-arid climate have insufficient recharge capacity to replenish high ground water use
    - In such areas, connecting to surface water deliveries is expensive and requires water rights that are difficult to obtain
4. No access to large water distribution systems
    - In California, complex public and private water systems (i.e. the Central Valley Project, the State Water Project, the Los Angeles Aqueduct, the Colorado River Aqueduct, the Hetch Hetchy Regional Water System, and more) deliver water from water-richer areas in the northern and Sierra Nevada regions of the state to the drier, southern, coastal regions, where demand is high for agricultural and urban use. In the more arid areas of the state and outside of the service areas of these water delivery systems, vulnerability to water scarcity is higher, as local sources are insufficient to meet year-round demand. These conditions are more likely in rural areas.

As a result, hyperscale data centers with potentially high water demands might exacerbate not only local water scarcity, but also water scarcity in the areas where the water is drawn from.

D. Social Vulnerability

Social vulnerability refers to the susceptibility of individuals and communities to harm from various social, economic, and environmental factors. It arises from unequal access to resources and opportunities, often rooted in historical and structural inequalities. Factors such as poverty, lack of education, inadequate healthcare, and limited political power contribute to social vulnerability by reducing the capacity of individuals and communities to adapt to or recover from shocks such as economic downturns, natural disasters, or health crises. Additionally, social vulnerability is heightened by discrimination based on race, gender, age, disability, or other forms of marginalization, which often result in exclusion from decision-making processes and access to critical support systems. The intersection of these vulnerabilities can amplify risks, leaving already disadvantaged populations more exposed and less resilient to external pressures. Ultimately, social vulnerability underscores the need for inclusive policies that address not only immediate needs but also the systemic drivers of inequality.

In combination, these factors demonstrate how water scarcity and social vulnerability can shape the environmental justice implications of data center siting and might intensify already existing inequities around water access. Accounting for these dynamics is crucial for assessing both the equity and sustainability of emerging digital infrastructure development.

IV METHODS

Photo by Briana Guirgona

This study analyzes the spatial distribution, potential environmental impact, and social vulnerability associated with data centers in California. To this end, we developed a database of identifiable data centers in California, a Social Vulnerability Index, and a Water Scarcity Index, which were then combined into a Total Vulnerability Index. The individual indices incorporate those factors most relevant in the context for data center siting. The individual steps are explained below.

A. Developing a Comprehensive Database of Data Centers and Potential Environmental Impact

To develop a comprehensive list of data centers in California and map them, the study gathered information from various online databases, including datacenters.com, datacentermap.com, baxtel.com, cleanview.co, and a database developed by the Business Insider publication, as well as news articles and project planning documents. The database created for this study includes details like the year when a data center opened, its address, total area, and any available data on its water and energy use, as well as water service provider and planning, where available. Data centers were categorized based on their operational status (e.g., existing, planned, or terminated). This database was continuously updated through September 2025. After organizing the information, mapping software (ArcGIS Pro) was used to create a spatial map digitizing the data centers' physical footprints for further analysis, as no spatial database of data centers with this information was previously available.

To obtain information on potential environmental impacts, we reviewed publicly available environmental documents, such as Environmental Impact Reports (EIRs) and Mitigated Negative Declarations (MNDs), for data centers in key California regions like Santa Clara, Los Angeles, Sacramento, and the Central Valley. Using online databases and city planning resources, we systematically searched for relevant reports published since 2010. These documents, where available, provide a snapshot of how data centers are projected to impact local communities and the environment. We were thus also able to determine what kind of information of potential environmental impact is publicly accessible in which locations.

B. Building the Social Vulnerability Index

This study created a Social Vulnerability Index (SVI) that integrates information on poverty and environmental stressors with information about community water access, as all three factors are relevant when considering social vulnerability in the context of data center location. This index helps identify communities most at risk from water scarcity and gives context to the impact data centers might have on these areas (Figure 19).

For the purposes of this study, we adopted and expanded the core definition of disadvantaged communities from the state of California's Office of Environmental Health Hazard Assessment application of SB 535 [34] based on California's CalEnviroScreen 4.0 [42]. California's CalEnvironscreen creates ranked scores for every census tract in California, based on socio-economic factors and environmental pollution. In turn, based on the CalEnviroScreen scores for each census tract, SB 535 designates four categories of geographic areas as disadvantaged:

- Census tracts receiving the highest 25 percent of overall scores in CalEnviroScreen 4.0 (1,984 tracts).
- Census tracts lacking overall scores in CalEnviroScreen 4.0 due to data gaps, but receiving the highest 5 percent of CalEnviroScreen 4.0 cumulative pollution burden scores (19 tracts).
- Census tracts identified in the 2017 DAC designation as disadvantaged, regardless of their scores in CalEnviroScreen 4.0 (307 tracts).
- Lands under the control of federally recognized Tribes.

However, not all census tracts evaluated to be in the top 25% with respect to poverty are included in the SB 535 definition. For this study, we designated as 'Disadvantaged' all SB 535 census tracts and all census tracts in the top 25% with respect to poverty.

Among the communities designated as "Disadvantaged," we also examined distinctions in their access to water. Some data centers fall

- outside of incorporated areas and outside of community water systems
- outside of incorporated areas
- outside of community water systems
- in water systems serving < 50,000 people

Table 1. Summary of the Information Available on Case Study Data Centers

Data Center Case Study Location	Status	EIR or other Environmental Planning	Cooling System information available	Water type information available	Projected water use information available	Actual water use information available
Santa Clara	Existing	Yes	Yes	Yes	Yes	No
Gilroy	Under construction (as of early 2026)	Yes	No	Yes	Yes	No
Sacramento	Existing	No	No	No	No	No
Los Angeles	Existing	No	No	No	No	No
Imperial County	Planned	No	No	No	No	No

Those categories represent several levels of vulnerability that are reflected in the Social Vulnerability Index (SVI).

Race or ethnicity are not included in the scoring of the CalEnviroscreen and not part of the SVI scoring in this report; however, many studies have reported that Latino and Black populations are disproportionately concentrated in the most severely impacted areas of California, and bear the greatest pollution burdens and associated vulnerabilities [71, 72]. For that reason, the racial/ethnic makeup for the communities reflected in the case study neighborhoods is also reported as a critical contextual factor.

C. Developing the Water Scarcity Index

A Water Scarcity Index was created by combining primary and secondary water scarcity risk factors. Primary risk factors used were annual precipitation and maximum summer temperatures numbers provided by UC Santa Barbara's Climate Hazard research group [35]. Secondary factors included projected temperature warming by 2025; a history of chronically declining water levels in groundwater; groundwater basins that have been overdraft; groundwater contamination; and consecutive dry years.

D. Total Vulnerability Index

We created a weighted overlay to combine the Social Vulnerability Index and the Water Scarcity Index into a Total Vulnerability Index with respect to data center siting (Figure 1).

E. Selection of Case Study Data Centers

After developing a map of existing data centers in California, we chose to focus our analysis on five of those centers, treating them as concise case studies, from which we aimed to extrapolate more broadly.

The following are the general criteria that we applied in selecting the five case studies:

- Located in areas where **data center density is high** or where new hyperscale data centers are planned for regions with high water scarcity
- Located within or **adjacent to disadvantaged communities** [see definition above], or in communities drawing water from disadvantaged areas, or as determined by the social vulnerability index described above
- Located **within a water-stressed area** or receiving water supplies from water stressed area
- **Recent start of operation** (post-2020), and thus more likely to be reflecting decisions made in light of AI-related needs
- In the top quartile of all data centers in California **by size**
- Availability of environmental impact reports (EIRs) or other **environmental planning reports**
- Availability of **information on cooling system, type of water used, and its source**

Based on these criteria we selected three existing data centers (in the City of Santa Clara, Sacramento County, and Los Angeles County), and two planned data centers (in the City of Gilroy and Imperial County). Of the five case studies, environmental planning documents and disclosure of the

type of water used were only available for the Santa Clara and Gilroy data centers, and cooling systems descriptions were only available for the Gilroy data center (Table 1).

Although racial and ethnic diversity of a neighborhood in or near which a data center is located was not an explicit selection criteria for our case studies, we noted it for each data center considered. Diverse neighborhoods can be considered vulnerable when systemic inequities limit access to resources, infrastructure, or decision-making, leaving residents more exposed to environmental and social stressors. Additionally, language barriers, lower rates of home ownership, and historical underinvestment, if present, can amplify the community's susceptibility to hazards and reduce its capacity to adapt or recover.

F. Ethical Analysis

We used the Framework for Ethical Decision Making developed by the Markkula Center for Applied Ethics at Santa Clara University, applying its six ethical lenses in order to identify some of the ethical issues arising in the context of data center water usage [36].

A key step in analyzing the broad context of an ethical issue is identifying the stakeholders—the individuals and organizations or communities either directly or indirectly impacted by choices to be made among various options.

In regard to the water use by data centers in California, stakeholders include people living in communities in close proximity to data centers; people whose water sources for daily usage are impacted by data center needs; various property owners; various types of corporations; water management agencies; regulators at various governmental levels; workers and labor unions; environmental activists; researchers; all users of data center services; and more.

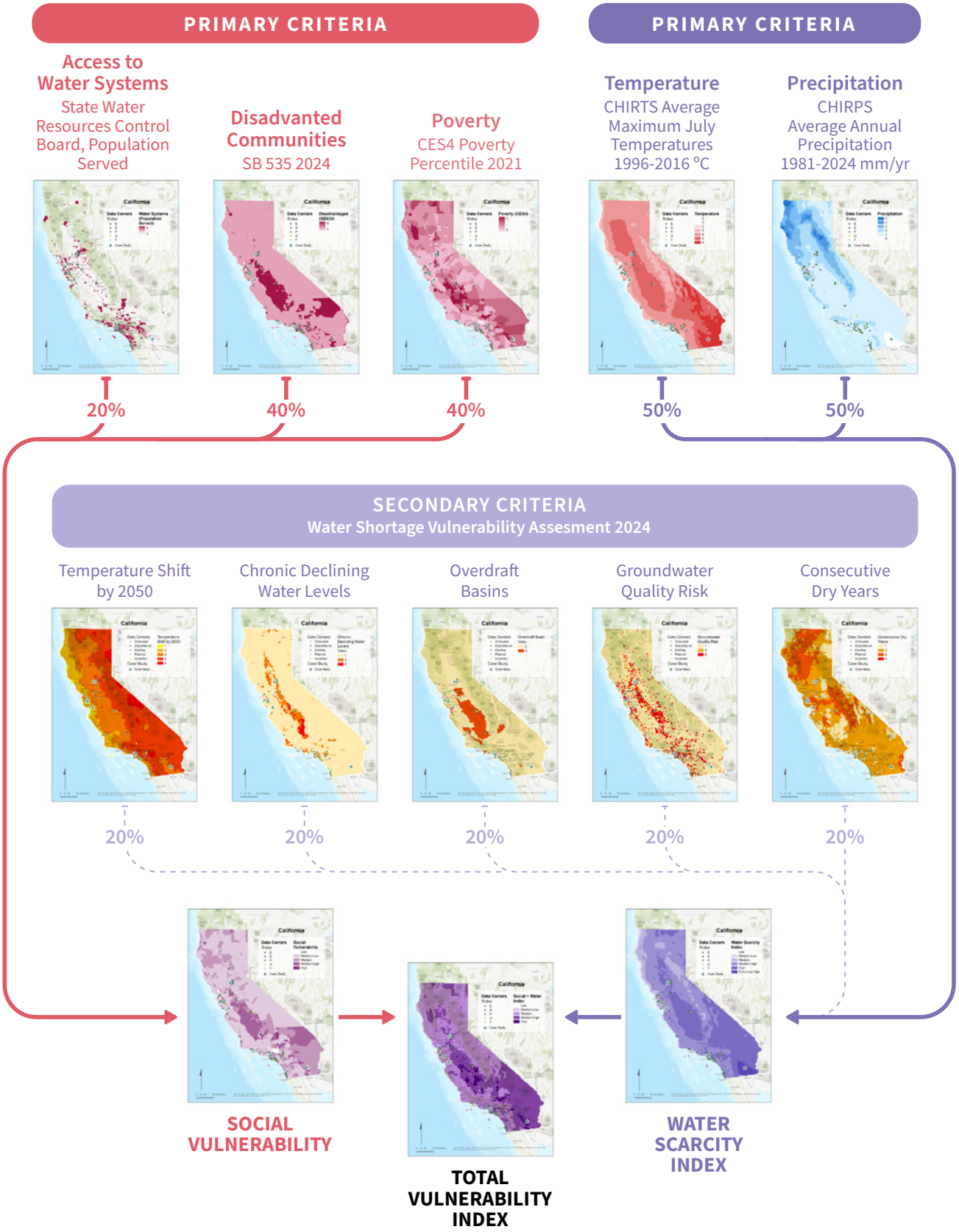
Appendix A includes a more detailed list of stakeholders (highlighting the complexity of the considerations and trade-offs involved in debates about data center water usage), as well as our detailed ethical analysis. That analysis also informs our policy recommendations in Section VII of the report.

G. Challenges and Limitations

In order to understand the impact of data centers on the water access of communities living in proximity to them, it is important to know, as a bare minimum, the amount of water that the data center operators anticipate using per year. However, estimated amounts don't tell the full story. Also necessary to know are the source(s) of water used by each center; what type of water is being used (recycled or not); what kind of cooling system is in place (closed loop, etc.); as well as, for existing centers, the amount of water actually consumed over prior months – in order to compare that with any prior estimates provided.

Note that for the vast majority of the data centers that we mapped, we were unable to find publicly accessible environmental planning documents or information on cooling systems or the type of water used. Water sources were determined from information available from the water service providers for the location of each data center, rather than the water source specific to the data center itself.

Figure 1. Diagram of GIS Methods Used to Calculate the Total Vulnerability Index for California



V RESULTS

A. Data Center Siting in California

The following findings summarize the current landscape of data center development and water use transparency in California based on a review of publicly available information, planning documents, and outreach to relevant water providers. The results highlight spatial patterns of where data centers have historically been located, emerging trends in the siting of larger facilities, and the significant challenges researchers face in assessing their environmental impacts. In particular, the analysis underscores the limited availability and consistency of data related to data center operations and water use, which constrains a comprehensive understanding of how the sector may affect both local water resources and communities across the state.

The following are our main findings related to data centers in California:

- As of December 2025, the densest clusters of data centers in California are in the San Francisco South Bay—especially the City of Santa Clara—and in the City of Los Angeles, with smaller clusters in Sacramento and San Diego.
- At the time of the study, no currently existing data centers in California appeared to have the scale of water use comparable to that of hyper-scale data centers that have been found to impact the water sources of entire communities or towns in other states (i.e. Virginia, Arizona, or Oregon).
- Until approximately 2020, data centers in California were almost exclusively located within urban tech centers, predominantly in the southern San Francisco Bay Area and Los Angeles, with a smaller cluster around Sacramento. Few data centers existed elsewhere, and those were smaller and older. The city of Santa Clara provided a combination of proximity to tech firms and cheap rates for electricity needed for cooling [38].
- As the scale of data centers has grown, and land, water, and electricity costs have skyrocketed, ex-urban spaces have become more attractive for data center siting.
- Larger, hyperscale data centers have been proposed and/or are getting built in rural spaces in California, for example in Gilroy (Santa Clara County), Imperial (Imperial County), and Monterey Park (Los Angeles County).[4] These areas are associated with smaller and less secure water sources/water providers, and more socially vulnerable/rural populations than those urban centers where data centers had historically been built.
- Aside from data center location and size, little information on data centers in California is available from any public source. Even datasets of data center locations are only provided by for-profit services. Information on who is operating a data center, size, capacity, beginning of operations, the type of cooling system (evaporative, closed loop), actual water use (as opposed to projected), type of water used (i.e. recycled, potable), and quality of water used is missing, contradictory, or vague—even in Environmental Impact Reports (where they are publicly accessible). For example, an EIR might report water sources as both 'potable and recyclable,' or state that recycled water will be used in 'Phase II' of a project, without any specification about the share or amount of potable water used in Phase I or the point at which Phase II would begin.
- Very few data centers in California have publicly available environmental impact reports (EIRs), and of those that do, most are in the City of Santa Clara.
- We reached out to every water provider in water districts where data centers are located; none of them provided data about those facilities' water use—either for individual data centers or cumulatively for all the data centers in the district.

4 In a widely publicized very recent example for California, growing opposition by the community of Monterey Park (Los Angeles) to the planned hyperscale data center has resulted in the developer abandoning construction plans as of April 2, 2026. This retreat comes before a special city-wide vote on a ballot measure that seeks to create a ban on data centers and is scheduled for June 2nd, 2026. Monterey Park is a neighborhood with high racial/ethnic diversity and is disproportionately burdened by pollution [73-75, 42].

B. Why Are So Few Environmental Reviews Available for Data Centers and What Does That Mean for Estimates of Water Use?

California's existing regulatory framework was not tailored to data centers, and notable gaps exist at the state and federal level. As a result, data center developments must navigate a fragmented set of environmental review processes, water access permitting, and efficiency standards [79].

The most relevant of these in California is the California Environmental Quality Act (CEQA), which applies to projects that are undertaken, funded, or approved by a public agency, or to those public or private projects that have the potential to cause a physical change to the environment [76]. Any proposed project that is subject to CEQA and meets specific land use criteria or would generate new water demands equal to or greater than 500 dwelling units, or increase service area demand by 10 percent, is subject to SB 610 and is required to prepare a Water Supply Assessment (WSA). However, our interviews with planning officials suggest that multiple mechanisms may enable projects to avoid triggering CEQA review, and such approaches may be employed by some data center developers.

A project is not subject to CEQA review if it meets the requirements for ministerial approval from cities, counties, or CEQA lead agencies. Ministerial projects only need to meet set requirements, and if they do so, the lead agency is required to approve them. Many data centers are located in areas already zoned for industrial uses or high-intensity development, served by existing infrastructure, and lacking sensitive environmental resources. Therefore, they may already meet the lead agency's requirements for development in such sites, and thus only require ministerial approval. By contrast, a discretionary project allows the lead agency to exercise its judgement in the approval process, and a CEQA review is often (but not always) required for discretionary projects.

Furthermore, developers can rely on "tiering" from prior environmental documents, such as a city's General Plan EIR, needing to prepare only an addendum if the project's impacts fall within those previously evaluated, allowing approval without public circulation or a new CEQA review. Additionally, California's Senate Bill 131, enacted in 2025, provides an exemption from CEQA review for "advanced manufacturing facilities" on land zoned for industrial uses [80]. While data centers are not explicitly included in the exemption, some stakeholders might interpret the provision as potentially applicable to them.

Although the California State legislature passed Assembly Bill 93 in 2025 [81], Governor Newsom ultimately vetoed the measure, citing concerns about imposing stringent reporting requirements on the sector without fully understanding the potential impacts on businesses and technology consumers [82]. The proposed legislation would have required data center developers to submit a projection of water use to their water supplier at the time of applying for a city or county permit, business license, or equivalent approval. In addition, it would have mandated annual reporting of actual water consumption to the water supplier as a condition for any subsequent permit or license renewals.

