Sustainability Roadmap 2018-2019:

Climate Change Adaptation

Progress Report and Plan for Meeting the Governor's Sustainability Goals for California State Agencies

California Department of Technology

Edmund G. Brown Jr., Governor

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California Department of Technology Sustainability Road Map 2018-2019: Climate Change Adaptation

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Acronyms

AB	Assembly Bill
EHT	Extreme Heat Threshold
EO	Executive Order
GCM	Global Circulation Model
GHG	Greenhouse Gas
RCP	Representative Concentration Pathway
SB	Senate Bill

EXECUTIVE SUMMARY

The California Department of Technology (CDT) Gold Camp Data Center provides information technology services to many state, county, federal and local government entities throughout California. Through the use of a scalable, reliable and secure statewide network, combined with expertise in voice and data technologies, CDT delivers comprehensive, cost-effective computing, networking, electronic messaging, and training solutions to benefit the people of California.

As power consumption, and the resulting Green House Gas (GHG) emissions from computer rooms and IT equipment continue to increase at a time when the power production industry is in a fundamental state of change, striving towards sustainability continues to be a challenge for all departments and their facilities. As the state's Information Technology (IT) leader, CDT continues to lead efforts to reduce total state department IT energy equipment use by at least 20 percent, as required by Assembly Bill 2408 (Smyth and Huber, Chapter 404, Statutes of 2010). To meet required energy reductions, many state departments consolidated their IT equipment into CDT's ENERGY STAR® rated data center, including equipment from two of CDT's data centers, which were decommissioned in 2010. Although energy, water, and GHG emissions increased at CDT's state-owned data center as a result of these consolidation efforts, departmental totals from data center operations were significantly reduced.

CDT has implemented significant energy and water efficiency strategies at its mission-critical, LEED Gold and ENERGY STAR® rated data center in Rancho Cordova. These strategies included site-wide power, lighting, and computer room equipment mechanical upgrades and real-time cooling tower control and monitoring equipment installation. This strategic implementation reduced energy use at the data center by 1.7 million kilowatt-hours annually, equal to the energy used by 91 homes, and saves over a million gallons of water per year. Energy and water improvement initiatives currently underway include server virtualization through cloud computing, improved computer room cooling efficiencies, replacement of cooling towers with more water-efficient models, LED lighting replacement, electric vehicle charging station installation, and a 1 megawatt solar panel installation in the parking lot.

Executive Order B-30-15 has declared climate change to be a threat to the well-being, public health, natural resources, economy, and environment of California. For the CDT and its mission critical data center, climate change certainly has an effect. A future increase in average maximum temperatures will negatively affect Power Usage Effectiveness (PUE), water usage, power usage, and reduce overall cooling performance. It is anticipated this will not impact the structural integrity or staff/occupant health and safety of the Gold Camp Data Center. An increase in extreme heat will, however, affect the useful life of the cooling and backup power generation equipment. Some strategies in the pipeline to reduce the impact of temperature change include: installation of a cool roof, re-designed landscaping, installation of solar canopies, and HVAC equipment replacement. As we move towards the end of the century, where average temperature is expected to rise significantly, CDT will adapt and upgrade equipment as needed to remain operational.

A change in precipitation due the expected future drought conditions would require CDT to use less water that would result in the diminished lifespan of the facility's cooling equipment. Some strategies to reduce the impact of unpredictable precipitation would include: recapturing grey water from cooling towers and replacing the current open cooling system with a close looped system to conserve water resources. The CDT data center would adapt and upgrade infrastructure as needed to remain operational or consider relocation.

Based on the information, the facility would not be at risk and no immediate action would be required to mitigate the situation. As of now, CDT has no plans of relocating or having

additional facilities located in high risk coastal zones. Natural infrastructure is being considered in the form of rainwater catchment and landscape planting.

Potential impacts of the CDT data center facility on communities would be minor as the facility is not located in a disadvantaged community nor located in an urban heat island.

Any climate risks in new/planned facilities would result in CDT a replacement of the Rancho Cordova data center, possibly in the Roseville/Rocklin area. For a new data center, the changes in climate conditions would result in the following changes in design philosophy, construction, and operations; mechanical cooling/heating would target the higher annual maximum predicated temperature, increased annual minimum temperature would have a neutral impact to a new design, increased frequency of drought conditions and reductions in available potable water would necessitate a 100% close loop and direct expansion cooling system, design would take into account anticipated extreme heat events, but it is not expected to impact operations.

The CDT data center is not actively seeking a new facility, but would consider a natural infrastructure. All future infrastructure and investments will incorporate full life-cycle cost accounting methodology and other non-fiscal intangible benefits will be considered as well.

Amy Tong
Director

SUSTAINABILITY GOALS

The Governor has directed California State Agencies to demonstrate sustainable operations and to lead the way by implementing sustainability policies set by the state. Sustainability includes the following general initiatives:

- Greenhouse Gas Emissions Reductions
- Climate Change Adaptation
- Building Energy Efficiency and Conservation
- Indoor Environmental Quality (IEQ)
- Water Efficiency and Conservation
- Monitoring Based Building Commissioning (MBCx)
- Environmentally Preferable Purchasing (EPP)
- Financing for Sustainability
- Zero Emission Vehicle (ZEV) Fleet Purchases
- Electric Vehicle Charging Infrastructure
- Monitoring and Executive Oversight

The Governor has issued numerous executive orders directing sustainable state operations. The order relevant to climate adaptation is:

Executive Order B-30-15

EO B-30-15 declared climate change to be a threat to the well-being, public health, natural resources, economy, and environment of California. It established a new interim statewide greenhouse gas emission reduction target of 40 percent below 1990 levels by 2030, and reaffirms California's intent to reduce greenhouse gas emissions by 80 percent below 1990 levels by 2050. To support these goals, this order requires numerous state agencies to develop plans and programs to reduce emissions. It also directs state agencies to take climate change into account in their planning and investment decisions and employ life-cycle cost accounting to evaluate and compare infrastructure investments and alternatives. State agencies are directed to prioritize investments that both build climate preparedness and reduce GHG emissions, prioritize natural infrastructure, and protect the state's most vulnerable populations.

