CHAPTER ONE
CLIMATE CHANGE ADAPTATION

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The State of California has determined that the effects of climate change including shifts in seasons, increasing temperatures, changes in precipitation levels and rising sea levels is a serious challenge facing California and has enacted executive orders and legislation aimed at addressing the challenge. A significant number of CDCR facilities are located in climate zones that experience extreme heat or cold in summer and winter months and an equally significant number are located in remote locations that may suffer from extreme rain events, wildfires, depletion of local water supplies, or similar climate-related concerns. In recognition of CDCR's vast footprint, the Department became an innovator in sustainability to alleviate both the adverse effects of a changing climate on the operations of CDCR but also to establish a leadership position in environmental stewardship. One of its earliest efforts was to install solar arrays at one of its prisons in 2006 to reduce carbon emissions, a prototype installation to test and later install at many more sites. By 2008, CDCR created a section within the Division of Facility Planning, Construction and Management (FPCM) dedicated to its growing renewable energy and sustainability program. This section, together with other key stakeholders has worked to implement substantial changes to CDCR operations and has and will continue to identify the potential effects of climate change and pursue efforts to prevent or mitigate them.

FIRST CALIFORNIA STATE AGENCY
To measure carbon emissions in partnership with the Carbon Footprint Registry

The Department has already incorporated climate action planning into its required *Annual Master Plan* and *Five-Year Infrastructure Plans* for the last several years.

In fact, beginning in 2007, CDCR undertook an ambitious effort as the first California State agency to measure its carbon emissions and report on these emissions in partnership with The Climate Registry. The Climate Registry was established in 2007 by states within the US and the Canadian provinces. In 2019, the Climate Registry's Voluntary Greenhouse Gas Reporting Program changed its name to the Carbon Footprint Registry. The Carbon Footprint Registry is governed by a Board of Directors comprised of senior officials from 41 US states, the District of Columbia, 13 Canadian provinces and territories, 6 Mexican states, and 4 native sovereign nations. The Carbon Footprint Registry is a nonprofit GHGe registry for North America that provides organizations with the tools to help them calculate, verify, report, and manage their GHGe in a publicly transparent and credible way. The information gathered from this analysis was used to guide the Department in various resource efficiency and emission reduction strategies since that time. Moving forward, the Department is considering third party verification

of its carbon emissions data to provide additional validity and understanding of CDCR's carbon footprint.
Over the past three years, CDCR has made significant progress on the preparation of an Environmental Impact Report (EIR) and 2030 Climate Action Plan (2030 CAP) that, when completed, will provide guidance in project-level impacts related to climate change for CDCR's facility portfolio and identify potential climate adaptation strategies that could be implemented to address these increased risks and improve the resilience of CDCR facilities and operations in the future. The 2030 CAP utilizes reference documents and measurement tools, including but not limited to the following: online Cal-Adapt tool, reference guides such as California Natural Resources Agency *Safeguarding California Plan* and associated Implementation Action Plans, California Environmental Protection Agency *Preparing California for Extreme Heat Guidelines and Recommendations,* and the California Coastal Commission Sea Level Rise Policy Guidance. It is CDCR's expectation that this 2030 CAP will eventually provide a blueprint by which CDCR can manage its climate risks and provide greater specificity and actionable strategies than are currently laid out in this Chapter of CDCR's Sustainability Plan. Additionally, when combined with CDCR's other ambitious efforts in sustainability; CDCR anticipates its 2030 CAP will help the Department continue to address the challenges and opportunities in improving its operations in an environmentally sustainable manner.

Executive Order (EO) 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
- Economic Analysis
- Development of Strategic and Functional Plans
- Permitting
- Purchasing and Procurement
- Guidance Development
- Regulatory Activity
- Outreach and Education

This chapter of the Sustainability Roadmap 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 on 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, plan, or existing infrastructure, the 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?
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?

The effects of climate change can be described in terms of primary exposure to various physical changes in the climate and environment caused by global climate change such as temperature, precipitation, and sea level rise, as well as stresses experienced by facilities as a result of these exposures (e.g., reduced water supply, impacts on structures from erosion and sea level rise, increased frequency and duration of heat waves). These vary considerably from region to region within California.