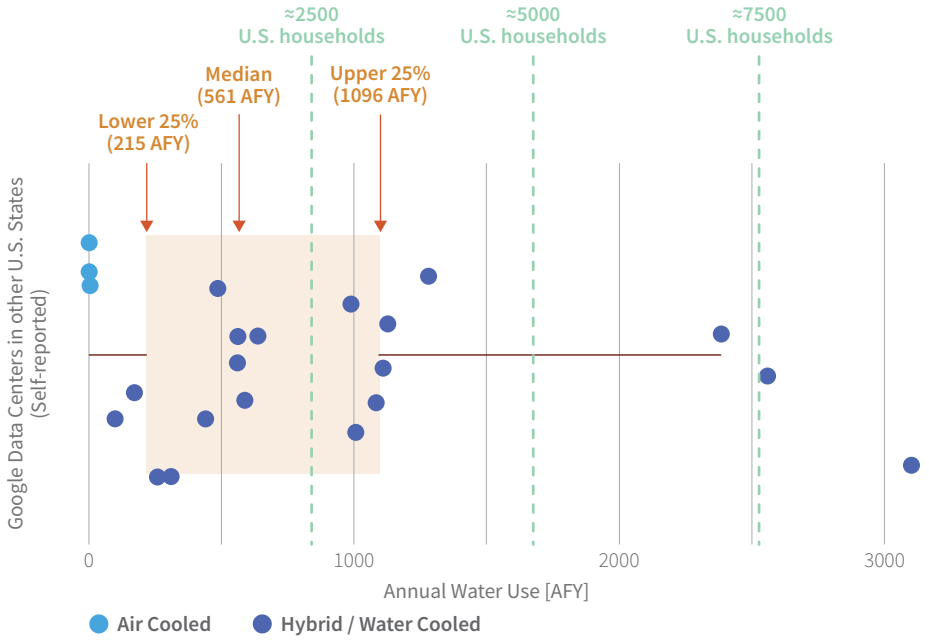
The recently introduced Assembly Bill 2619 [104] would mandate even more detailed and extensive disclosures related to data center water consumption, and would require the Department of Water Resources and the State Energy Resources Conservation and Development Commission to develop related "guidelines and best practices" (including, specifically, use of closed-loop systems and nonpotable water) and to co-develop, with other state agencies, "guidance that cities and counties may use for assessing projected water use, water efficiency measures, and cumulative water resource impacts of proposed data centers within the context of local and regional water management objectives."

With regards to environmental review, Senate Bill 887 [105], introduced this year, would confirm that data centers are indeed reviewable under CEQA and provide applicants with a pathway towards accelerated environmental review if they meet certain requirements regarding water use, clean energy, and paying full infrastructure costs [83].

In the absence of the type of reporting that would have been mandated by AB 93 (or would be mandated by AB 2619), the limited data on water use in California data centers hampers a comprehensive assessment of their impacts on both local and statewide water resources, as discussed in more detail below. For example, even in cases where projected (i.e. not actual) water use was reported in the EIRs and planning documents for California data centers, the reported amounts are generally well below the actual water use self-reported by Google, for example,

for its data centers in other states (no actual self-reported water use figures were available for California). While those reports might refer to data centers different than those in California, the actual water use reported raises the possibility that projected water use numbers in California might be underestimating the eventual consumption. Moreover, as noted elsewhere, whether a particular magnitude of water use is sustainable depends on the local context, the context of the places from where water is imported, and the quality of water used (i.e. potable or reclaimed/recycled).

Figure 2. Google's Self-Reported U.S. Annual Data Center Water Use Compared to the Water Use of Average American Household



Source: Google's 2025 Environmental Report for U.S. Data Centers [39] and the United States Environmental Protection Agency [84]. Note: The water use of the average American household was estimated at 300 gallons per day [84].

C. Case Studies

To better understand how AI data center development interacts with local infrastructure, governance, and water systems, we conducted a set of place-based case studies. We analyzed five cases in-depth before applying insights from these cases to the broader state context.

1. Santa Clara County: 2 Case Study Locations

As of December 2025, there are 100 data center locations recognized in Santa Clara County, the hub of Silicon Valley and historically the seat of global tech giants. Of the 100 data centers identified from available databases, the existence of 78 could be verified, 14 are planned to be built in the 2026 to 2030 time frame, 2 are planned with an unknown time frame, and another 6 were listed at addresses that could not be verified. Of these 94 existing and planned data centers, 56 are or will soon be located in the comparatively small city of Santa Clara alone and 31 in San Jose, with few others in the cities of Sunnyvale, Mountain View, Milpitas, and soon Gilroy (2026). Thus, the county of Santa Clara, and in particular the city of Santa Clara, host by far the highest concentration of data centers in the state.

Some of the earliest data centers in the world were built in Santa Clara County, dating to before the 1990s. Among the 72 (or roughly two-thirds) data centers for which the start year of operations is publicly available, early data center construction amounted to less than 10 per decade. Between the early 2000 and 2025, the rate of growth has increased to 10-22 per decade. However, there are indications that the rate of data center construction in the county is declining (Figure 5). We were unable to find information on when the remaining 28 data centers will begin operations.

When it comes to environmental impact reports (EIR) or other environmental planning documents that would provide information about planned volumes, quality, and sources of water use in Santa Clara County, EIRs are available for 10 (10%) data centers, mitigated negative declarations (MND) are available for for 15 (15%), and initial studies are available for 7 (7%). While environmental planning documents are thus only available for 32% of the data centers in Santa Clara County, this is the only county in the state for which they are publicly available at all, aside from very few exceptions in Los Angeles.

Figure 3. Distribution of Santa Clara Data Centers by Status

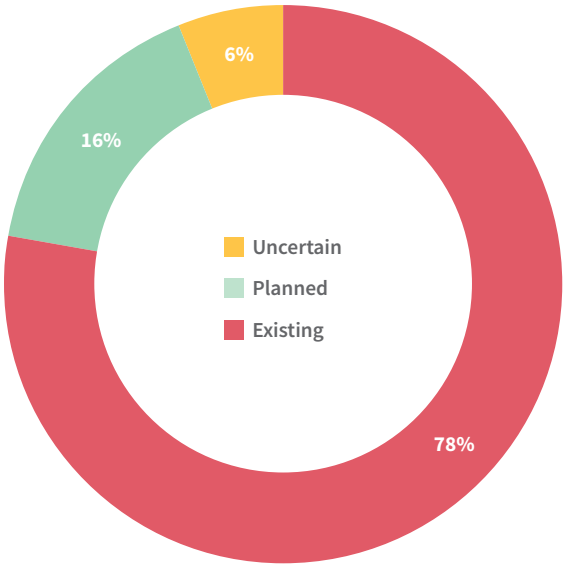


Figure 4. Distribution of Santa Clara Data Centers by City

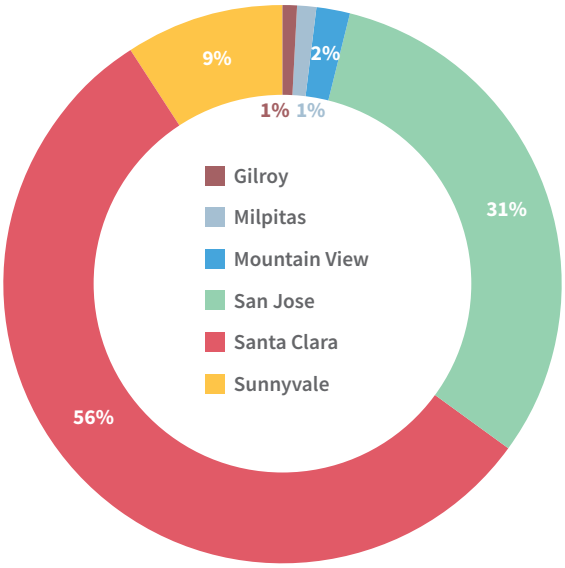
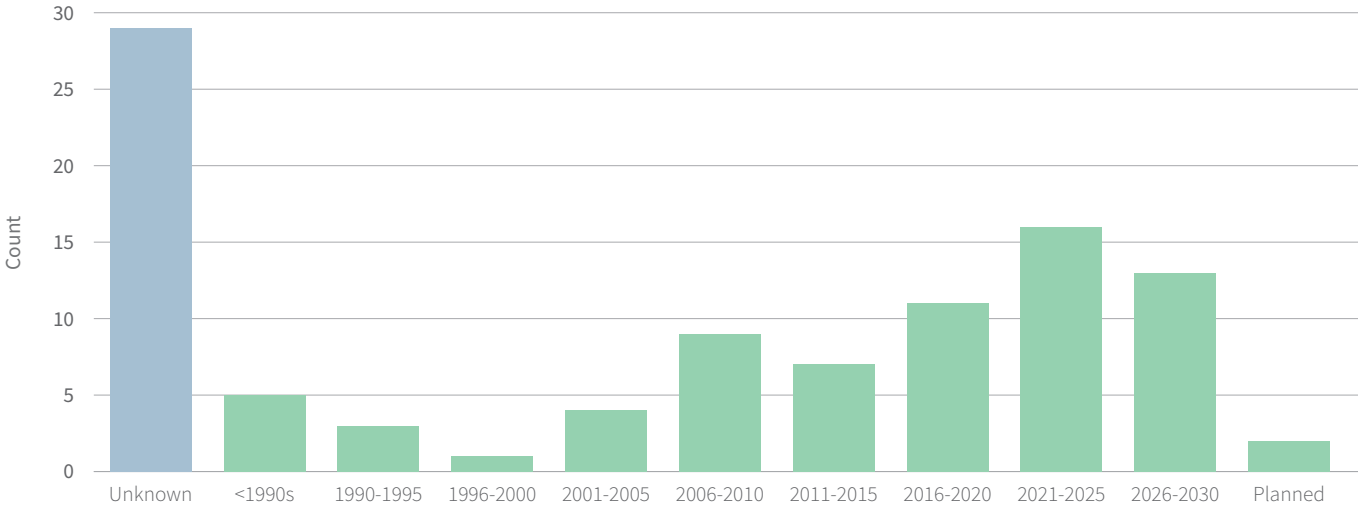


Figure 5. Distribution of Santa Clara County Data Centers by Year Opened



Water Use and Sources:

- Valley Water is the wholesaler for all locations in Santa Clara County (SCC); different water retailers sell this water to customers in their service area, including to data center operators.
- Water sources include approximately 45% local ground and surface water, 50% imported water from the Sierra Nevada through the Delta, and 5% recycled water [40].
- SCC cannot meet its water demand by local water and must import water from other watersheds, where this water is then missing [85, 4]. SCC has a history of subsidence and water supplies require a careful balance, especially during drought years. Subsidence occurs when so much water is withdrawn from aquifers that the grains in the aquifers compress and the land begins to sink. Santa Clara now sits about 1 floor lower than it did 100 years ago due to subsidence [86]. Aquifers that have been compressed through subsidence cannot be completely filled again, even if water were available to do so.

- Few estimates of projected water use per data center are made public in EIRs and MNDs; those that are available span a wide range: for example between 0.53 – 840.68 acre-feet per year (AFY) (or 473 – 750,616 gallons per day (gal/d)), which corresponds to the water use of between 7 – 11,548 individual water users in San Jose, based on an estimated per person use of 65 gal/d [41].
- The water use projections from the EIRs cannot be verified, as actual water use data could not be obtained from any water retailer. However, to the best of our knowledge, no obvious cases of water depletion due specifically to data center water use have been publicly identified for any water supplier in California.
- Information on the use of recycled water is spotty: 22% of the data centers mention some use of recycled water in their environmental planning documents, but none include the actual proportion of the total water use (Figure 7). In addition, recycling water requires substantial energy, which might also indirectly raise the overall water footprint of a data center.

More recently, some Santa Clara leaders are voicing concerns about how the clusters of data centers in the city affect water and energy resources and land use for its residents [87].

Figure 6. Distribution of Available Environmental Documents for Data Centers in Santa Clara County

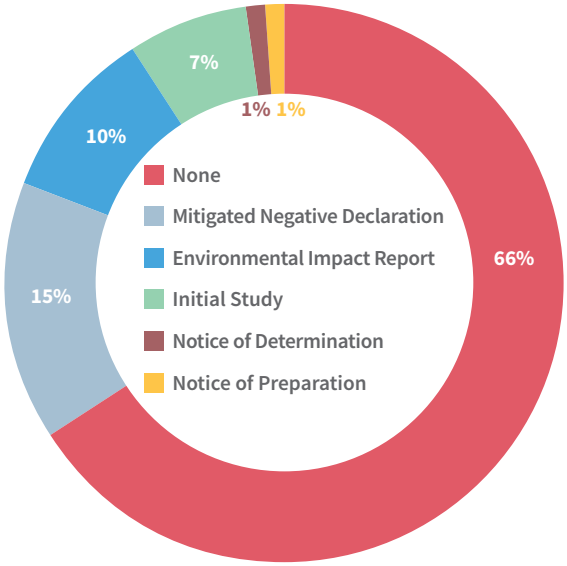
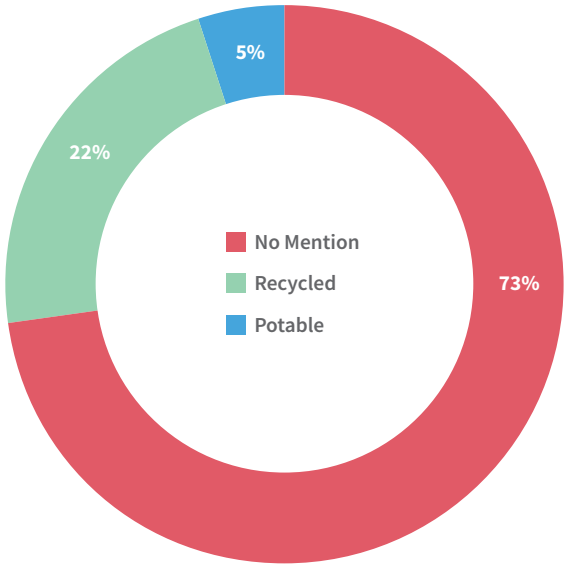


Figure 7. Distribution of Available Environmental Documents that Mention Recycled Water Type



a) City of Santa Clara Case Study

Social Vulnerability Score: 1.8

Water Scarcity Score: 3.5

Scores are given on a scale of 1-5, with 5 indicating the highest vulnerability.

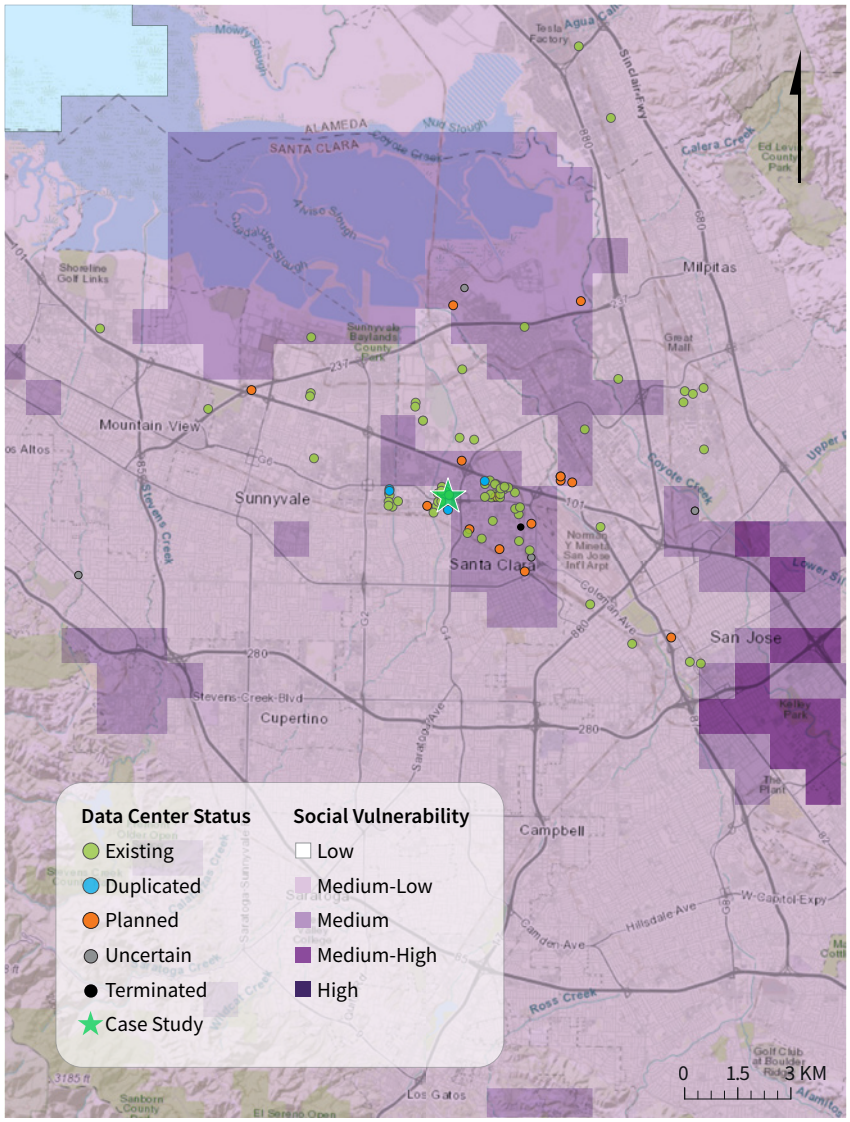
Siting and Size: The data center that was identified for the city case study is the CoreSite SV9 Data Center, which opened in 2025. Its location is marked with a green star in Figures 8a & 8b. The reported size is 228,000 ft^2.

Reason for Selection: It was selected from the at least 78 existing data centers in Santa Clara County as it opened recently, is relatively large compared to other existing data centers in the vicinity, and included information about its hydrological impact. An environmental planning document that includes information on the cooling system, the type of water used, and projected water use are available for this data center, making this a positive example in terms of data transparency compared to others in California.

The data center is sited in a neighborhood with medium-high ethnic diversity (34.6% Latino/a, 26.4% Asian-American, 2.6% Black, 26.0% White) and a medium-low poverty rate of 20.4%, corresponding to the 35th percentile with respect to poverty percentile among census tracts in California [42].

Water Sources: The water provider is the City of Santa Clara's Water & Sewer Utilities Department. Within the City of Santa Clara, 61% of the water is obtained from Santa Clara groundwater, 20% from SFPUC/Hetch Hetchy, and 19% from Valley Water, which draws from a combination of local & state sources [43]. While groundwater levels have been stabilized in the recent decades within the City of Santa Clara, historically there has been substantial subsidence throughout the Santa Clara Valley. The stabilization was made possible by importing water from the Hetch Hetchy Reservoir and Sierra Nevada watersheds via the State and Central Valley Water Projects. That import in turn reduces the flow available for other users and ecosystems. Low flows in streams draining the western side of the Sierra Nevada have been identified as a major contributor to ecological impacts, such as the decline of native species (especially salmon) and toxic algal blooms [88]. These environmental impacts occur mostly in the lower reaches of the watershed, where more socially vulnerable communities are located.