Legislative Direction

Several pieces of legislation were signed in 2015-16 that codified several elements of the EO. These include the following:

- Assembly Bill (AB) 1482 (Gordon, 2015): Requires that the California Natural Resources Agency (CNRA) update the State's adaptation strategy, Safeguarding California, every three years. Directs State agencies to promote climate adaptation in planning decisions

and ensure that state investments consider climate change impacts, as well as the use of natural systems and natural infrastructure. (Public Resources Code Section 71153)

- Senate Bill (SB) 246 (Wieckowski, 2015): Established the Integrated Climate Adaptation and Resiliency Program within the Governor's Office of Planning and Research to coordinate regional and local efforts with state climate adaptation strategies to adapt to the impacts of climate change. (Public Resources Code Section 71354)
- SB 2800 (Quirk, 2016): Requires State agencies to take the current and future impacts of climate change into planning, designing, building, operating, maintaining, and investing in state infrastructure. CNRA will establish a Climate-Safe Infrastructure Working Group to determine how to integrate climate change impacts into state infrastructure engineering. (Public Resources Code Section 71155)

State Resources and Guidance Documents

California has invested significant resources in understanding the risks of climate change to the State and actions available to respond to and reduce these risks. These include the following:

- **Safeguarding California**: The State's climate adaptation strategy organized by sector. Each sector identifies risks from climate change and actions to reduce those risks.
- **Safeguarding California Implementation Action Plans**: Directed under EO B-30-15, the Implementation Action Plans outline the steps that will be taken in each sector to reduce risks from climate change.
- **Building a Resilient California**: Prepared under direction of EO B-30-15, this document provides a framework for State agencies to integrate climate change into planning and investment, including guidance on data selection and analytical approach.
- **California's Climate Change Assessments**: California has completed three comprehensive assessments of climate change impacts on California. Each assessment has included development of projections of climate impacts on scale that is relevant to State planning (i.e., downscaled climate projections). These data are available through Cal-Adapt, an online data visualization and access tool.

CLIMATE CHANGE ADAPTATION

Executive Order B-30-15 directs State Agencies to integrate climate change into all planning and investment. Planning and investment can include the following:

- Infrastructure and capital outlay projects
- Grants,
- Development of strategic and functional plans,
- Permitting,
- Purchasing and procurement,
- Guidance development,
- Regulatory activity,
- Outreach, and education.

This template will focus on the first three of these activities, and follows the guidance created by the Technical Advisory Group developed under EO B-30-15 to assist State Agencies to complete this task.

Climate Change Risks to Facilities

For all infrastructure, it is important to assess the risk that a changing climate poses to an asset or project (e.g., sea level rise or increasing daily temperatures). It is also important to recognize the impact that an infrastructure project has the surrounding community and the impacts on individual and community resilience (e.g., heat island impacts).

To determine how to consider climate change for a given project or plan or existing infrastructure, this department will consider the following screening questions.

1. What is the lifetime of the facility, planned project or plan?
2. Could it be affected by changing average climate conditions or increases in extreme events over its lifetime?
3. What is the consequence of that disruption? Increase cost and energy usage
4. Will that disruption affect vulnerable populations, critical natural systems, critical infrastructure, or other assets?
5. Will that disruption cause irreversible effects or pose an unacceptable risk to public health and safety?

CDT has used the assumption that the current state owned data center will have an additional 25 years of effective use. CDT's rolling 15 year infrastructure plan will continue to consider climate adaptation throughout the full lifespan of the data center. While the current role as a primary state data center may not last this expected duration, some hosting of legacy systems and networking equipment is anticipated over remaining facility lifespan. The general increase in expected temperatures will require an intelligent plan of mechanical and electrical equipment replacement to maximize efficiency (keeping increases in utility costs to a minimum) and preventing state wide data processing outages due to facility equipment failure.

To date, original infrastructure equipment has been replaced with equipment that can operate in higher temperature ranges while offering the same or greater capacity for data center support. While the choice of more efficient equipment has been prioritized, the desire for energy savings has been balanced with the selection of equipment that has an extended operating safety margin. This margin ensures that anticipated worse case temperature

conditions over the next 25 years will not cause catastrophic equipment failure. CDT believes the approach taken to date will leave the department well prepared for expected climate change events

Understanding Climate Risk to Existing Facilities

Risk from Increasing Temperatures

Under a changing climate, temperatures are expected to increase – both at the high and low end. As a result, facilities will experience higher maximum temperatures and increased minimum temperatures.

Table 1: Top 5 Facilities Most Affected by Changing Temperature

Facility Name	Annual Mean Maximum Temperature (1961 – 1990)	Annual Mean Maximum Temperature (2031 – 2060)	Annual Mean Max T (2070-2099)	Annual Mean Minimum Temperature (1961 – 1990)	Annual Mean Minimum Temperature (2031 – 2060)	Annual Mean Min T (2070-2099
CDT Gold Camp Data Center	74.35	79.37	83.12	49.59	53.94	57.81

In addition to changing average temperatures, climate change will increase the number of extreme heat events across the State. Extreme events are likely to be experienced sooner than changes in average temperatures.