The application by CDCR of this screening process will depend upon the type of project planned. First, it is worth noting, new and renovation projects planned for CDCR follow the requirements of CALGREEN and, where appropriate, executive order initiatives for Leadership in Energy and Environmental Design[1] (LEED®) and Zero Net Energy (ZNE) construction. The Department also developed uniform standards and guidance documents for its project architects and engineers to ensure these initiatives were met. Its own Design and Construction Policy Guidelines outlines, among other things, requirements to consider and mitigate GHGe, improve energy and water efficiency, improve indoor air quality, implement on-site renewable generation, utilize environmentally preferable construction materials, and develop on-site electric vehicle charging stations. As of December 2019, CDCR has completed 69 LEED-certified facilities, has two LEED

1 USGBC® and LEED® are trademarks owned by the U.S. Green Building Council and are used with permission.

Silver projects in design phase and is in the construction phase of its first project specifically designed to achieve ZNE, Health Care Administration Building at Chuckawalla Valley State Prison. Projects designed to be LEED-certified and ZNE, by their very nature, will have features that will reduce both the project's carbon footprint and be more reflective of existing climate conditions that may restrict the design and/or include features that are more adaptive to the climate.

In the case of planning for a Capital Outlay Project, the need for these projects is identified in the Department's Five-Year Plan that is updated each year and submitted to the Department of Finance (along with Capital Outlay Budget Change Proposals [COBCPs}) for funding consideration. The planning process for each submittal and the COBCP document itself will incorporate a specific section that addresses the above questions. Most often, these projects will not include a newly constructed prison but rather smaller new or renovated structures on an existing prison site. However, when a new prison is required due to operational needs, CDCR will first evaluates the ability to build upon its existing footprint to minimize the impact of new construction on the environment. This has been the case over the last decade of construction by the Department. Additionally, all project impacts, including emissions, waste, and natural habitat impacts, are already studied as required by the California Environmental Quality Act (CEQA). In that endeavor, CDCR has preserved over 800 acres of wildlife breeding/foraging habitats and funded the restoration or creation of nearly 2,500 acres of natural habitat and farmland, resulting in over 3,300 acres to be held in perpetuity by natural resource agencies, land conservancies, or other reputable environmental stewardship organizations.

108 ENERGY EFFICIENCY PROJECTS
Have yielded a combined GHGe reduction of 69,891 metric tons per year

Other CDCR infrastructure projects are funded through an annual support appropriation to address critical repairs or in some cases, through utility rebates, grants, or loans.

CDCR maintains more discretion over these types of projects, but they still contain all or most of the above environmental components and will similarly ensure the climate screening questions outlined above are incorporated into its review process.

Beyond infrastructure repairs and capital improvements, CDCR's operations also include a number of other operational areas that have been impacted or could be impacted by the effects of climate change. CDCR's leased portfolio is located in communities throughout California and is managed by the Department of General Services (DGS). CDCR has encouraged DGS to identify new lease opportunities that meet the same sustainability goals as CDCR promotes for its State-owned portfolio and presumes that DGS will now include these climate screening criteria in new site searches on CDCR's behalf. Additionally, CDCR

manages an extensive fleet of 4,326 owned vehicles and 2,037 leased vehicles. The Department has worked with DGS to replace a portion of its fleet with Zero Emission Vehicles (ZEV), and has installed electric vehicle charging stations at five facility locations with many more planned over the next several years. CDCR has increased its use of renewable diesel by 52% since 2016. CDCR recycles and purchases recycled materials and other environmentally preferable products for use in its facilities.

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. Average temperatures in California have already increased 1.8 degrees Fahrenheit over the past century. Extreme heat days and nights as well as heat waves have become more frequent since 1950. While heat waves have been highly variable, nighttime heat waves have shown a significant increase since 1950 (CNRA 2018a). Statewide, temperatures are projected to increase substantially by the end of the 21st century with a projected increase of approximately 4.3° to 6.0° F above 1990 averages by 2050. (Cal-Adapt 2018c). The anticipated increase in average temperatures may also be characterized by extreme heat events such as more frequent and longer-lasting heat waves. Higher increases in temperature are projected to be more prominent further inland and closer to desert regions.