Figure 8a. Social Vulnerability Scores from Santa Clara Case Study



Note: Data center locations are in areas with medium-low to medium social vulnerability.

Environmental Planning Documents and Water Use:

A mitigated negative declaration (MND) was available for this data center, rather than a full EIR [89]. The description of the cooling system and projected water use included in this MND is the most extensive one we found among all the California data centers.

Based on the MND, this location uses potable water for adiabatic cooling, chemically treating water on site. The MND reports the estimated water demand as 16,070 gal/d (or 5,865,325 gal/yr or 18 AFY). This estimate suggests that the closed-loop system of this data center will use the same amount of water as 247 people in the City of San Jose, based on an estimated per person use of 65 gal/d [41].

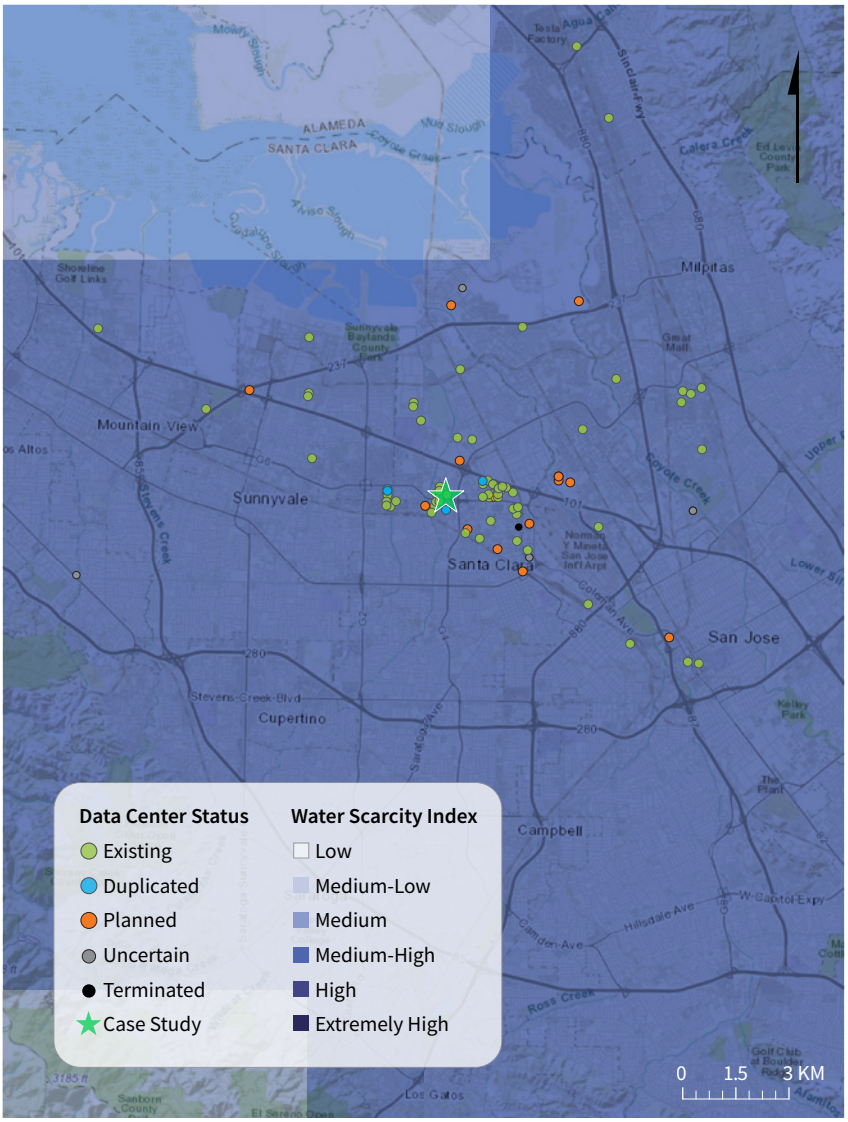
According to the MND, "The project includes nine modular chiller plants located in the chiller yard adjacent to the SV9 data center. Adiabatic fluid coolers would be installed on the roof of the data center. Each 1,575-ton chiller would be supported by five adiabatic fluid coolers, for a total of 45 adiabatic fluid chillers. The adiabatic fluid coolers require minimal make-up water and would collectively use approximately 18 AF annually, or 5,865,325 gallons. It is anticipated that the makeup water serving the adiabatic fluid coolers would have a single potable source. To supplement, two 15,000-gallon aboveground water storage tanks would be installed on site to provide 24-hours of makeup water in the event of temporary loss of water service. Aboveg-

round water tanks would be installed adjacent to the modular chiller plants. The make-up water would be chemically treated on-site before use to meet specifications for water quality. Biocides and scale and corrosion inhibitors would be injected into the stream to limit biological growth. Water treatment chemicals would be stored in a pumphouse, located adjacent to the modular chiller plant to treat incoming potable water."

This description is important, as adiabatic fluid coolers in the context of data centers are often described as a hybrid approach. They keep the IT cooling loop closed, but they still use some water during peak temperatures to improve efficiency and reduce energy demand [44, 45]. The important nuance is that they reduce water consumption compared to cooling towers, but do not eliminate it entirely. The description also suggests that water will be chemically treated, without giving specifics on the type of chemicals or how they will be disposed of.

Summary: This is a large recent data center within an urban tech cluster and—of the existing data centers—the one we found to have the greatest environmental data transparency in all of California, thus setting a minimum achievable standard. While the cooling system strives to minimize water demand, the water used is potable. The cooling system was listed as a major component of the energy demand, underscoring the tradeoffs between water and energy use, both locally and in the location where the water and energy are being generated.

Figure 8b. Water Scarcity Scores from Santa Clara Case Study



Note: Data center locations are in areas with medium-high water scarcity.

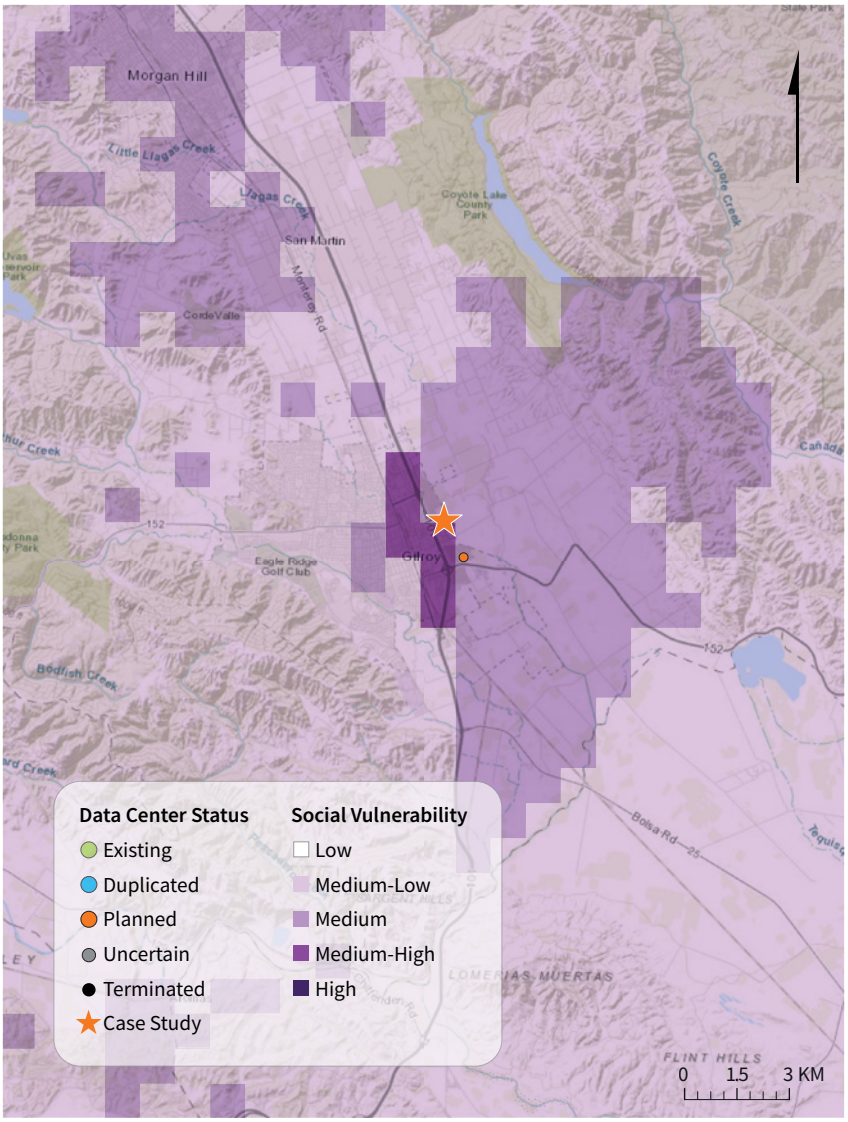
b) Gilroy Case Study

Social Vulnerability Score: 2.8

Water Scarcity Score: 3.6

Scores are given on a scale of 1-5, with 5 indicating the highest vulnerability.

Figure 9a. Social Vulnerability Scores from Gilroy Case Study



Note: Social vulnerability is medium to medium-high around the Gilroy case study data center.

Siting and Size: As of December 2025, Amazon Web Services (AWS) is building a 438,500 ft2 data center on a 56-acre undeveloped parcel in Gilroy (South Santa Clara County). This project was approved on July 21, 2025 and is in the construction phase, with planned completion in 2026. According to its Environmental Impact Review, the project is divided into two phases, with each phase featuring the construction of a 218,000 ft^2 35-foot-high single-story data center building [90]. Phase I is planned to operate with potable water; in Phase II, according to the EIR, the project would use recycled water with AWS funding the required recycled water delivery infrastructure. However, what constitutes Phase II or when it would begin are not specified in the EIR.

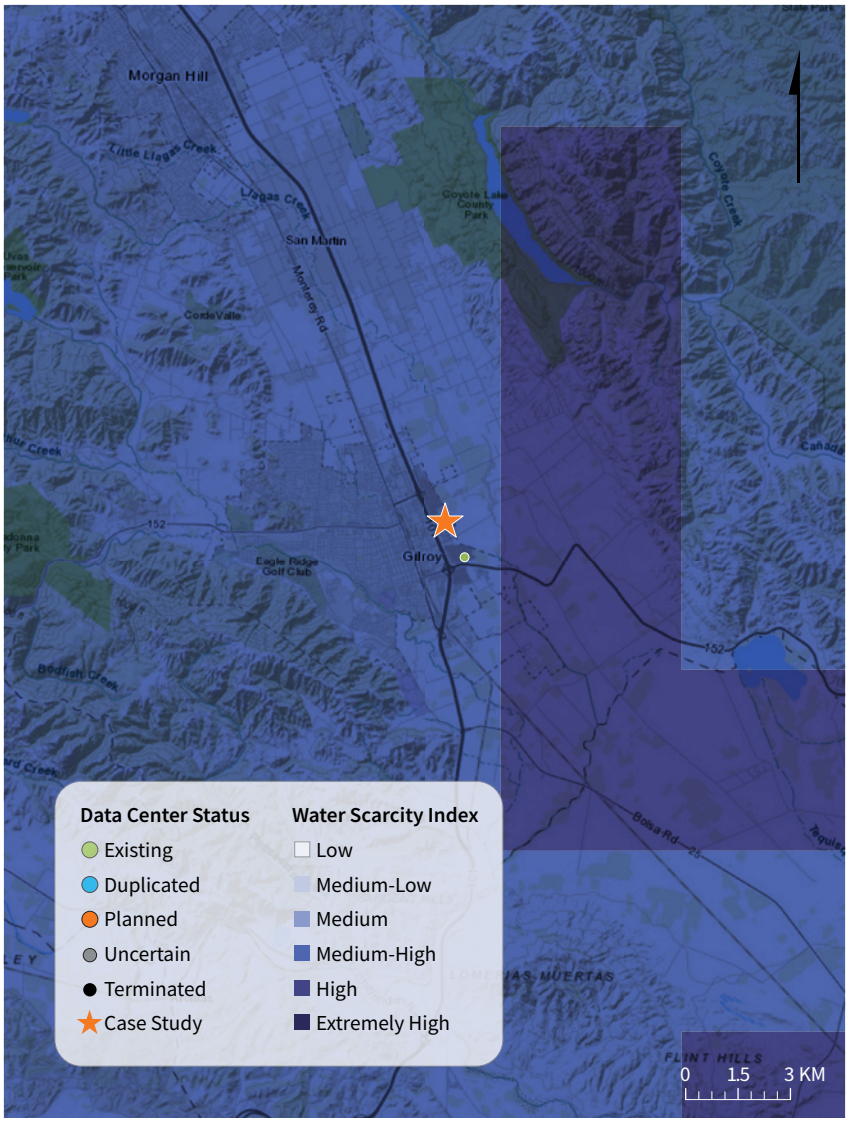
Reason for Selection: The Gilroy data center is the largest and newest data center in Santa Clara County, historically a rural agricultural community south of Silicon Valley. It is located in an area with a medium poverty rate of 26.1% (47th percentile with respect to poverty for census tracts in California) and medium ethnic diversity (45.5% White, 41.2% Latino/a, 12.1% Asian-American, 0.4% Black) [42]. The project also underwent a full EIR review, and thus offers more publicly available information regarding environmental impacts than other data centers in California do.

Water Sources: The City of Gilroy currently uses local groundwater pumped from the Llagas subbasin as its sole source of potable water supply. The Llagas groundwater basin is a closed groundwater basin, meaning that it does not receive influx from adjacent areas and is solely dependent on within-basin recharge. Natural recharge takes place from precipitation (which at an average of 18 in/yr is low and highly seasonal) and from local streams. A Department of Water Resources 2004 report noted that while groundwater levels were generally stable in the basin, they did decline during drought periods [46]. The basin is also subject to shallow groundwater contamination by nitrate, mainly affecting domestic wells. Groundwater levels in the Llagas Basin are carefully and successfully monitored and stabilized by the Santa Clara Valley Water District (Valley Water) through the import and managed recharge of imported and local surface water.

In 2015, a recent drought year, 42,200 acre-feet (AF) were pumped from the Llagas subbasin. 100 AF represented natural outflow while 21,500 AF of water were

added as natural recharge and 19,300 AF in managed aquifer recharge, leading to a net decline of 1,500 AF in storage [47]. The most recent report available, for 2024 (an above-average year in terms of precipitation), notes that 127,000 AF of water were pumped from the Llagas subbasin for agricultural, industrial, and domestic uses that year [48]. Less than half of the managed recharge is from local sources. Even in above average hydrologic years, stable groundwater levels in the basin can only be achieved through the import and managed recharge of surface water import from Sierra Nevada watersheds. During drought years, increased pumping and reductions in surface water imports lead to some reductions in groundwater storage that need to be replenished during wetter years.

Figure 9b. Water Scarcity Scores from Gilroy Case Study



Note: Water scarcity is medium-high to high around the Gilroy case study data center.

Environmental Planning Documents and Water Use:

The project falls under CEQA and has a full EIR review; thus more is known about potential environmental concerns raised in connection with this project than is the case for other data centers [90]. During the public comment period, several entities raised environmental concerns related to air quality, land use, and water use and quality.

In the EIR, the Santa Clara Valley Water District (Valley Water) noted that the site lies within a FEMA flood zone and requested a floodplain impact study. Valley Water requested hydraulic and stormwater analyses to ensure that runoff and flooding would not worsen post-development. It stated that the EIR must evaluate impacts to groundwater and recycled water systems, given the high cooling demands typical of data centers, and emphasized that groundwater quality and quantity should be analyzed due to reliance on the Llagas Subbasin. It also reminded the City that any modifications to the Gilroy Water Reclamation Facility require Valley Water's review and CEQA participation. The City of Gilroy (in an internal agency comment) requested that the EIR fully consider water usage, especially for cooling systems, and cited the Governor's drought emergency order and urged drought-resilient water management. A local resident expressed concern over high water use of data centers, citing other cities like Mesa and Chandler, AZ, and also noted that such projects often provide few quality jobs and can be very noisy. The resident suggested that data centers should be located in low-population, water-abundant areas rather than in Gilroy.

Projected water use for project operations (included in the EIR) is 23 acre-feet per year (AFY). The water demand from the Llagas Basin (groundwater and recycled water)

for all residential, commercial, industrial, and institutional customers was 46,966 AFY in 2025 and is projected to increase to 47,372 AFY in 2045. The largest share of water use (30,346 AFY or 64% in 2025) is by non-domestic users, such as agriculture and industry.

Total supplies in the Llagas Basin are projected to rise from 47,320 AFY in 2025 to 48,342 AFY in 2045. Groundwater withdrawals are projected to remain constant over that time period (22,478 AFY or about 47%), while deliveries from the Central Valley Project are expected to decline from 12,918 AFY to 8,201 AFY. Local surface water and recycled water are expected to increase to make up the deficit. Thus, even though the projected water use for the data center is limited compared to the City's water budget overall, the demand for water will be increasing while water imports will be decreasing, rendering local supplies more important and the area more susceptible to drought.

The EIR for this project noted that the temperature of servers and other equipment would be regulated by evaporative cooling units installed on the walls of each data center building. The chilling units would draw in outside air, chill the air using evaporative cooling, and then circulate the cooled air over servers. Water for the evaporative cooling system would be stored in four storage tanks with a capacity of 60,000 gallons each and a combined total onsite water storage of 240,000 gallons. Each building would require up to 9 AFY of potable water, for a total cooling-related demand of 18 AFY.

Summary: This data center is a hyper-scale data center under construction south of Silicon Valley. Compared to the cities of Santa Clara and San Jose, in which almost all data centers within Santa Clara County are located, Gilroy has a higher share of Latino/a residents (and medium ethnic diversity) as well as a higher rate of poverty—about 26%. Historically, Gilroy has been a rural farming community but is now rapidly transitioning to other peri-urban industrial and residential land uses.

The project's environmental impact review process is the only one that we found publicly available (online) for any California data center, and the most detailed, and appears to have led to greater commitments by the developer towards minimizing environmental impacts. In response to concerns about water use, for example, AWS committed to using recycled water and paying for the needed infrastructure. However, while the planning documents explain that the project would switch to recycled water with Phase II, no timeline for Phase II is provided [91].

While the near-future projected water use by the data center is small compared to the city's overall water use (representing only about 6% of the typical water use of a golf course, all water in the Gilroy area is drawn from a groundwater basin with very limited recharge, which can only be maintained by water imports that are projected to decline due to less reliable snowmelt under climate warming. The need to increasingly rely on local surface water and recycled water render the Llagas Basin more susceptible to drought. In addition, the type of cooling system described in the planning documents would demand more energy and more water under hotter conditions. Gilroy is already one of the hottest places in the SF Bay Area and is expected to further warm under climate change; however, the effects of climate change are not addressed in the planning documents.