Table 2: Five Facilities that Will Experience the Largest Increase in Extreme Heat Events

Facility Name	Extreme heat threshold (EHT)	Average number of days above EHT (1961-1990)	Average number of days above EHT (2031-2060)	Increase in number of days above EHT by mid-century	Avg. # days above EHT (2070-2099)	Increase in Avg. # days above EHT by end of century
CDT Gold Camp Data Center	103.92	4.3	17.3	13	29	24.7

- There is a definite sensitivity of operations to change in temperature. An increase in mean maximum temperature would increase PUE, water usage, power usage and reduce overall cooling performance. There is no anticipated impact to facility structural integrity or occupant health and safety. An increase in extreme heat events would affect useful life of the Data Center's cooling equipment. There would be no risk to structural integrity or occupant health and safety. The facility can operate independently, using on-site diesel generators for an extended period of time in the event of a utility failure.
- To reduce the impact of changing temperatures, the Department will be installing a cool roof and will consider landscaping options. In addition, the installation of the solar canopies will provide added square footage of shade to the facility parking lot. There is a strategy in place to replace HVAC equipment to a more efficient and effective system. Additionally, the Department utilizes an employee awareness campaign to make employees aware of changes to the buildings during temperature changes. Based on the rolling 15 year plan, climate

adaptation will be considered for mechanical equipment, but in the event of potential catastrophic failure, a planned shutdown and replacement of the data center facility will be implemented.

Risks from Changes in Precipitation

Table 3: Facilities that Will be Most Impacted by Projected Changes in Precipitation (inches)

Facility Name	Annual Mean Maximum Precipitation (1961 – 1990)	Annual Mean Precipitation (2031 – 2060)	Percent Change by mid-century	Annual Mean Precipitation (2070 – 2099)	Percent change by end of century
CDT Gold Camp Data Center	20.118	23.093	14.787	24.46	21.583

- Although the provided spreadsheet shows increases in annual precipitation, CDT bases planning on climate models that show extended future drought conditions. If extended drought conditions require the facility to use less water, the lifespan and reliability of the cooling equipment would diminish.
- To reduce the impact of facility performance due to changing precipitation, the Department has planned the following strategies:
    - Recapture cooling tower grey water in the event of drought conditions.
    - Replace open cooling systems with close looped systems to conserve water resources.

Risks from Sea Level Rise

Increasing global temperatures are contributing to rising sea levels. Rising sea levels will result in inundation of coastal areas and increased flooding due to storm surges. The California Ocean Protection Council (OPC) has issued guidance for State agencies on what level of sea level rise to consider. The Guidance document provides the following estimates of sea level rise for the California Coast, which are based on a study by the National Academy of Sciences:

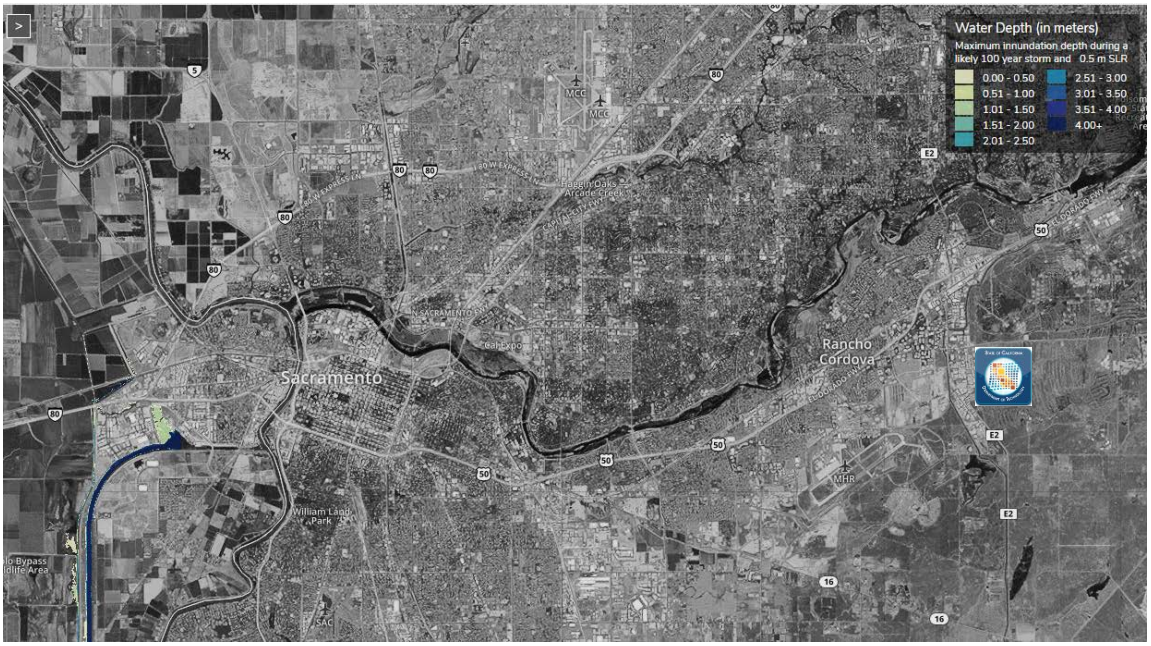
Table 4. Estimates of sea levels for the California Coast

Time Period	North of Cape Mendocino	South of Cape Mendocino
2000 - 2030	-4 to 23 cm (-0.13 to 0.75 ft)	4 to 30 cm (0.13 to 0.98 ft)
2000 – 2050	-3 to 48 cm (-0.1 to 1.57 ft)	12 to 61 cm (0.39 to 2.0 ft)
2000 – 2100	10 to 143 cm (0.3 to 4.69 ft)	42 to 167 cm (1.38 to 5.48 ft)

An accompanying OPC resolution recommends that departments base analyses on estimates of sea level rise in the upper two-thirds of the range.

Time Period	South of Cape Mendocino
2000 - 2030	4 to 30 cm (0.13 to 0.98 ft)

Figure 1 . Sea level rise scenario of 0.5 meters for Sacramento area.



Time Period	South of Cape Mendocino
2000 – 2050	12 to 61 cm (0.39 to 2.0 ft)

Figure 2. Sea level rise scenario of 1.0 meters for Sacramento area.

Time Period	South of Cape Mendocino
2000 – 2100	42 to 167 cm (1.38 to 5.48 ft)

Figure 3. Sea level rise scenario of 1.4 meters for Sacramento area

The sea level time periods specified from table 4 are represented in Figure 1, Figure 2, and Figure 3. All three time periods show minimal impact due to rising sea levels to the Rancho Cordova area, where CDT's Gold Camp Data Center facility is located. Due to the minimal impact, the facility would not be at risk and no immediate action would be required to mitigate the situation. As of now, CDT has no plans of relocating or having additional facilities located in high risk coastal zones. (Source: http://beta.cal-adapt.org/tools/slr-calflod-3d/)

Table 4: Facilities at Risk From Rising Sea Levels

Natural Infrastructure to Protect Existing Facilities

EO B-30-15 directs State agencies to prioritize the use of natural and green infrastructure solutions. Natural infrastructure is the "preservation or restoration of ecological systems or the utilization of engineered systems that use ecological processes to increase resiliency to climate change, manage other environmental hazards, or both. This may include, but need not be limited to, flood plain and wetlands restoration or preservation, combining levees with restored natural systems to reduce flood risk, and urban tree planting to mitigate high heat days" (Public Resource Code Section 71154(c)(3)).

Due to the minimal rise of sea levels, the Department is not investing to employ a natural infrastructure. However, CDT will continue to monitor the situation and will reevaluate when deemed necessary.

Understanding the Potential Impacts of Facilities on Communities

Vulnerable Populations

Certain populations are more susceptible to the effects of changing climate conditions, and will have less capacity to recover from changing average conditions and more frequent and severe extreme events. A number of factors contribute to vulnerability, often in overlapping and synergistic ways. These can include a number of social and economic factors, and be determined by existing environmental, cultural, and institutional arrangements. Vulnerable populations can include, but are not limited to, people living in poverty; people with underlying health conditions; incarnated populations; linguistically or socially isolated individuals; communities with less access to healthcare or educational resources; or communities that have suffered historic exclusion or neglect.

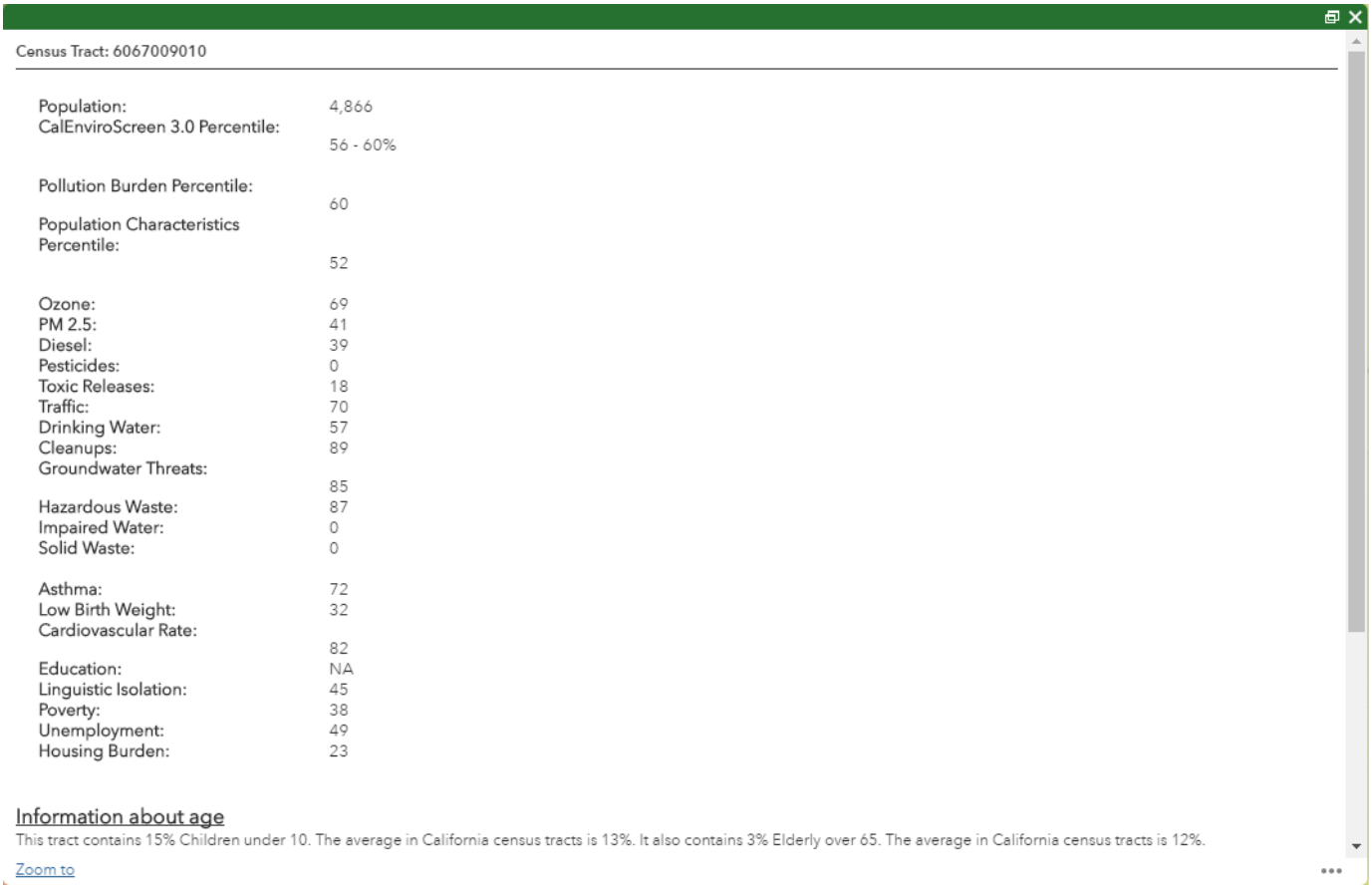
The Department of Technology does not reside in a disadvantaged community and does not interact with the local community.