As of early 2026, residents of Gilroy have been speaking out against the construction plans, and a petition to stop the data center has garnered thousands of signatures [92].

2. Los Angeles County

As of December 2025, the existence of 40 of 41 data centers could be verified in Los Angeles County: 37 existing ones, and 3 in the planning stage (Figure 10). About 50% of the data center locations are within the City of Los Angeles; the others are located in adjacent municipalities. The rate of data center construction has been approximately constant at about 5 per decade for those data centers where information on the beginning of operations is publicized (Figure 12). With few exceptions, no EIRs or NMD are available for any of the data centers in Los Angeles County—93% have none (Figure 13).

Water Use and Sources:

- Most of the data centers are located in the Los Angeles Metropolitan Water District (MWD), the largest water district in the state.
- Water sources for the MWD include approximately 50% imported water, 30% of which flows from the Sacramento and San Joaquin rivers (and Sierra Nevada Tributaries), via the State Water Project, and 20% which flows from the Colorado River, via the Colorado River Aqueduct.
- The remaining 50% is derived from local ground water and 'locally developed' surface water projects, such as the Owens Valley aqueduct (with its history of depleting Owens Valley, Owens Lake, and Mono Lake of water), as well as small amounts of recycled and desalinated water [49].
- Los Angeles has a history of relying on imported water sources: it is in a semi-arid climate and local water sources fall far short on meeting demand even in wet years. Thus, groundwater resources may be viewed as non-renewable in many cases.
- No information on the use of potable versus recycled water use by LA County data centers is publicly available.
- Several data centers are located in smaller water districts that rely more prominently on groundwater, such as the Cogent Data Center within the Suburban Water Systems La Mirada.

Figure 10. Distribution of Los Angeles Data Centers by City

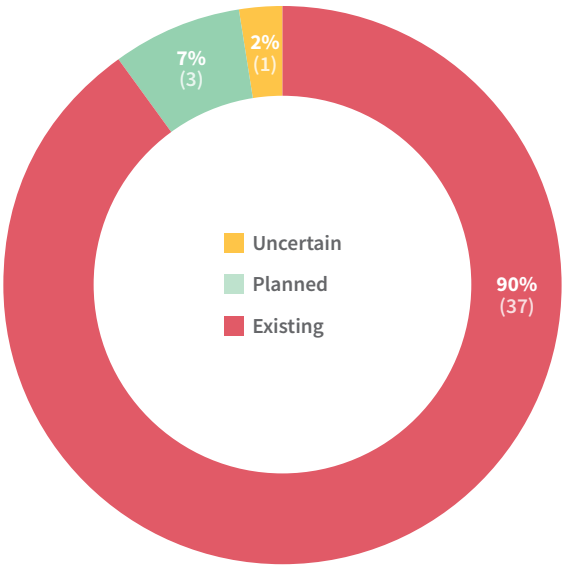


Figure 11. Distribution of Los Angeles Data Centers by Status

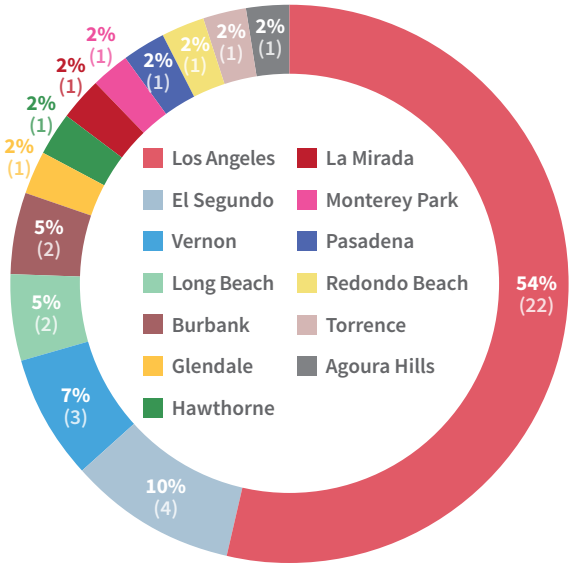
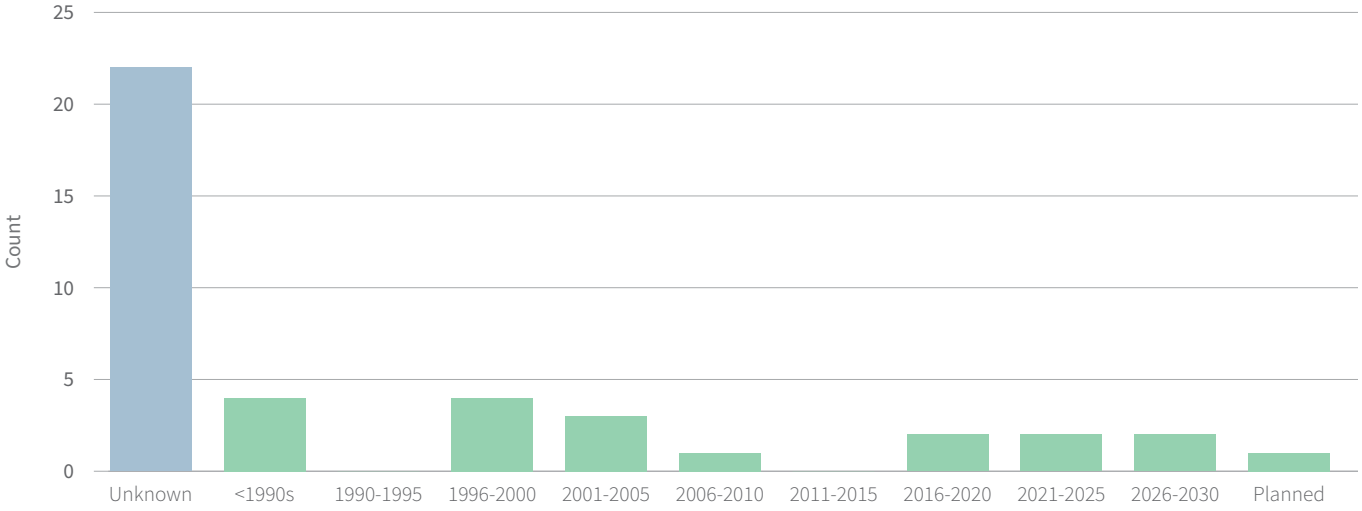


Figure 12. Distribution of Los Angeles Data Centers by Year Opened



c) Los Angeles Case Study

Social Vulnerability Score: 2.6

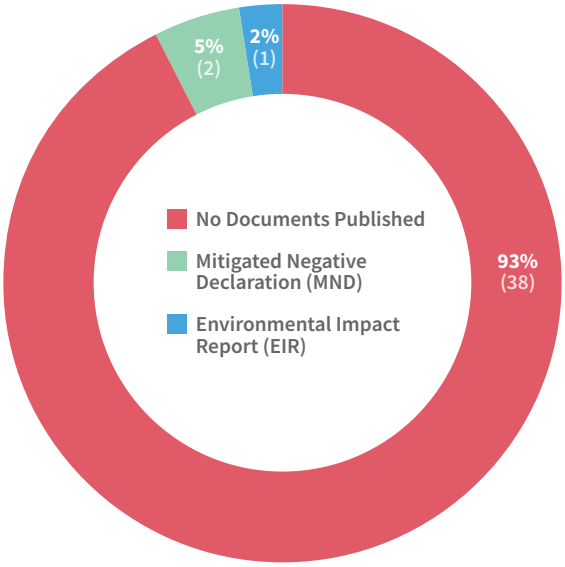
Water Scarcity Score: 4.0

Scores are given on a scale of 1-5, with 5 indicating the highest vulnerability.

Siting and Size: The data center selected as a case study for Los Angeles is the Alchemy Downtown West 7 Center, which opened in 2024 with a reported size of 375,000 ft^2.

Reason for Selection: The Alchemy Downtown West 7 Center is located in an area with high poverty (65.8%, which corresponds to the 95th percentile with respect to poverty among census tracts in California) and high diversity (73.9% Latino/a, 11.1% Asian-American, 6.2% Black, 7.0% White). Poverty is a factor included in our definition of vulnerable communities, and people of color have been found to be disproportionately exposed to environmental burdens. The blocks around the Alchemy Downtown West 7 Center are a transitional urban zone marked by both reinvestment and concentrated poverty. The location is near the boundary of the Westlake area and within close proximity to Los Angeles' Skid Row, which is an area with one of the highest concentrations of poverty in the United States [93, 94]. As a result, the neighborhood presents as a stark mix of modern residential towers and office buildings along 7th Street that coexist with historic but dilapidated structures, limited green space, continuous loud noise from the adjacent freeway, and a significant unhoused population. Gated newer apartment buildings are moving into the older neighborhood.

Figure 13. Distribution of Available Environmental Documents for Data Centers in Los Angeles



Water Sources: The data center is located within the service area of the Los Angeles City Department of Water and Power. As of 2024, the Los Angeles Department of Water and Power (LADWP) primarily sources water from imported supplies, with roughly 36% purchased from the Metropolitan Water District of Southern California (MWD, primarily Colorado River and Northern California imported water) and 59% from the Los Angeles Aqueduct (LAA, snowmelt and runoff from the Eastern Sierra). Local groundwater provides approximately 2%, while recycled water accounts for about 3% of the city's water supply [50]. Based on annual rainfall and drought conditions,

which affect the availability of LAA water and increase reliance on MWD, these percentages can fluctuate. As Colorado River and Sierra Nevada water uses are being curtailed for water distribution and ecological reasons, the LADWP is actively working to increase local sources (groundwater and recycled water) to 70% by 2035 [50].

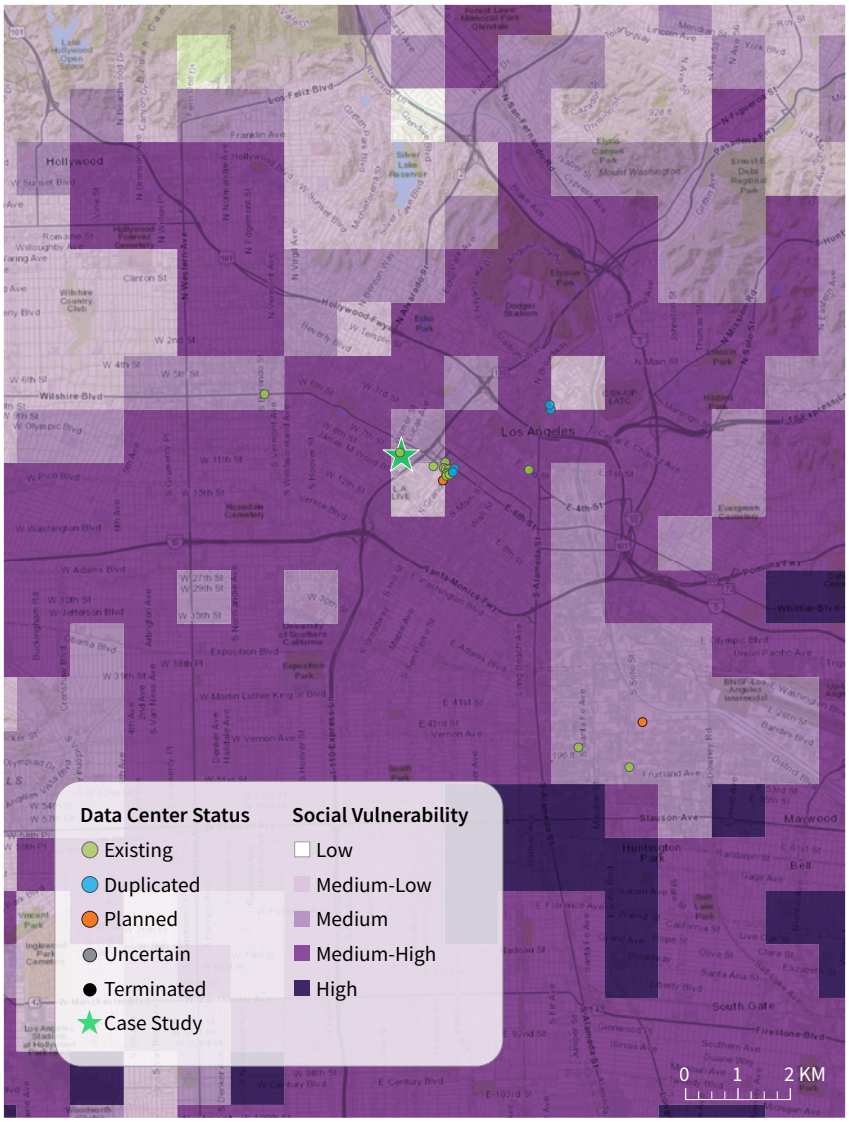
Environmental Planning Documents and Water Use: No environmental planning documents are available aside from parent company annual impact reports. Unlike environmental planning documents, company annual impact reports are not subject to review and approval by planning agencies (such as the city or water district) and do not include a public comment process.

In its annual report [106], the data center operator, Rising Realty, advertises that it focuses on investing in three specific environmental effects and certifications, namely Zero Net Energy, attaining LEED Certification, and achieving the best Energy Star rating.

According to the annual report, the data center uses evaporative cooling and uses 'surplus' groundwater that in the past would have been diverted to a sanitary sewer system. The report notes that the center's estimated water demand is 16 gal/ft^2/yr (or 6 million gal/yr for the facility), and claims that this number reflects approximately 1.2 million gallons in savings per year. How these water savings are attained is not explained in the impact report, but presumably they would be obtained from the 'surplus' groundwater, meaning that 4.8 million gal/yr would still need to be drawn from public water supplies.

With respect to cooling equipment, the company impact report refers to the "installation of high efficiency boilers with smaller make-up water requirements. West 7 Center's HVAC Plants are designed and operated in an N+1 redundancy for supporting critical cooling. The chiller plants are made up of four 1,250-ton, three 1,000-ton, and two 500-ton centrifugal chillers served by nine cooling towers and four 1,100-ton Title 24 compliant water-side economizers, resulting in high energy efficient PUE and cooling load factor." Again, this is more detailed information than many data center operators make public; however, the company's claims cannot be independently verified from publicly available data.

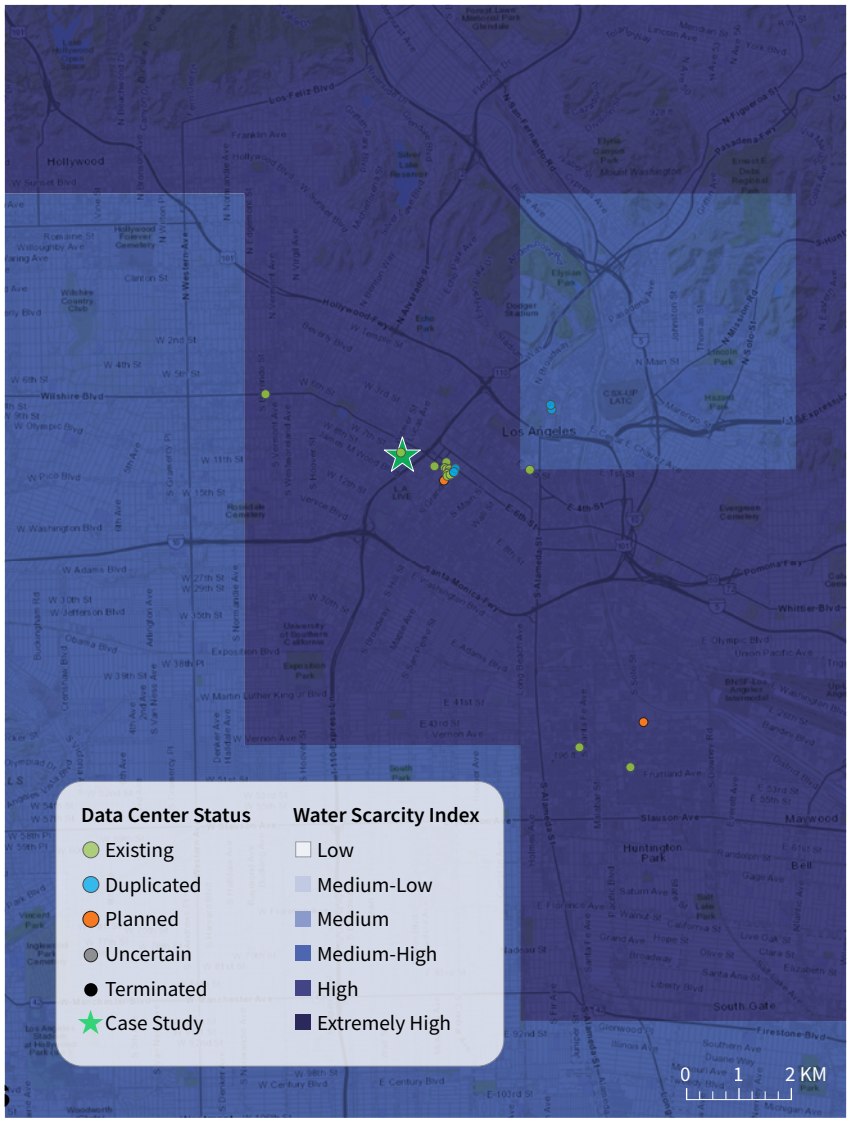
Figure 14a. Social Vulnerability Scores from the Los Angeles Case Study



Note: Data center locations are in areas with medium-low to medium high for social vulnerability.

Summary: The Alchemy Downtown West 7 Center highlights the recent developments of siting data centers outside of historical 'clusters' and at the intersection of socially vulnerable urban communities and water scarcity. Communities such as those surrounding the Alchemy West 7 Center already face a number of environmental burdens. The data center's significant water demand, estimated by the company report as 6 million gal/yr, is primarily met through imported surface water from the Colorado River and Sierra Nevada watersheds. With ongoing curtailments of these water sources due to drought, ecological protections, and regional water allocation constraints, and potentially rising water needs due to warmer temperatures, the water provider's ability to supply additional large water users is likely to become increasingly limited, raising concerns about long-term sustainability and prioritization of water resources. Although the operator reports partial use of "surplus" groundwater and energy-efficient cooling systems, the absence of formal environmental review, consideration of warmer climates, and independent verification of water use makes it difficult to accurately assess the actual impact on both local water supplies and the surrounding community.

Figure 14b. Water Scarcity Scores from the Los Angeles Case Study



Note: Data center locations are in areas with medium-high to high water scarcity.

3. Sacramento County

There are currently 18 data centers in Sacramento County within the Central Valley. No environmental documents regarding their review are publicly available. While many of the data centers are located within Sacramento's main water district, two clusters are located outside of it. We were unable to determine the start date of operations for 13 of these 18 data centers. For the rest, all operations have been initiated between 2006 and 2020. Although one data center is listed as planned, no new ones have actually come online since 2020.

Water Use and Sources:

- The main municipal water district in Sacramento, City of Sacramento Department of Utilities, derives 80% of its water from the Sacramento and American Rivers and 20% from groundwater wells [51]; surrounding smaller water districts in the area have less access to surface water and predominantly access groundwater.

a) Sacramento County Case Study

Social Vulnerability Score: 3.4

Water Scarcity Score: 4.1

Scores are given on a scale of 1-5, with 5 indicating the highest vulnerability.

Siting and Size: The case study selected for Sacramento County, QTS Sacramento, opened in 2013 and is part of a data center cluster located outside of the service area of the City of Sacramento Department of Utilities, in a suburban area of the City of Sacramento. Its size is reported to be 92,644 ft^2.

Reason for Selection: It is located outside the main Sacramento city water provider's service area in a neighborhood with a high poverty rate of 73.2% (corresponding to the 98th ranked percentile with respect to poverty with respect to census tracts in California) [42]. The neighborhood also has high ethnic diversity (30.7% Latino/a, 17.7% Asian-American, 39.2% Black, and 8.4% White).

Water Sources: The water agency for the cluster that includes this data center is the Sacramento County Water Agency – Laguna/Vineyard (SCWA). SCWA provides water to over 50,000 households in 13 water systems throughout Sacramento County. Approximately 85% of the agency's water supply comes from groundwater; the remainder is from surface water from the Sacramento and American rivers. Very recent reports have emphasized that the availability of surface water for the Sacramento Basin will become increasingly unreliable (both in timing and amount), given climate change, and that groundwater levels in the western Sacramento Basin have been declining and require more careful management [52, 53].

Figure 15. Distribution of Sacramento Data Centers by Status

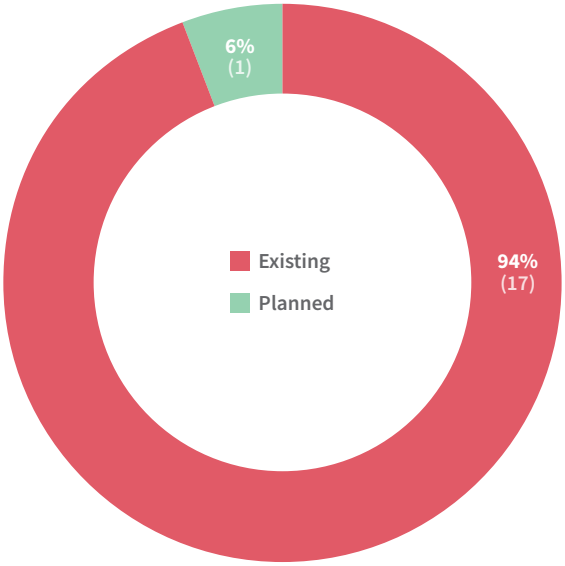


Figure 16. Distribution of Sacramento Data Centers by City

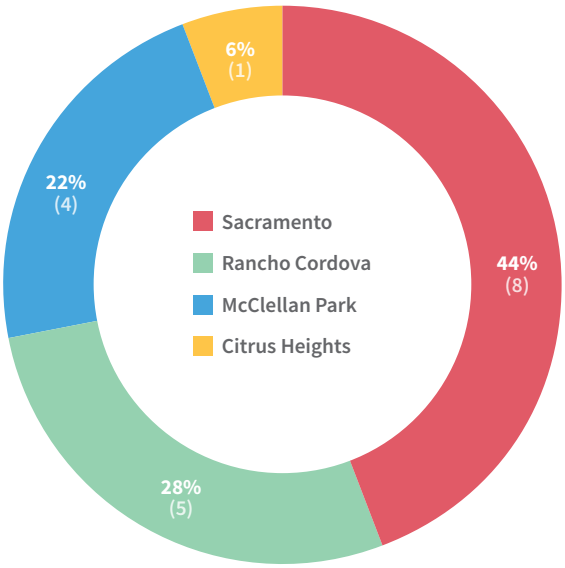
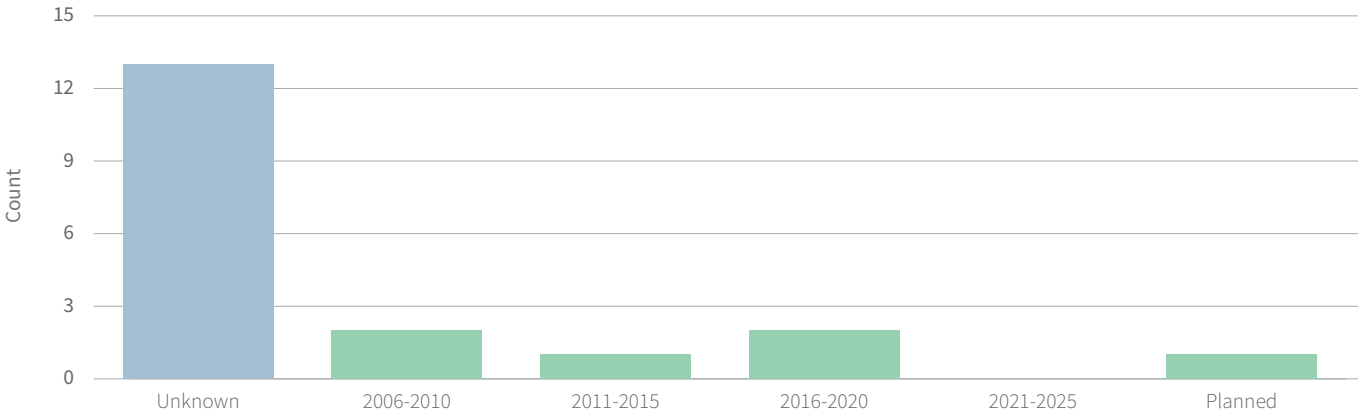


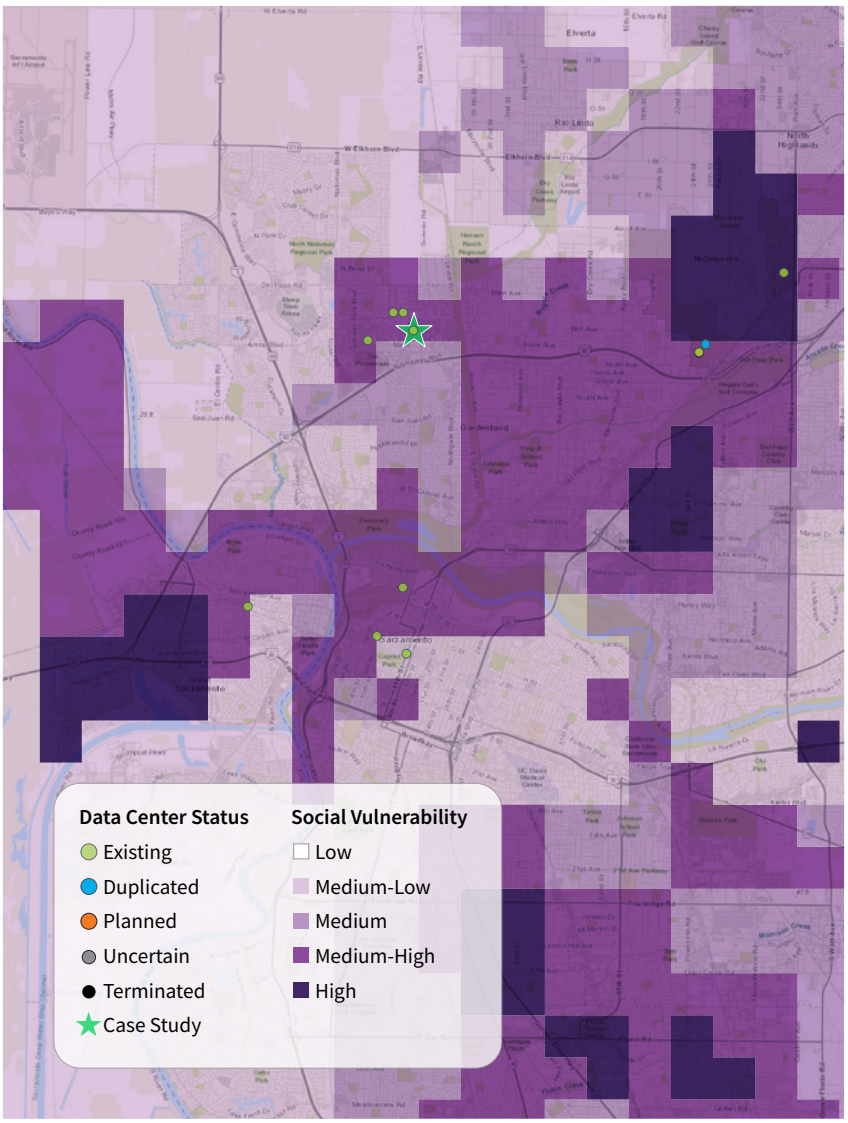
Figure 17. Distribution of Sacramento Data Centers by Year Opened



Environmental Planning Documents and Water Use:
Estimated Water Demand is based on 3,000 tons of cooling capacity for the facility [95]. No information on cooling systems and no environmental review documents were available.

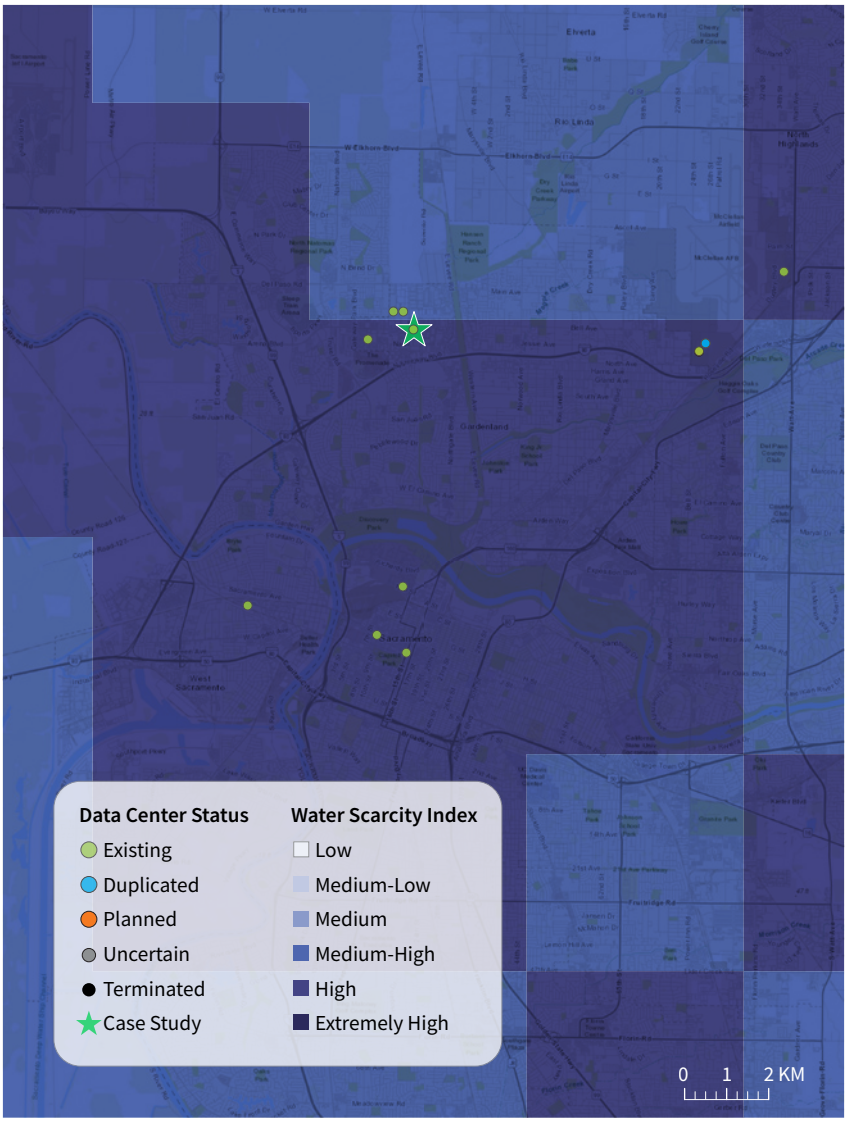
Summary: The QTS Sacramento data center highlights the risks of locating water-intensive infrastructure in smaller suburban districts with limited access to imported water. Relying on groundwater for roughly 85% of its supply, the facility adds pressure to ground water resources in the western Sacramento Basin, which are already declining and increasingly vulnerable to climate-driven variability. The data center's presence in a more economically challenged and more ethnically diverse community (compared to the City of Sacramento) underscores the need to consider social equity in resource allocation, as water-intensive industrial uses may compete with local residential needs. The absence of publicly available environmental review or water use data further complicates oversight, leaving both water managers and the community with limited visibility into long-term sustainability impacts.

Figure 18a. Social Vulnerability Scores from the Sacramento Case Study



Note: Social vulnerability is medium-high around the Sacramento County case study data center.

Figure 18b. Water Scarcity Scores from the Sacramento Case Study



Note: Water scarcity is high around the Sacramento County case study data center.

4. Imperial County

As of the end of 2025, two data centers were planned for the Imperial Valley, an agricultural area near the Salton Sea. From a climatic perspective, the area is a desert, with an average rainfall of less than 3 in/yr and mild to hot temperatures year-round. According to the Imperial Irrigation District (IID), the water provider that serves this area, "[g]roundwater resources in the Imperial Valley are generally of poor quality and unsuitable for domestic or irrigation purposes" [96]. Thus, agricultural activity is only possible with vast imports of surface water from the Colorado River Basin, and the Imperial Valley relies exclusively on the Colorado River as its source of surface water.

For context, California receives the largest share of Colorado River water of all the states bordering the river [97]. For decades, California has imported more water from the Colorado River than its allotment, historically by relying on surplus supplies made available when other Colorado River Basin states did not fully use their allocations. More recently the state has been relying on strong legal and political strategies to maintain those historic overdrafts. As river flows have declined, this longstanding practice is no longer sustainable, and California is now required to reduce its Colorado River imports to align with legal allocations and protect reservoir storage. New post-2026 operating rules will likely formalize these reductions, with mandatory curtailments imposed by the U.S. Bureau of Reclamation if the basin states do not reach agreement. To date, the states have not reached such an agreement.[5] As California reduces its Colorado River imports, the Imperial Valley will need to play a central role in meeting cutbacks because it holds the state's largest and most senior water rights on Colorado River water.

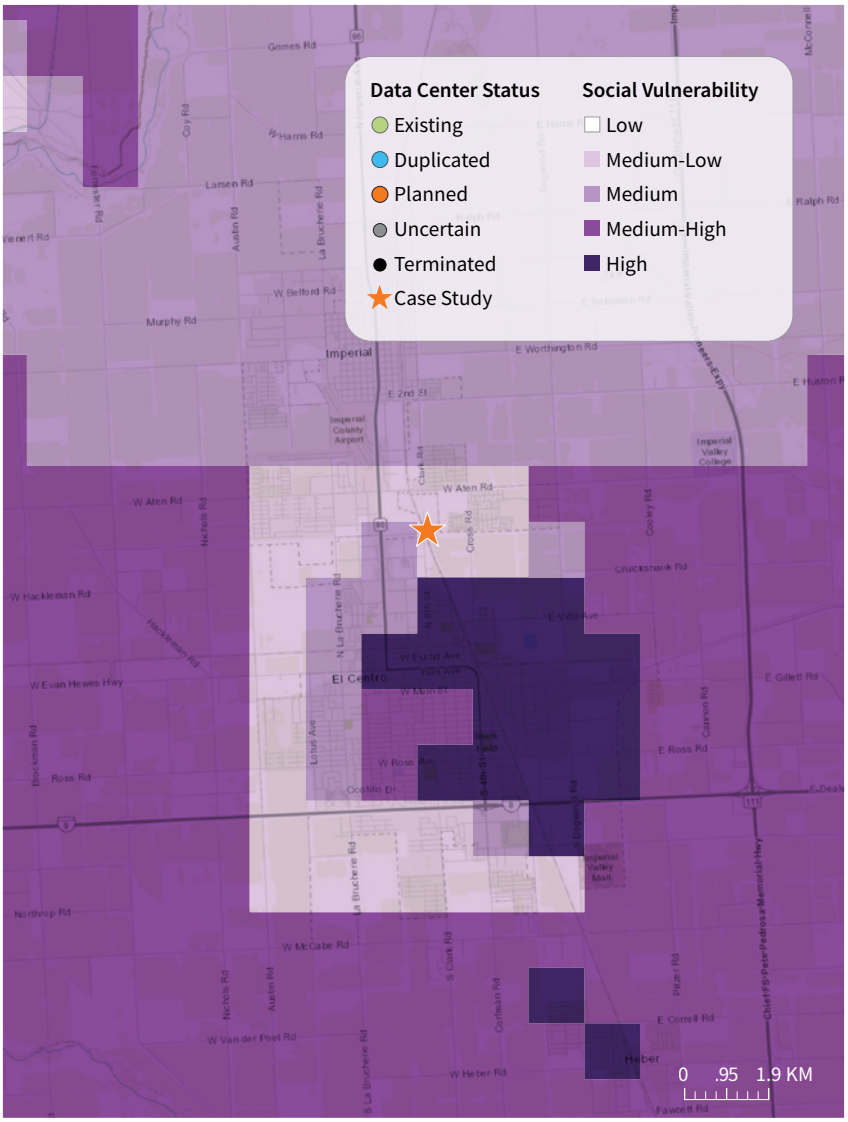
The Imperial Irrigation District (IID) is the water agency for the entire region that imports Colorado River water and distributes it primarily for agricultural purposes. In addition to agricultural deliveries, IID supplies water for non-agricultural uses to seven municipalities, two special districts, and one state and one federal institution for treatment to potable standards; as well as to industrial

5 Notably, two of the other "lower basin" states that also depend on Colorado River water, Arizona and Nevada, are also seeing a massive development of data centers [100] even as residents are being asked to conserve water and expect higher water bills [101]. In addition, the Colorado River itself is impacted by the fact that snowpacks that feed it are "at the lowest they have been in 10 years" [54].

(renewable energy) users, feedlot, dairy, and fishery operations, environmental resource demands, and recreational uses. Thus Colorado River water import reductions will have significant implications for agricultural production, local economies, and inflows to the Salton Sea, making additional demands on water supplies difficult. The low annual rainfall in the region does not contribute to IID's water supply, though it may periodically increase or decrease agricultural water demand for short periods. In turn, the Salton Sea in its current form is not a natural lake but is possible only through diversions from the Colorado River and agricultural return flows. While it was a resort town in the mid-20th century that provided habitat for fish and a stop-over for millions of birds on the Pacific fly-way, it has suffered from contamination since the 1970's that have led to massive die-offs. To prevent contamination of the agricultural root zone of the fields in Imperial County, subsurface tile drains are used to dewater fields, and these tile drains and other drainage waters ultimately discharge to the Salton Sea.