Disadvantaged Communities

California is required to invest resources in disadvantaged communities (DACs). DACs are identified using CalEnviroScreeen, a tool that ranks census tracts based on a combination social, economic, and environmental factors. While it does not capture all aspects of climate vulnerability, it is one tool that is available, and does include several relevant characteristics. In many cases, disadvantaged communities are more likely to suffer damage under changing climate conditions, including extreme events. The department's facilities located in these communities can contribute or alleviate the vulnerability of these communities.

Table 5: Facilities located in disadvantaged communities

Facility Name	CalEnviroScreen Score	Is it located in a disadvantaged community? Yes/No
CDT Gold Camp Data Center	56-60	No

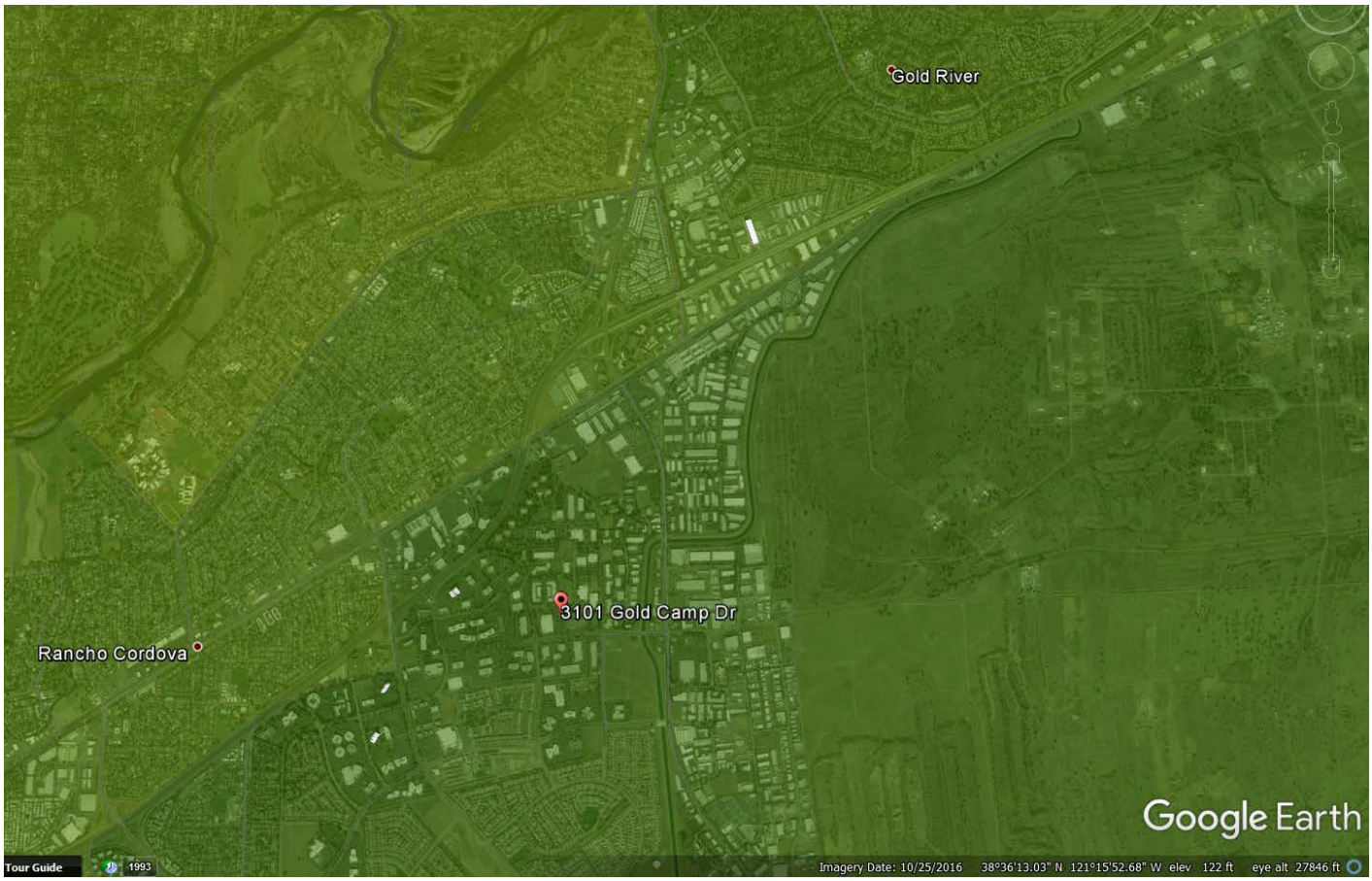


Urban Heat Islands

Urban heat islands are areas with localized spikes in temperature, which impact human health, increase pollution, and increase energy demand. Urban heat islands occur during the hot summer months in areas with higher percentages of impervious surface and less vegetation. This is likely in areas with large parking lots, dense development, and lower tree density and shading. Urban heat islands can be mitigated (i.e., reduced) through tree planting and other greening measures, cool roofs (e.g., lighter roofing materials that reflect light), cooler pavements, and other measures.