Two data centers had been proposed, for the communities of Calipatria and Imperial, but in early 2026 the plans for Calipatria were withdrawn. Calipatria had been promoted as an innovative design that would rely on geothermal energy and require 'low water usage' [98].

Figure 19a. Social Vulnerability Scores from the Imperial County Case Study



Note: Social vulnerability is medium-high to high around the hyperscale data center location planned for Imperial County.

a) Community of Imperial

Social Vulnerability Score: 3.8

Water Scarcity Score: 5.0

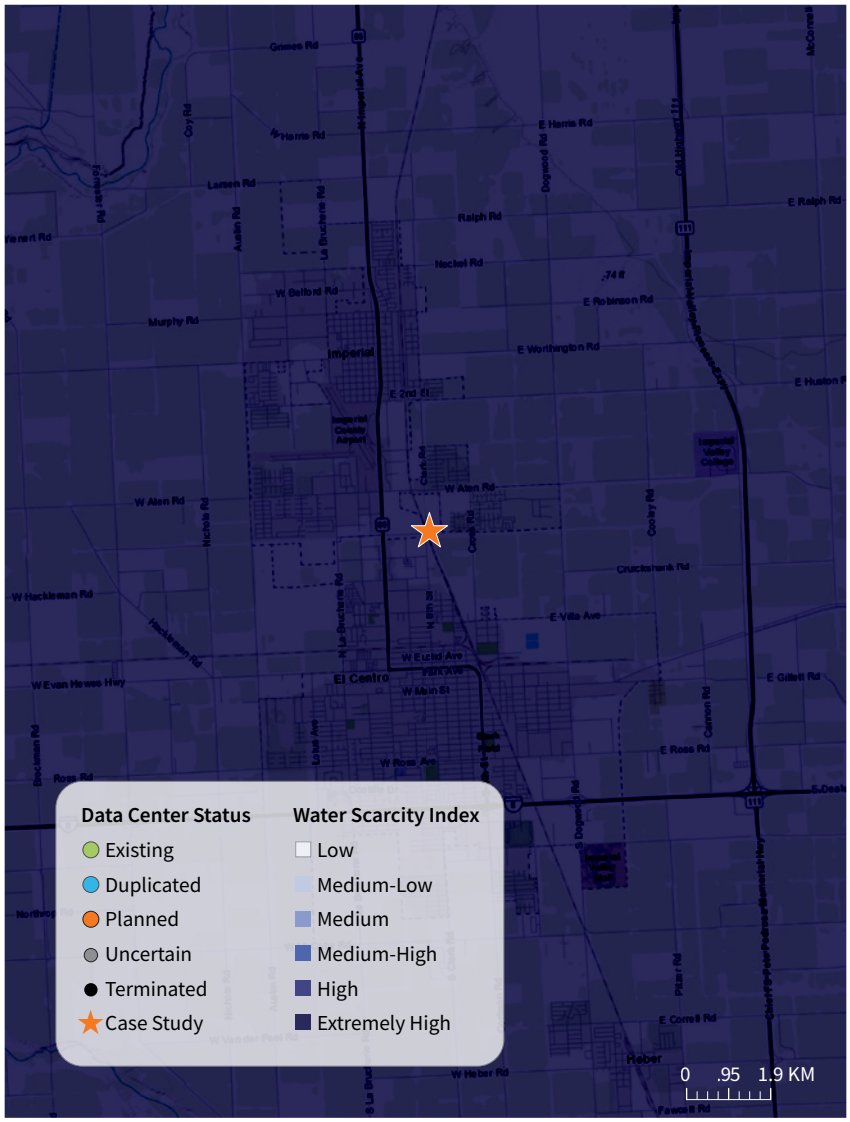
Scores are given on a scale of 1-5, with 5 indicating the highest vulnerability.

Siting and Size: The case study selected is the Imperial Valley Computer Manufacturing LLC facility, an approximately 950,000 ft^2 planned hyperscale data center (330MW), which would be built alongside an emergency backup generator building (330 MW) and Energy Storage System (862MWh) [99]. The planned site encompasses approximately 74 acres within Imperial County's jurisdiction, but on the border with the City of Imperial. This has been historically a rural agricultural area, where more recently subdivisions are being developed. The site is located within the service area of the Imperial Irrigation District.

Reason for Selection: If built, the $10 billion project would represent one of the largest data centers in the U.S. in one of the driest places in the nation that is almost entirely dependent on imported water from the Colorado

River, with commitments to reduce that water allocation. In addition, there have been disagreements between the City and County of Imperial about the necessity of an EIR and concerns from the community about water use, noise, and air quality related to the project. The data center would be located in a tract with medium-low poverty (22.4%, corresponding to the 39th percentile with respect to poverty percentile among tracts in California) and high ethnic diversity (85.1% Latino/a, 9.4% White, 2.4% Black, 0.1% Native American, and 2% Asian-American and Pacific Islander) [42]. The tract is also adjacent to tracts with higher levels of poverty, reaching up to 76%.

Figure 19b. Water Scarcity Scores from the Imperial County Case Study



Note: Water scarcity is high to extremely high around the hyperscale data center location planned for Imperial County.

Water Sources: Planning documents, including the Phase I Environmental Site Assessment[6] (ESA) [55, 56], indicate that the data center is intended to operate exclusively using recycled water. This treated wastewater would be supplied through a planned dedicated conveyance system from the City of Imperial Wastewater Treatment Plant, which receives domestic, commercial and industrial wastewater generated within the City of Imperial. To this end, the facility operator has proposed to formalize a contractual agreement with the City. An August 2025 Draft Report by the City of Imperial notes that the City of Imperial Wastewater Treatment Plant would need upgrades to its disinfection process in order to provide up to 3.0 million gal per day of effluent that could be reused as recycled water [57]. Thus the recycled water needed for data center operations would undergo additional on-site treatment prior to use. It remains unclear, however, whether the treated wastewater that would be used by the planned data center is currently allocated to other applications. In the case that the data center operators are not able to contractually secure recycled water, they would need to rely on potable water from the IID. As noted above, all of the water that the IID distributes is imported from the Colorado River and primarily used for agricultural purposes. The agency also treats and distributes water to seven municipalities, industrial (renewable energy) users; feedlots and dairies, among other users. Groundwater is of exceedingly poor quality and unsuitable for domestic or irrigation purposes.

6 Such assessments differ from EIRs and are generally done when a property is bought/sold.

Table 2. Summary of the Information Available on Case Study Data Centers

Case Studies	Santa Clara	Gilroy	Los Angeles	Sacramento	Imperial
Social Vulnerability Score (1-5)	1.8	2.8	2.6	3.4	3.8
Water Scarcity Score (1-5)	3.5	3.6	4.0	4.1	5.0

Note: The higher the value of the index, the higher the social vulnerability or water scarcity as evaluated by this study.

Environmental Documents and Water Use: The facility operator projects the use of 750,000 gal of treated waste water per day. No EIR or MND is available, but two planning documents exist [55, 56]. Neither document provides much detail about the cooling system, the planned recycled water treatment and conveyance system, or other potential uses of the reclaimed water. Other environmental impacts, such as impacts on noise levels, air quality, or electricity generation are not discussed.

According to news reports, the City of Imperial became aware in November of 2025 that the County of Imperial was in the process of finalizing approval of the plans to build this project and exempt the project from a CEQA review. The proximity and concern over community impacts and shared environmental resources have prompted the City and some residents to call for a public approval process and full environmental review under CEQA [102]. The legal dispute between the City and the County remains ongoing at the time of this writing [58, 59]. The developer has provided a global settlement proposal.

Summary: The Imperial Valley data center would be one of the largest data facilities in the U.S. within one of the driest areas, located in a historically rural and underserved community far away from traditional tech centers. The data center would rely entirely on recycled water, requiring plant upgrades and/or on-site treatment, yet it is unclear whether contracts can be obtained for this and whether this water is currently allocated to other uses. Limited environmental documentation and unresolved permitting disputes underscore uncertainties regarding impacts on water availability, air quality, and noise, emphasizing the importance of comprehensive planning and public review before project implementation.

D. Summary of Analysis from the Case Studies

The case studies illustrate that data centers in Imperial- and Sacramento are located in areas with the highest combined social vulnerability and water scarcity, suggesting these sites face the greatest potential stress on both communities and local water resources (Table 2). Even centers in traditionally urban tech areas (Santa Clara and Los Angeles) experience elevated water scarcity scores, highlighting the fact that operational water demands intersect with environmental constraints across diverse settings. The Gilroy and Sacramento case studies illustrate that within tech regions, hyperscale data centers are moving to ex-urban spaces, even though those score higher in social vulnerability and are more susceptible to water scarcity.

Taken together, the case studies also highlight the challenges of siting large data centers in areas with constrained water resources and socio-economically vulnerable populations. While water districts emphasize their planning for sustainability, closer examination indicates that recent hyperscale facilities have been constructed and are being planned in areas where groundwater or imported surface water is increasingly uncertain due to climate variability and regulatory limits, placing pressure on already fragile water systems. While some data centers are taking advantage of means to bypass environmental review processes, the case studies also indicate that greater data transparency and an environmental review process have led to better outcomes for water resource sustainability. Recent siting of data centers in socio-economically challenged and ethnically diverse communities raise equity concerns, as industrial water use may compete with local residential needs while public oversight and environmental review are often limited. Combined with high water and energy demands for cooling, these examples illustrate the need for careful planning, transparent reporting, and integrated manage-

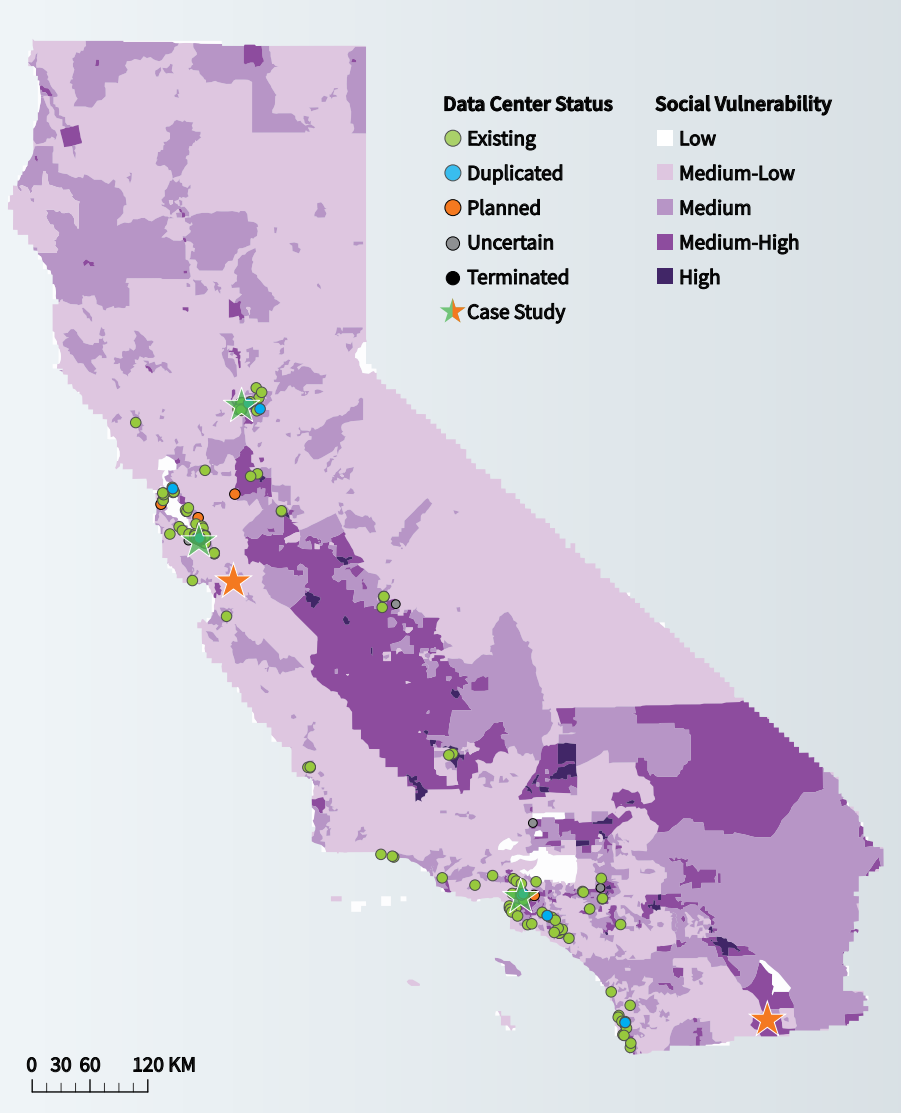
ment of water, energy, and social impacts.

E. Data Center Locations Within Vulnerable Communities

As a reminder, a classification of 'disadvantaged' for this study is based on three components: a) exposure to pollutants and social vulnerability (b) poverty, and (c) secure water access. This study also assumed that smaller water systems have less financial and political strength to obtain new water sources or supplement their water sources under drought, thus—all other factors being equal—locations in smaller water districts will be classified as more vulnerable as those in larger water districts.

Social vulnerability to data centers is most prevalent in the Central Valley, the Imperial Valley, and in pockets of Santa Clara and Los Angeles County (Figure 20) based on the index developed for this study. Additionally, while data centers have historically not been located in the most socially vulnerable regions, more recent or planned data centers are exploring those areas.

Figure 20. The Distribution of the Social Vulnerability Index (Including Water Access) for California

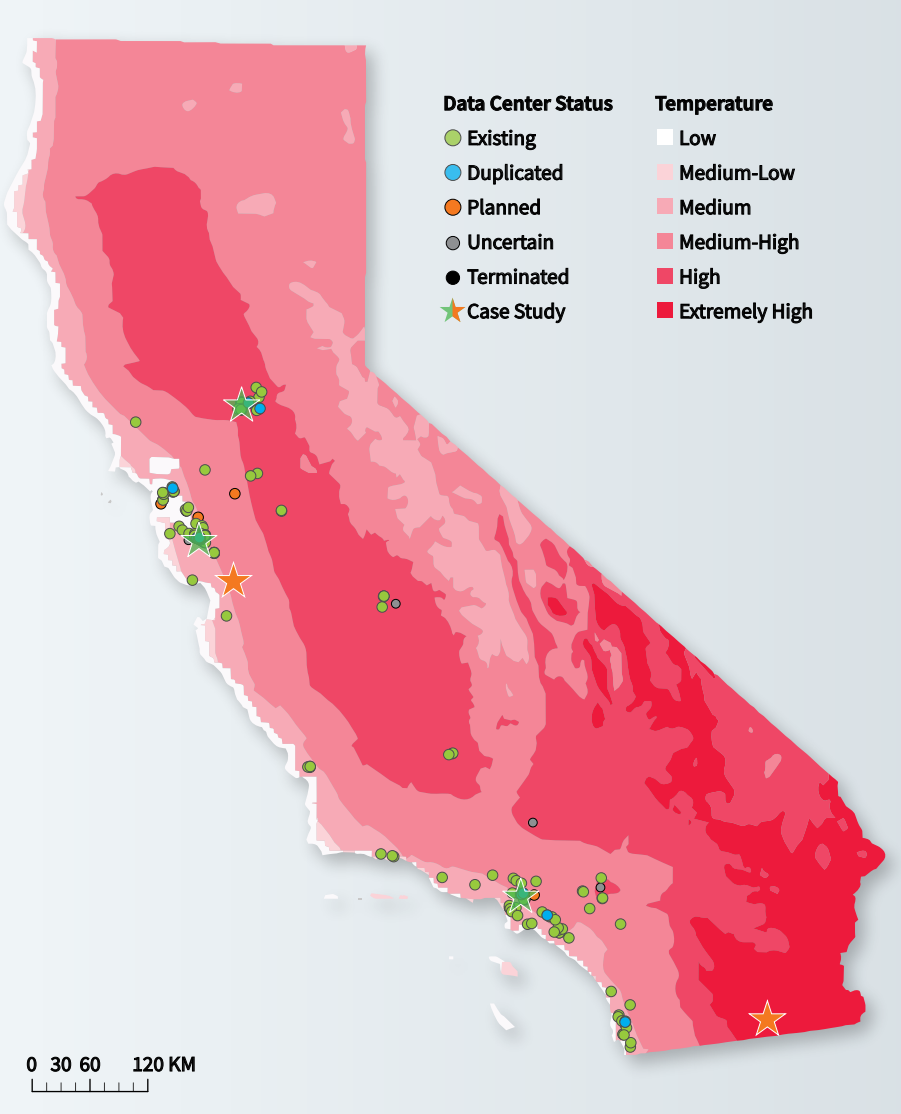


F. Data Center Locations in Areas Vulnerable to Water Scarcity

A number of different factors drive water scarcity in California. The primary factors are precipitation and temperature. Much of the state receives less than 15 in/yr of rainfall on average, and that rainfall is limited to 2-5 months of the year. This low and highly seasonal precipitation intersects with high summer temperatures.

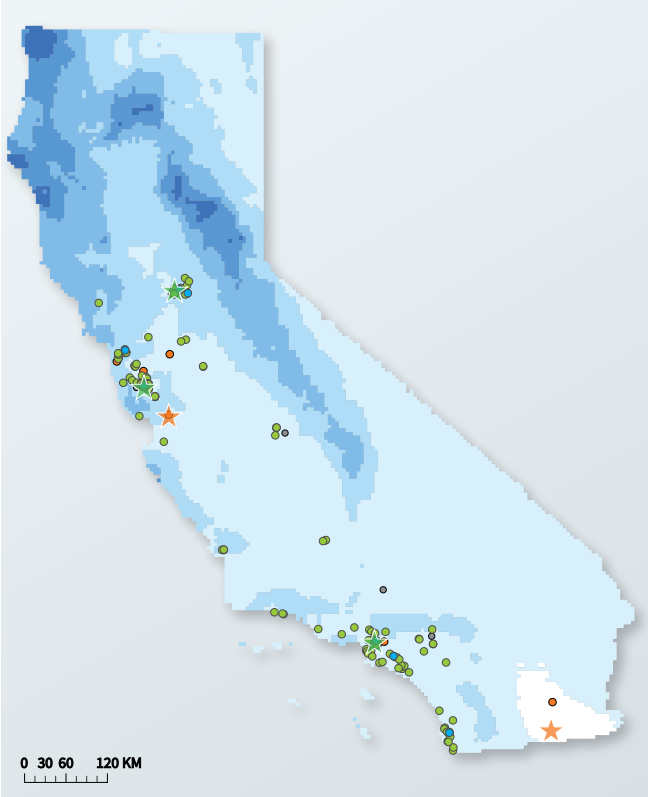
Low precipitation and high temperatures are primary factors for water scarcity and intersect in the Central Valley and southeastern part of the state. Secondary, human-induced factors, namely chronically declining water levels, temperature shifts by 2050, consecutive drier than normal years, and groundwater basins classified as chronically overdrafted have an additional impact on water scarcity and were considered for this study. While secondary factors affect different parts of the state, they do increase water scarcity particularly for the Central and Imperial Valleys through widespread groundwater level declines and groundwater contamination, and projected temperature increases with climate change. As a result, the total water scarcity scores, a combination of primary and secondary factors, are highest in the lower Central Valley, Imperial County, but also in coastal pockets of the southern part of the state. Planning for data center locations should consider the multitude of factors that constitute water scarcity.

Figure 21. Average July Temperature (1981-2016)



Source: CHIRTS climate data

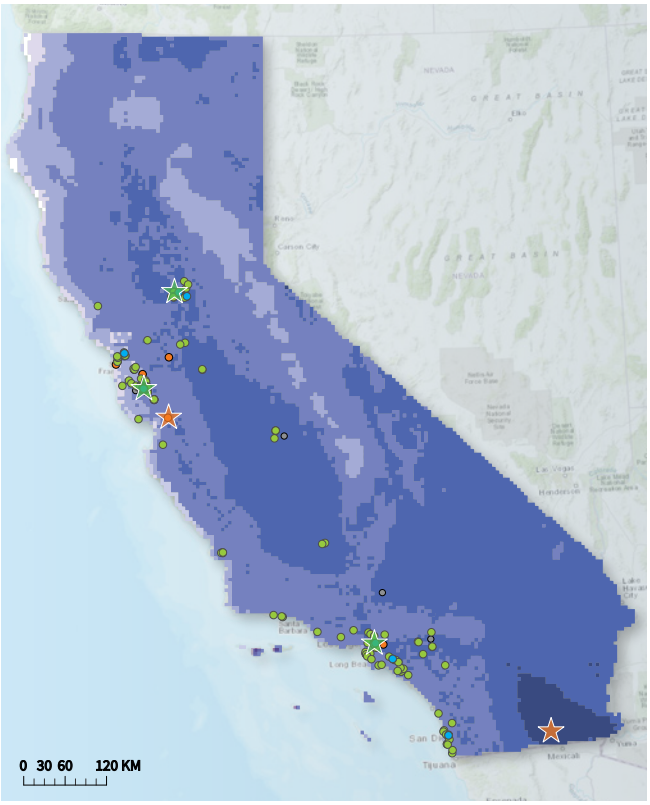
Figure 22. Average Annual Precipitation (1981-2025)



Data Center Status	Precipitation
Existing	Extremely-Low
Duplicated	Low
Planned	Low-Medium
Uncertain	Medium
Terminated	Medium-High
Case Study	High

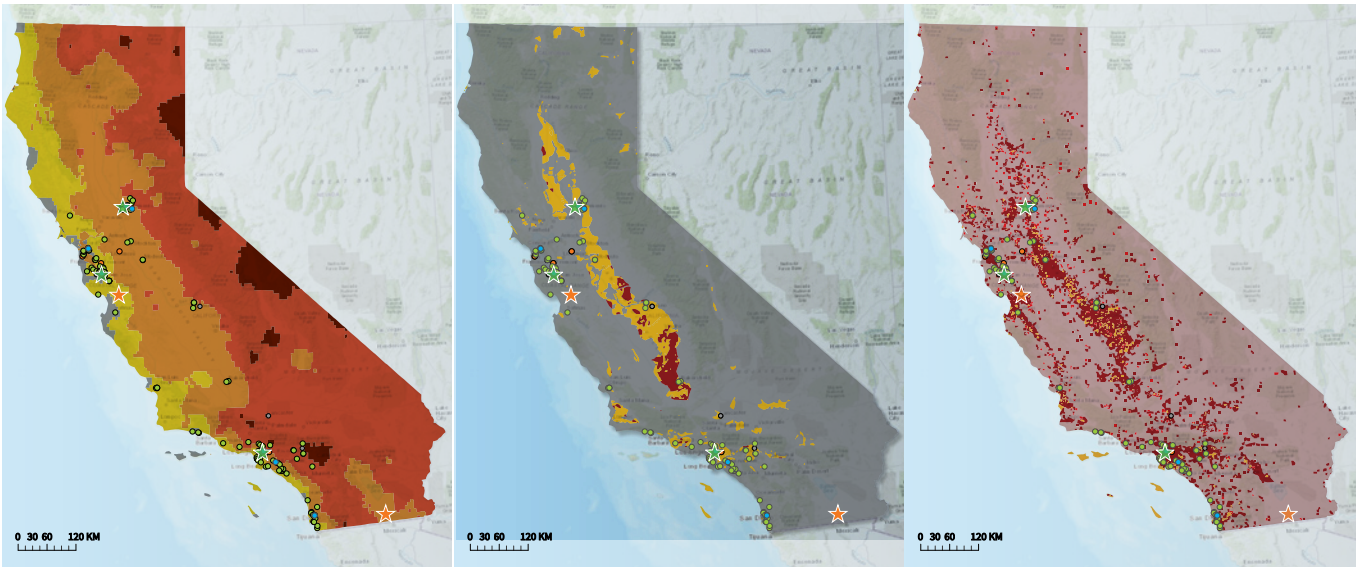
Source: CHIRTS climate data

Figure 23. The Total Water Scarcity Score for California



Data Center Status	Water Scarcity Index
Existing	Low
Duplicated	Medium-Low
Planned	Medium
Uncertain	Medium-High
Terminated	High
Case Study	Extremely High

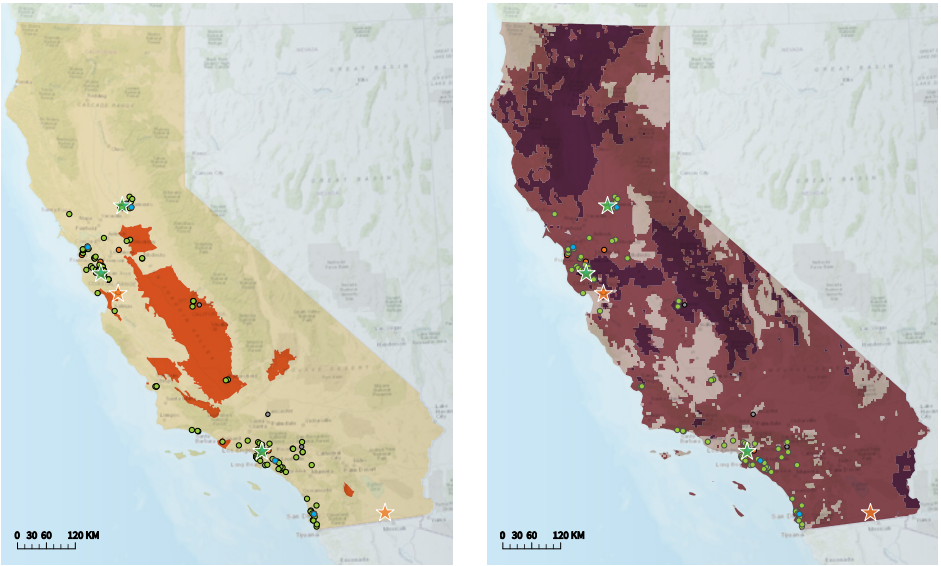
Figure 24. Secondary Factors Contributing to Water Scarcity in California: a) Temperature shifts by 2050, b) Chronically declining water levels, c) Groundwater quality risk, d) Overdraft basin, and e) Consecutive dry years



Temperature Shift by 2050
- Low
- Medium Low
- Medium
- Medium High
- High

Chronically Declining Water Levels
- No change
- Small decrease (<= 2.5 ft.)
- Substantial decrease (> 2.5 ft)

Groundwater Quality Risk
- Low Risk
- Medium Risk
- High Risk



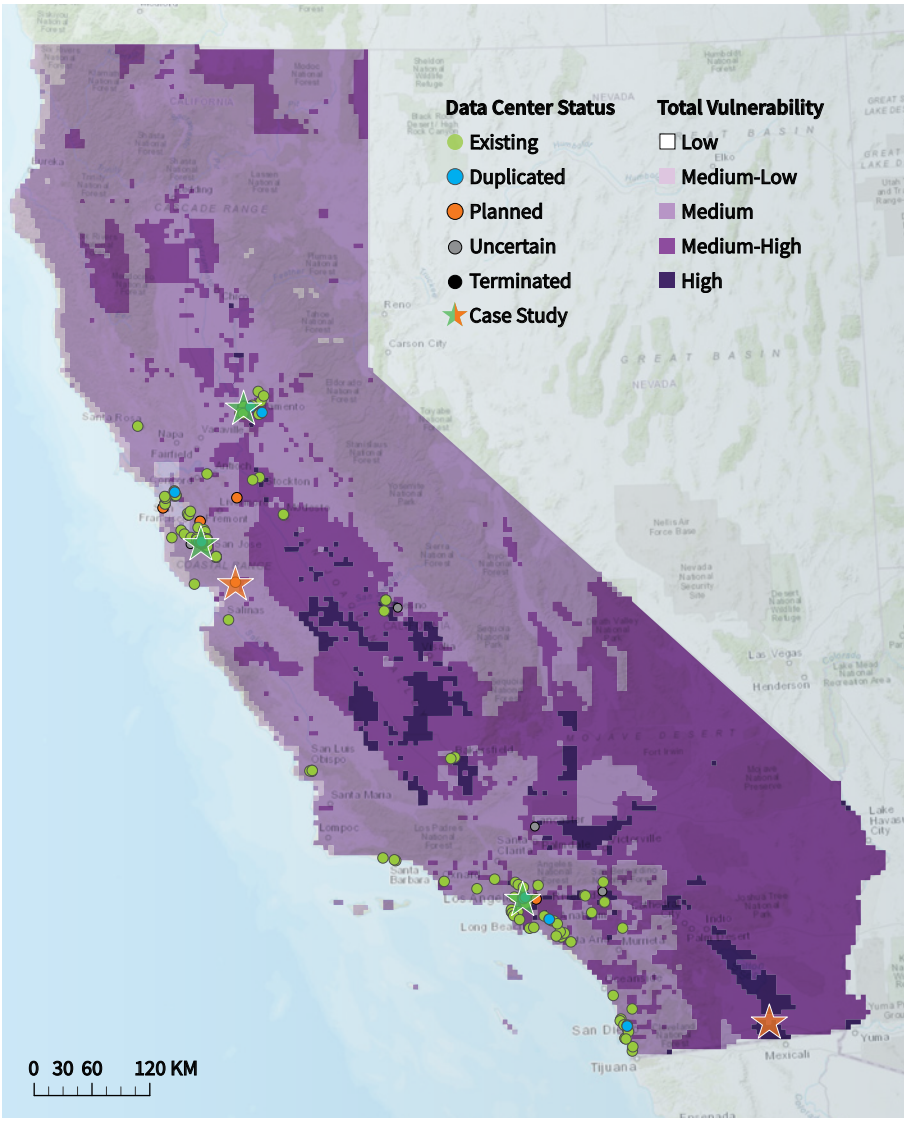
Overdraft Value
- No
- Yes

Consecutive Dry Years
- Low
- Medium Low
- Medium
- Medium High
- High

G. The Total Vulnerability Index for Social Vulnerability and Water Scarcity in California

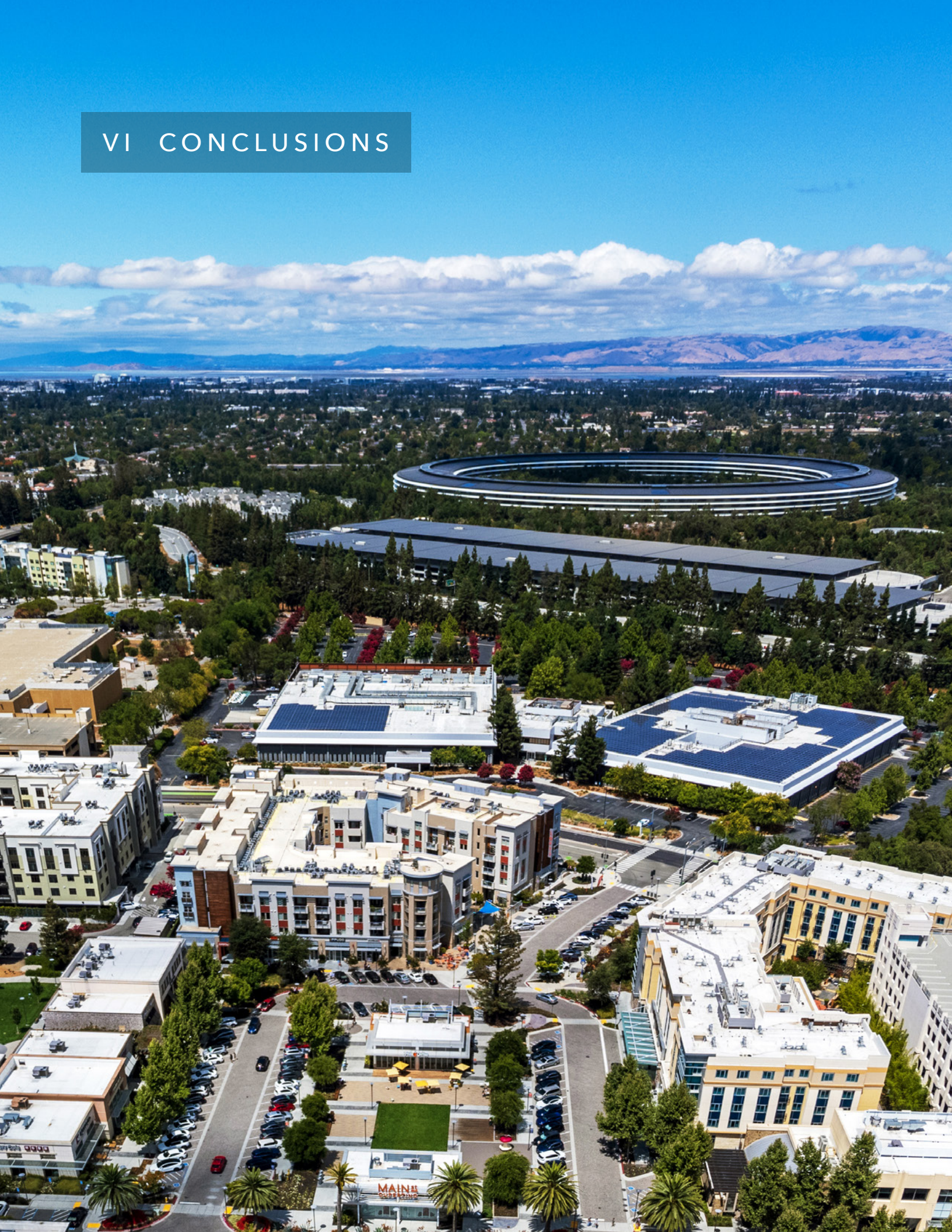
Our spatial analysis shows a clear overlap between high water scarcity and elevated social vulnerability in parts of the Central Valley and Imperial Valley, with additional pockets in Los Angeles and Santa Clara Counties (Figure 25). Communities in these regions face compounded risks: limited and climate-sensitive water supplies intersect with higher poverty rates, pollution burdens, and reduced institutional capacity to respond to new demand. While historically most data centers were located in less socially vulnerable urban tech hubs, newer and proposed facilities increasingly appear in areas where both water stress and social vulnerability are moderate to high. This intersection raises concerns about cumulative impacts, particularly where groundwater-dependent or smaller water systems serve already disadvantaged populations.

Figure 25. The Total Vulnerability Index and Data Centers in California



Note: Total Vulnerability Index is composed of the Social Vulnerability and Water Scarcity Index.

VI CONCLUSIONS



1. Transparency regarding water use and environmental impacts is severely limited. Across counties, publicly available information on actual water use, type of cooling technologies, recycled water proportions, and operational water use data for data centers is incomplete or inaccessible. Most data centers lack publicly available Environmental Impact Reports (EIRs), particularly outside Santa Clara County. In Los Angeles County, approximately 93% of facilities have no accessible environmental documentation. The inability to obtain verified water use data from water providers further limits accountability and impact assessment. And water providers might lack accurate information themselves, which makes it impossible for them to plan for effective water distribution that also satisfies the requirements of environmental justice. In addition, as noted above, environmental justice demands "equal access to the decision-making process"; the lack of accurate data about water use by data centers makes it impossible for community members to function as effectively as they might in decision-making processes that determine where data centers should be located.

2. Water scarcity impacts extend beyond the footprint of any single data center, particularly when facilities rely on imported water or shared groundwater basins. Increased demand in one jurisdiction can contribute to basin-wide depletion, reduced drought resilience, and ecological stress in distant source regions. In addition, direct water use does not include the 'indirect' water needs to generate the energy required by data centers. Closed-loop systems require more energy and thus potentially more water, depending on how and where the electricity is generated. This portion is not figured into the direct use and the overall water use for data centers in California. Depending on the type of cooling and energy used, the indirect water use may be even larger than the direct water use. This interconnectedness underscores the need for comprehensive, cumulative water supply assessments rather than project-by-project evaluations.

3. Data centers are expanding into more socially and hydrologically vulnerable regions. While early data centers in California were concentrated in urban tech hubs such as Santa Clara County and Los Angeles County, newer and planned hyperscale facilities are increasingly located in exurban and rural areas such as Gilroy, Sacramento County, and Imperial County. These locations score higher on both social vulnerability and water scarcity indices, indicating a shift toward siting in communities with fewer economic and water security buffers. Increasingly, some socially vulnerable and water scarce communities in California have questioned and resisted plans for hyperscale data centers in their communities.

4. Water scarcity risk is highest in the Central Valley and Imperial Valley, where at least two new massive projects are being planned. The highest combined water scarcity scores occur in the lower Central Valley and Imperial County, where precipitation is low, groundwater basins are stressed, and climate projections indicate worsening conditions. Proposed hyperscale facilities in the Imperial Valley would rely on Colorado River imports, a system already facing mandatory reductions, increasing long-term supply uncertainty. These are also areas with particularly vulnerable communities, in which environmental justice factors are not being met.

5. Smaller and groundwater-dependent water systems face greater relative risk. Facilities located in smaller water districts (e.g., Gilroy, parts of Sacramento County, and Imperial Valley communities) rely heavily on groundwater or single-source imported supplies. These systems have less financial, water rights-based, and hydrologic flexibility during drought. In contrast, larger metropolitan systems (e.g., Santa Clara's mixed supply or Los Angeles' Metropolitan Water District imports) have more diversified portfolios, though they remain substantially dependent on imported water from stressed basins.

6. Many planned data centers depend on imported water from already stressed external basins. Several current and proposed data center locations rely on water imported from other hydrologic basins that are themselves experiencing long-term depletion. In Santa Clara County, roughly half of the water supply is imported from the Sierra Nevada through the Sacramento-San Joaquin Delta, meaning local demand contributes to pressures far beyond the county's boundaries. In Los Angeles County, major supplies are drawn from the Colorado River and Northern California via the State Water Project, systems which are facing mandatory cutbacks and declining reliability. Proposed hyperscale facilities in Imperial County would likely depend almost entirely on Colorado River water, a river basin already overallocated and subject to post-2026 reductions. As a result, the water footprint of these data centers extends beyond their host communities, effectively shifting hydrologic risk to other regions that are simultaneously confronting scarcity and ecological strain, which is likely to increase with projected climatic changes.