Table 6: Facilities Located in Urban Heat Islands

Facility Name	Located in an urban heat island (yes/no)
CDT Gold Camp Data Center	No


Gold River
3101 Gold Camp Dr
Rancho Cordova
Tour Guide
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Google Earth
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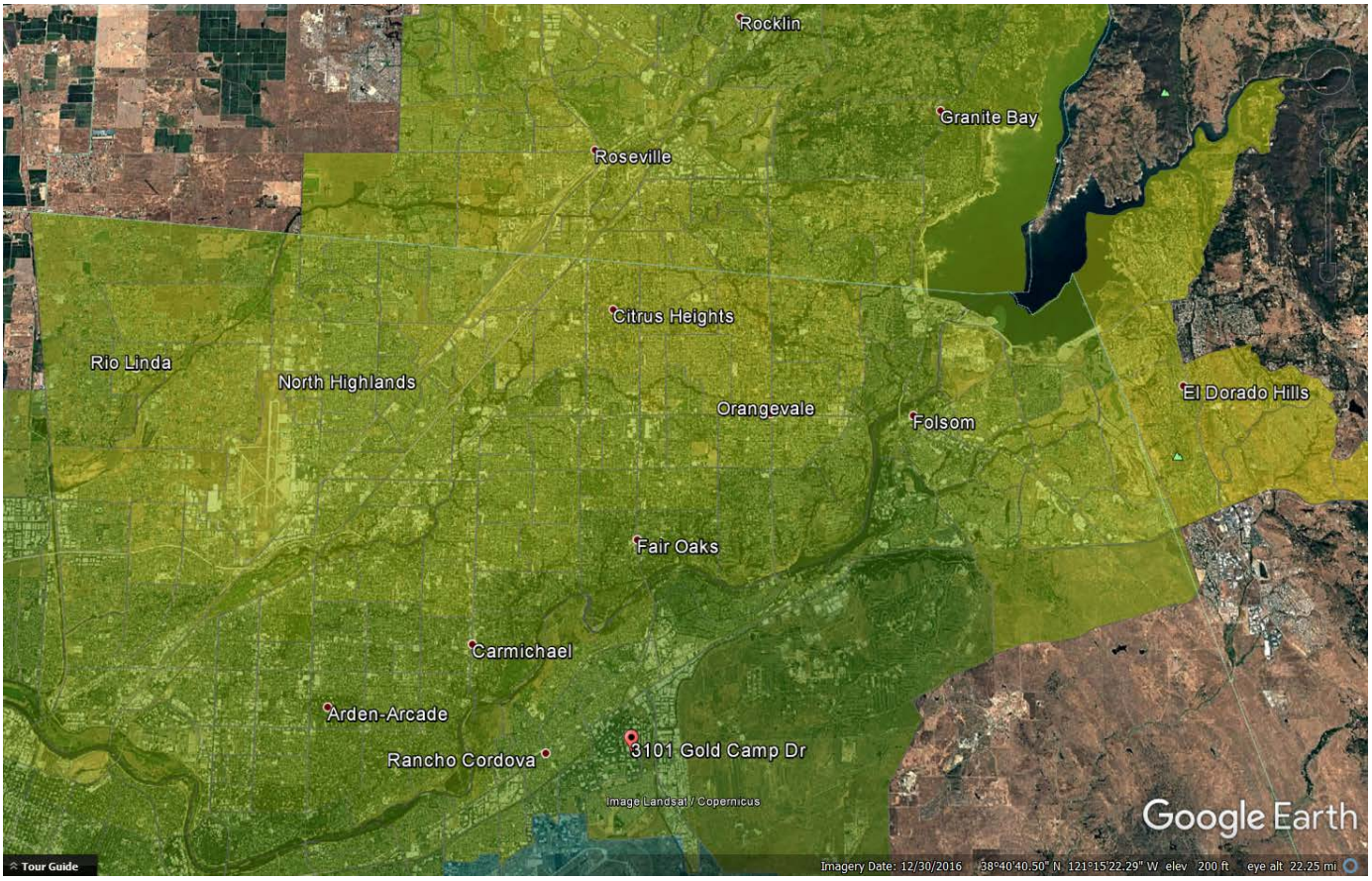

Rocklin
Granite Bay
Roseville
Citrus Heights
Rio Linda
North Highlands
Orangevale
Folsom
El Dorado Hills
Fair Oaks
Carmichael
Arden-Arcade
Rancho Cordova
3101 Gold Camp Dr
Image Landsat / Copernicus
Tour Guide
Google Earth
Imagery Date: 12/30/2016 38°40'40.50" N 121°15'22.29" W elev 200 ft eye alt 22.25 mi

- CDT has a large employee parking lot, however, to reduce the facility's contribution to the urban heat island, CDT will be installing solar canopies to provide additional shade to the facility parking lot. In addition, the Department will be installing a cool roof and will consider landscaping options. While the Department does not reside in an urban heat island, but CDT will continue to monitor the situation and will reevaluate when deemed necessary.