7. The environmental review framework for data centers has gaps that may allow developers to bypass full regulatory scrutiny. In the absence of a regulatory framework specific to data centers, some data centers appear to proceed through ministerial approval or tiering under the California Environmental Quality Act (CEQA), avoiding full Environmental Impact Reports and Water Supply Assessments. Given the high cooling-related water demands and indirect water consumption via electricity generation, current review processes may underestimate total water impacts, particularly in regions already facing groundwater depletion and climate-driven scarcity.

8. Socio-economic vulnerability and water scarcity relative to data centers intersect for large regions in California. A total vulnerability index (composed of a social vulnerability and a water scarcity index) with respect to data centers developed for California by this study indicates medium-high and high compound vulnerability for large areas in California's Central Valley and inland areas of the southern portion of the state.

9. A lack of data leads to a lack of trust. In annual sustainability reports, some of the largest technology companies include stories about positive pilot projects that attempt to mitigate the negative effects of their data centers on the water needs of impacted communities. However, those projects don't match the speed and scale of the data center build-up, and often such efforts (e.g. water replenishment) happen in different areas than those directly impacted by the data centers. A lack of data also hampers good legislation, consumer/user agency, technical innovation, and environmental justice. In the context of the current data center buildup, in California and elsewhere, widespread data scarcity is leading to increasing community pushback. Environmental justice requires a focus on those who are most vulnerable, and requires that decisions such as approving the building of new data centers be made with meaningful input from the people living in surrounding areas. Such meaningful input, in turn, requires timely and accurate data. Working with communities in transparent ways could lead to more just and sustainable outcomes.

VII RECOMMENDATIONS

State lawmakers should continue to propose and push for laws requiring disclosure of electricity and water usage by data centers.[7] (See the recently proposed AB 2619 as an example of such laws [104].) Useful transparency would require 1) timely disclosure of usage data for individual data centers; 2) standardized reporting; and 3) audits to confirm whether commitments (e.g. re. use of recycled water) are kept and whether estimates provided are accurate. Note that lack of data also hampers the development of effective legislation. (Comparable recommendations have been made by other researchers [79], and requests for more transparency have been met with claims that water usage disclosure would somehow implicate trade secrets. However, those claims have not been clarified or tested in courts.)

State lawmakers should also incentivize the development and deployment of water-saving and energy-saving technologies for data center operations,[8] as well as the use of recycled water and the building of adequate infrastructure.

Local water providers and regulatory agencies tasked with water management should engage more with lawmakers and local communities that are either hosting or about to host data centers, to explain the need for accurate water use data and for audits of estimates once data centers are operational.

Data center developers should focus on areas not disproportionately affected by environmental burdens, and offering sufficient water, cooler climate, and/or access to renewable energy. However, in California, where water is often moved across vast distances for a variety of uses, data center development should also be informed by considerations of impacts on local and imported water supplies, direct and indirect water use, and type of water being used (e.g. recycled v. potable). Location determinations should be informed by environmental justice concerns.

Researchers who focus on water issues and environmental justice should engage more with lawmakers and the public in conjunction with the boom in data center development; this will require ongoing analysis and reporting. A broad effort is required in order to try to match the speed and scale of data center build-up, and to offer real-time data-informed suggestions as conditions continue to change. A recent poll suggests that such researchers would be a trusted source of information [62].

Businesses, nonprofits, and government agencies that are considering adopting AI products should consider requiring bids that include assessments of such tools' environmental impact.

Communities could build local capacity to make informed decisions with respect to the water impacts of proposed data center projects. Capacity building could include public education, leveraging public records and transparency laws, forming local coalitions and community-academic partnerships, and developing accessible tools and strategies.

Community organizers and environmental activists could help inform the broader public about the need for accurate data about individual data centers' water and energy usage.

Individual users should give preference to AI services and tools from companies that disclose the energy and water usage of the data centers in which their servers are located to the extent possible, and once more information becomes available. Users should also prioritize services and tools that work with communities directly impacted by the development of data centers.

7 Of course, many of the water-use considerations apply to other industrial uses as well, and transparency regarding water usage should not be limited to data centers. However, the staggering rapid growth in the development and deployment of data centers means that particular attention on them is warranted.

8 For example, a recent report from the University of Michigan's Science, Technology, and Public Policy program at the Gerald R. Ford School of Public Policy argues that "data center tax breaks [if offered] should adopt sustainable growth policies for data centers, mandating energy audits, strict performance standards, and renewable energy integration, while also requiring transparency in energy usage reporting" [60, 61].

APPENDIX A: Ethical Analysis

The following analysis of issues related to data center water use in California applies six ethical lenses featured in the Markkula Center for Applied Ethics' "Framework for Ethical Decision Making" [36].

Identifying the Stakeholders

A key step in analyzing any ethical issue is identifying the stakeholders—the individuals and organizations or communities who are either directly or indirectly impacted by choices to be made among various options available. Note that stakeholders may be both negatively and positively impacted; the following stakeholders may receive benefits, incur harms, or experience a mix of both.

In regard to the water use by data centers in California, stakeholders include

- People living near data centers; within this group, in particular,
  - » any who might have insufficient access to clean water
  - » any who might have specific health needs/vulnerabilities/ and/or insufficient access to medical care
  - » any who might have been historically subject to discrimination
- People living in cities or counties hosting data centers
- People living in states hosting data centers
- People living in countries hosting data centers
- People who depend on water sources that would supply water for data center needs for drinking water/personal use
- People who depend on water sources that would supply water for data center needs for alternate water uses (e.g. agriculture, tourism, etc.)
- Property owners whose land or other properties are located near data centers
- Companies that build data centers
- Organizations that operate data centers
- Customers of services that depend on processing that happens in data centers
- Unions representing workers who build data centers
- Elected officials at municipal/county level
- Elected officials at state level
- Elected officials at national level
- Regulatory bodies at municipal/county level
- Regulatory agencies at state level
- Regulatory agencies at national level
- Land owners impacted by the data center construction boom
- Water distributors
- Community activists
- Environmental activists
- Researchers from a variety of disciplines who study issues related to water access and quality
- Researchers from various disciplines who are specifically working on efforts to limit the water needs of data centers
- Companies involved in the building of the infrastructure required for data center and power plant operations
- All people who use digital tools that require data center processing
- All people who work in industries that incorporate internet usage
- All people impacted by government functions that incorporate internet usage—including national security
- All living things that require water to live

The list reflects the complexity of the considerations and trade-offs involved in choices to be made about data center development, AI usage, water usage, and environmental justice.

Applying the Lenses Included in The Markkula Center for Applied Ethics Framework

Rights-related consideration of data center location & water

There are multiple rights impacted by the water usage required for data center operations.

They include the right to life and health of people who need, for their everyday usage, the water that might instead be directed to serve data centers or power plants that provide the energy required for data centers. They also include the rights of those who are otherwise negatively impacted, in terms of health, by the competition for resources with data center.

But other rights to life and health of people are also implicated—for example the rights of those who depend on the processing that occurs in data centers for survival/medical needs (e.g. electronic records, internet-reliant medical devices, research to develop new drugs and treatment methods, etc.).

Also at issue are a slew of property rights, including those of land owners on whose property data centers are built; those of data center owners; people who use the services of data centers as part of their work; people who store their electronic property (including IP but also personal photos, videos, etc.) in data centers; etc.

Broader rights are also implicated, especially in light of the environmental justice focus: the right to be treated fairly; to have enough information to enable people to exercise their autonomy by expressing wishes and making choices; to have access not just to drinking water but also to clean air and a healthy environment; as well as to have access to the internet and to the innovations that depend on the data center processing.

Justice-based consideration of data center location & water

Data centers bring financial and other benefits for data center owners and operators; local governments and their constituents; and companies and other organizations that use the services provided by particular data centers—including nonprofits doing research for the public good. The latter might be located far from the data centers themselves, although in some parts of the world there is also a growing movement to keep local data in local data centers, at the intersection of environmental justice and data sovereignty [63].

The unequal negative impacts of data centers, however, are concentrated on communities in the immediate vicinity of data centers, and/or communities that end up competing for water with data centers (i.e. communities whose water sources are being drawn on for data center use).

More broadly, there is also the negative impact on those who face rising bills for water and electricity prompted at least in part by the development and improvement of infrastructure needed to support new data centers. Several bills proposed in various states aim to make the data center operators pay for the growing infrastructure needs; the argument is that it is unfair to make local communities bear that financial burden when the vast majority of the financial benefits derived from the data centers go to the tech companies that build them and/or use their services.

Where communities with higher levels of poverty are hosting data centers, that unfairness is even more marked.

In water-stressed areas, additional competition develops among those in need of drinking water and other water uses drawing on the same sources as the data centers—such as agriculture, wildlife conservation, tourism, etc.—requiring an assessment of the justice of water distribution for these diverse purposes.

Questions of justice also arise related to the way in which recent development of some data centers has been approved in various communities. In multiple cases, local residents have not had a chance to participate in the approval decisions; sometimes they were left completely in the dark, surprised by the sudden construction and uninformed about its implications for their community.[9]

9 See, for example, the situation in Memphis, TN [64].

Utilitarian consideration of data center location & water

Utilitarianism prompts us to ask how we might maximize the number of people benefitting from the development and use of data centers, v. the number who aren't—or who are actually harmed. The location of data centers is therefore also a utilitarian consideration.

If the benefits of data center usage were distributed fairly evenly, a utilitarian argument could be made that some harms to local communities would still be ethically acceptable. However, the concentration of those benefits remains a key part of the ethical analysis, especially in the case of data centers that are built specifically for particular tech companies' own use—and in some locations more than in others.

A utilitarian analysis might also reach different conclusions when considering long-term versus short-term consequences. In the short term, utilitarianism might support the development of data centers in areas that have cooler temperatures, cleaner electricity grids, and/or plentiful water resources. Long-term, however, that might not be enough, as climate change impacts might shift all of those categories.

Utilitarian considerations would also point toward means of mitigating harms, such as optimizing the scheduling of AI processing so as to require as little cooling as possible; choosing the smallest models that can competently fulfill the task-related needs, since such models are more efficient in terms of both energy and water required; and limiting the kinds of AI usage to those that in themselves maximize benefits for the greatest number of people (think of AI for medical research v. AI summaries of Zoom meetings, or AI generation of images just for fun).

Common good consideration of data center location & water

The common good lens focuses on the conditions required for an entire community to thrive. In looking through this lens, a key question is how to define the community impacted. Is it the neighborhood around the data center? The city or county in which a data center is located? the state of California? The United States?

In answering this, environmental justice highlights the needs and interests of the communities in immediate proximity to data centers.

Note that research about water access, as well as about climate change and other key issues inherent to the common good, itself also requires AI.

Given the uneven availability of drinking water, even in areas where it's plentiful, this lens might suggest that data processing for the common good should take precedence. And it might prompt a related question—whether some uses should be delayed until data centers become more sustainable.

But there are broader questions, too—for example, whether prioritizing the common good would require prioritizing water use for ecological restoration projects over its use for data center needs.

Even more broadly, communities considering tax breaks for data center development might consider whether other projects might deserve such tax breaks instead,[10] given their common good impact.

Virtue ethics consideration of data center location & water

In looking at the issue of locating data centers in or near communities that are vulnerable or are seeing water bills rise because of the development of massive data centers, several virtues come into play: fairness, compassion, and empathy, for example, as well as creativity, prudence, and humility (on the part of technology developers, builders, and government officials).

Virtue ethics also looks for exemplars—in this case, people or organizations that might be fulfilling their roles in ways that should be encouraged and emulated. Although many tech companies' sustainability reports mention research and deployment of more water-efficient and energy-efficient solutions, the lack of data provided makes it more difficult to assess those claims.

In this context, more disclosure would allow community members, customers, regulators, and others to assess exemplars of information disclosure that would enable better analysis and technical, policy, and regulatory developments; exemplars of positive interactions and listening

10 One recent report from the University of Michigan's Science, Technology, and Public Policy program at the Gerald R. Ford School of Public Policy, for example, notes that "[t]he high energy consumption and environmental impact of data centers can strain local infrastructure and undermine climate goals. Redirecting public resources toward initiatives with more substantial and equitable economic returns, such as education, workforce development, or renewable energy, offers a more responsible and effective use of taxpayer dollars" [60, 61].

and responding to input from impacted communities (in the case of local governments,[11] for example); exemplars of educational efforts about data-center-related environmental issues (especially in directly impacted communities); or exemplars of advocacy efforts on behalf of technical solutions that better support environmental goals.[12]

Care ethics consideration of data center location & water

Among other considerations, care ethics focuses greatly on the ethical valence of relationships and on the relevance of embodiment.

The data centers are not clouds but giant buildings (and now tents, too), embodied in themselves. And as noted throughout this report, the AI being developed and used doesn't impact only brains and social structures, but bodies and the physical environment, too. Care ethics highlights, for example, the public health impact of data center development and operation.

In the context of data centers and in particular of the implications of their water use, some key relationships are those between local government representatives and their constituents (in particular those constituents who are part of vulnerable communities); between companies building and/or operating data centers and the communities in which those centers are located; between companies developing AI products and the communities in which they operate; among individuals and companies working on developing more efficient AI models, chips, and data centers, and the residents of communities who would most directly benefit from such developments; and between all of us who rely on data centers (for our various digital interactions and as the repositories of our digital lives) and the people living in communities whose water access is negatively impacted by the data centers.

The care ethics perspective prompts governments, companies, communities, and individuals to help create a culture that considers more holistically the needs, benefits, and harms of various stakeholders. As part of that, if those in positions of power (developers who design technologies, corporations that deploy them, government agencies that regulate them, etc.) listen, first, to the input of those who would be most directly negatively impacted, such input may well guide better decision-making and innovations to mitigate the negative impacts while optimizing for the positive ones.

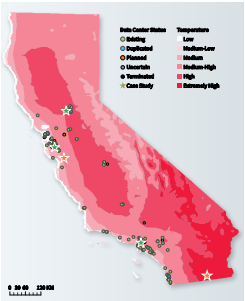
11 According to an NPR report, one city in Missouri, for example, "enacted regulations requiring data center developers to notify residents who live near the facility of its construction, limit noise produced by the structures to 60 decibels and hold meetings with the community about the project" [65].

12 See, for example, the nonprofit Climate Change AI [66].

APPENDIX B

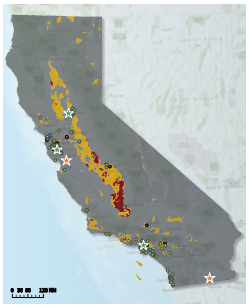
Methodology for Developing Social Vulnerability and Water Scarcity Indices: The main factors used in the calculation of the Social Vulnerability Index were SB535's Disadvantaged Communities classification and CES4's Poverty (each accounting for 40% of the calculation), while access to water systems was given a weight of 20%. For the Water Scarcity Index, the primary criteria, which accounted for 75% of the calculation, consisted of the average maximum temperatures and average annual precipitation. Both temperature and precipitation were given equal weight within the primary criteria. The secondary criteria, which accounts for 25% of the index consists of the 5 data layers from the Water Shortage Vulnerability Assessment (Temperature Shift by 20250, Chronic Declining Water Levels, Overdraft Basin, Groundwater Quality Risk, Consecutive Dry Years), which were all weighted equally within this secondary criteria.

Average Maximum July Temperature (°C) (1996 - 2016)



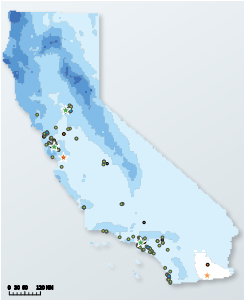
< 10 °C	0	Extremely Low
10 °C - 16 °C	1	Low
16 °C - 22 °C	2	Low-Medium
22 °C - 28 °C	3	Medium
28 °C- 34 °C	4	Medium-High
34 °C - 40 °C	5	High
> 40 °C	6	Extremely High

Chronic Declining Water Levels (2003 - 2024)



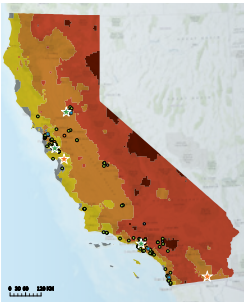
0 (groundwater level increase or no change)	1
0.75 (groundwater level decrease up to 2.5 ft)	3
1 (groundwater level decrease greater than 2.5 ft)	5

Average Annual Precipitation (1981 - 2024) (mm/yr)



0mm/yr - 100mm/yr	6	Extremely Low
100mm/yr - 500mm/yr	5	Low
500mm/yr - 1000mm/yr	4	Low-Medium
1000mm/yr - 1500mm/yr	3	Medium
1500mm/yr - 2000mm/yr	2	Medium-High
2000mm/yr - 2500mm/yr	1	High
> 2500mm/yr	0	Extremely High

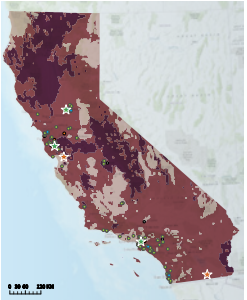
Temperature Shift by 2050 (scaled Range [0-1])



<= 0.2	1.00	Low
<= 0.4	2.00	Medium-Low
<= 0.6	3.00	Medium
<= 0.8	4.00	Medium-High
<= 1	5.00	High

"Rescaled to 0-1 using min/max/range, where a higher temperature increase is closer to 1 and a lower temperature increase is closer to 0"

Consecuritve Dry Years (5 years) Range [0-1]

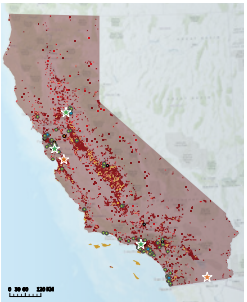


<= 0.2	1.00	Low
<= 0.4	2.00	Medium- Low
<= 0.6	3.00	Medium
<= 0.8	4.00	Medium-High
<= 1	5.00	High

"0.0 = Local precipitation was above 70 percent of average precipitation.

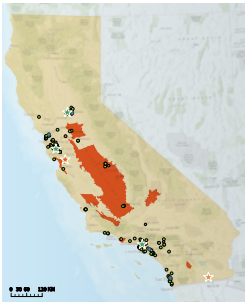
1.00 = Presence of dry local conditions; local precipitation was less than 70 percent of average precipitation."

Groundwater Quality Risk



0 (Low risk)	1
0.5 (Medium risk)	3
1 (High risk)	5

Overdraft Basin



0 (No)	2
1 (Yes)	4

SB535 Disadvantaged communities	
Outside	na
Inside	4

CES4 Poverty Percentile	
Less than 50	1
50-70	2
70-80	3
80-90	4
90-100	5

Water systems (population served)	
More than 1,000,000	1
More than 500,000	2
100,000	3
50,000	4
Less than 50,000	5

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