Understanding Climate Risk to Planned Facilities

Table 7: Climate Risks to New Facilities

Facility Name	Annual Mean Maximum Temperature (1961 – 1990)	Annual Mean Maximum Temperature (2031 – 2060)	Annual Mean Minimum Temperature (1961 – 1990)	Annual Mean Minimum Temperature (2031 – 2060)	Annual Mean Maximum Precipitation (1961 – 1990)	Annual Mean Precipitation (2031 – 2060)
New CDT Gold Camp Data Center	74.35	79.37	49.59	53.94	20.118	23.093

Table 8: Extreme Heat Events and New Facilities

Facility Name	Extreme heat threshold (EHT)	Average number of days above EHT (1961-1990)	Average number of days above EHT (2031-2060)	Increase in number of days above EHT
New Gold Camp Data Center	103.92	4.3	17.3	14

For the Sustainability Roadmap exercise the assumption is that for a replacement facility for Gold Camp, CDT would look to remain in the Rancho Cordova area. As an alternative location the Roseville/Rocklin area might be considered as a suitable replacement site.

For a new data center in Rancho Cordova the changing conditions brought about by climate change would result in the following changes to the design philosophy, construction, and operation:

Increased annual mean maximum temperature:

The mechanical cooling and heating design would target the higher annual maximum predicated temperature. In general the rooftop units would be slightly less efficient in terms of electrical consumption versus targeting a lower annual temperatures. This is primarily due to the need for larger air handler cooling coils needed to exchange water or refrigerant utilized for closed loop cooling systems. Also if open loop cooling towers are specified, higher horsepower motors and more surface area for heat exchange would be needed for practical chilled water loop heat exchange.

Increased annual mean minimal temperature

The increased annual minimal temperature would have a neutral impact to the design of the new data center. With the predicated higher minimal temperatures there would be less opportunity for the use of free cooling in a traditional water side plate and frame economizer. In its place an air side economizer or wind wall would be used to bring in outside air for computer room cooling. For heating, the higher minimum temperature would result in less natural gas or electrical use for office and make up air heating.

Increase in duration of drought conditions.

It is inevitable that the anticipated increase in the number of years of drought conditions and the resulting decrease in precipitation for the new site location would result in a facility designed to utilize 100% closed loop and direct expansion cooling for the computer room and office. Continuing to use the current style of cooling towers which use evaporation and require the flushing of tower water due to silica concentrations is unsustainable for the environment in light of predicated future drought conditions

It is unknown at this time if technology advances will result in DX cooling equaling the efficiency of open loops cooling towers with water cooled chillers, however for now the assumption is they will not. As a result the challenge for the new location will be to operate with a low PUE in the range of 1.2 to 1.3.

Increase in Extreme Heat Events

The design of the facility will take into account the anticipated extreme heat events they are not expected to impact Operations. As stated above the data center will not be as efficient as it could have been, with less anticipated days, as engineers must use a worst case prediction model for HVAC design. More research of climate models would be needed to determine the actual maximum temperatures anticipated for heat events to predict the total loss of cooling efficiency for the facility.

Natural Infrastructure

EO B-30-15 also directs agencies to prioritize natural and green infrastructure solutions. Natural infrastructure is the “preservation or restoration of ecological systems or the utilization of engineered systems that use ecological processes to increase resiliency to climate change, manage other environmental hazards, or both. This may include, but need not be limited to, flood plain and wetlands restoration or preservation, combining levees with restored natural systems to reduce flood risk, and urban tree planting to mitigate high heat days” (Public Resource Code Section 71154(c)(3)).

The department is not actively seeking a new facility or relocation, but would consider natural infrastructure.

Full Life Cycle Cost Accounting

EO B-30-15 directs State agencies to employ full life cycle cost accounting in all infrastructure investment. Lifecycle cost accounting includes:

- Considering initial investment costs, as well as lifetime operation and maintenance costs under changing climate conditions, including changing average conditions and increases in extreme events.
- Applying non-market evaluation methods such as travel cost, avoided costs or contingent valuation to capture hard to quantify benefits and costs

All future infrastructure investments will incorporate full life cycle cost accounting methodology. Other non-fiscal intangible benefits will be considered as well.

Integrating Climate Change into Department Planning and Funding Programs

Table 10: Integration of Climate Change into Department Planning

Plan	Have you integrated climate?	If no, when will it be integrated?	If yes, how has it been integrated?
CDT Gold Camp Data Center	Yes	Climate Change currently integrated into Department 15-year Planning timeline	Department uses full LCCA planning for current facility equipment replacement, maintenance and operations, and future facility design and operation. The current facility has been designed and has operational procedures in place to be able to adapt to climate change while continuing to meet its required mission critical role.

Developed a weighted decision making matrix

Table 11: Engagement and Planning Processes

Plan	Does this plan consider impacts on vulnerable populations?	Does this plan include coordination with local and regional agencies?	Does this plan prioritize natural and green infrastructure?
CDT Gold Camp Data Center	N/A	Yes	Unknown

Table 12: Climate Change in Funding Programs

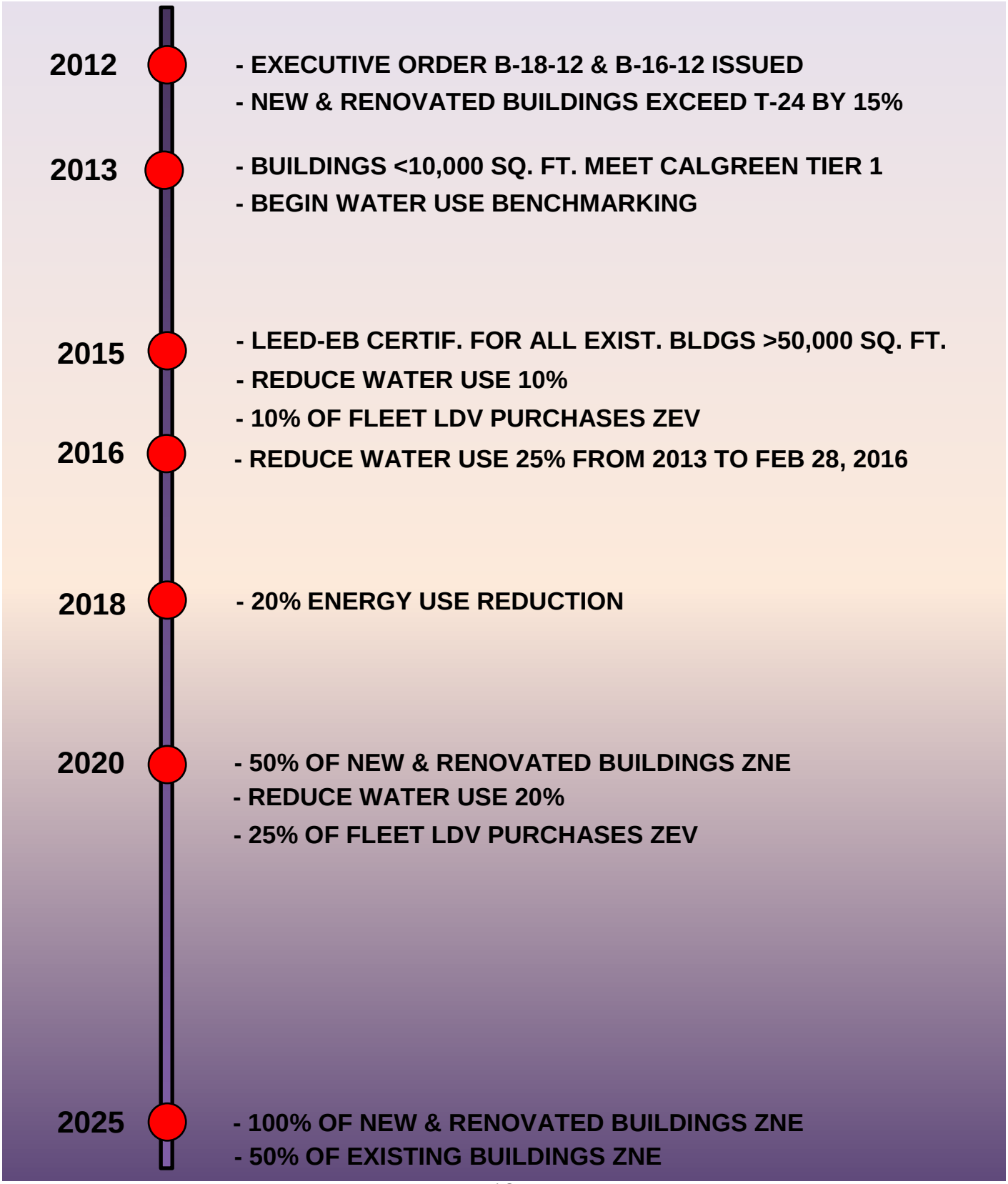
Grant or funding program	Have you integrated climate change into program guidelines?	If no, when will it be integrated?	Does this plan consider impacts on vulnerable populations?	Does this program include coordination with local and regional agencies?
Revolving fund	Yes	Integrated into current departmental plans	N/A	N/A

Measuring and Tracking Progress

The increase in average mean temperature will have the largest impact to our current facility and plans. As temperature increases total building efficiency is reduced and fixed facility costs as a percentage of the total rates charged to customers will increase. CDT closely tracks all metrics of building energy use and overall efficiency using industry standard metrics such as Power Usage Effectiveness (PUE) and ASHRAE 90.4 2016 Energy Standards for Data Centers.

- Continued investments in monitoring tools for the accurate measurement of energy and water use. There is full accounting of energy efficiency measure costs, savings, and environmental impact.
- The Department forecasts the facility's cost as far into the future as possible to determine impact to customer rates and funding sources.
- The Office of Administration is developing a policy to integrate climate change into all infrastructure investment. Additionally, continued use of the rolling 15 year infrastructure plan will be utilized for investment prioritization and advanced customer rate planning. The Department forecasts facility's cost as far into the future as possible to determine impact to customer rates and funding sources.

SUSTAINABILITY MILESTONES & TIMELINE



DEPARTMENT STAKEHOLDERS

Understanding Climate Risk at Existing Facilities	
Facility and Administrative Services Branch	Mark Standley, Facility and Administrative Service Branch Manager Ian Noumov, Senior Information Systems Analyst Sarah Do, Sustainability Coordinator

Understanding Climate Risk at Planned Facilities	
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Integrating Climate Change into Department Planning and Funding Programs	
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Measuring and Tracking Progress	
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