To ensure consistency in planning for climate impacts, CDCR uses the latest climate change information from Cal-Adapt, which is the most updated source of climate change data. Cal-Adapt uses Global Circulation Models (GCMs) to project future climate conditions. Models project future climate conditions under different future emission scenarios that are called Representative Concentration Pathways (RCPs). Different RCPs represent more or less rates and magnitudes of global greenhouse gas emission reduction.

Of the 32 internationally-recognized course-resolution GCMs, the State of California has chosen four models to utilize in its climate studies for the Fourth Assessment.[2]
The following four models were selected to capture a range of different climate futures:

[2] Pierce, D.W., D.R. Cayan, L. Dehann. June 2016. Creating Climate projections to support the 4th California Climate Assessment.

- Model 1: HadGEM2-ES characterizes a warm and dry future (warm/dry)
- Model 2: CNRM-CM5 characterizes a cool and dry future (cool/wet)
- Model 3: CanESM2 characterizes an average future condition (average)
- Model 4: MIROC5 provides a complement to the above models, and covers a range of outputs

Table 1 reflects those prisons that are projected to experience the highest estimated maximum temperatures in the year 2070-2099. In addition to changing average temperatures, climate change will increase the number of extreme heat events across the State.

Table 1- Top Five Facilities Most Affected by Changing Temperature (Degrees Fahrenheit)

Facility Name*	Annual Mean Maximum Temperature (1961–1990)	Annual Mean Maximum Temperature (2031–2060)	Annual Mean Maximum Temperature (2070-2099)	Annual Mean Minimum Temperature (1961–1990)	Annual Mean Minimum Temperature (2031–2060)	Annual Mean Minimum Temperature (2070-2099)
CAL	88	93	97	57	62	67
ISP	87	92	96	59	64	69
CEN	88	92	96	57	62	66
CVSP	87	92	96	58	64	68
CRC	79	84	88	50	55	59

* Sorted data by Estimated Average Max Temp 2070 – 2099*+

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

Facility Name*	Extreme heat threshold (EHT)	Average # of days above EHT (1961-1990)	Average # of days above EHT (2031-2060)	Average # of days above EHT (2070-2099)	Increase in # of days above EHT by mid-century (2031-2060)	Increase in average # of days above EHT by end of century (2070-2099)
CCWF	104	4	25	41	21	37
VSP	104	4	25	41	21	37
LAC	104	4	28	41	24	37
CAL	113	4	23	39	19	35
SCC	105	4	23	36	19	32

*Sorted by Increase in Average Number of Days above EHT by end of century 2070-2099

Table 2 reflects those prisons with the highest forecasted extreme heat events as measured by the Extreme Heat Threshold.

The nature of CDCR's operations dictates the need for very sturdy shell construction (i.e., concrete, concrete block, metal framing, and structural steel) that has a typically longer lifecycle than other types of construction (i.e., wood framing, etc.). CDCR structures tend to withstand the harsh effects of solar rays,

wind and rainstorms, and even fire events because of these materials. However, many of the critical support systems contained within and around these structures remain susceptible to climate conditions. Approximately half of the CDCR adult correctional facilities are in areas of the State that have moderate to high summer temperatures. This includes several correctional facilities in the eastern and southeastern deserts, the lower San Joaquin Valley, Antelope Valley, and Inland Empire. Accordingly, CDCR has had long experience in the adaption of the operation of prisons in areas with periods of high daily temperatures. CDCR has traditionally used evaporative cooling for the majority of inmate housing and program areas, which can provide little relief in extreme heat events; only a small portion of each facility typically has refrigerated cooling. However, all facilities regardless of their cooling systems are required to have a heat plan protocol to help reduce the harm to staff and the offender population from extreme conditions.

During new construction and renovation projects, CDCR considers efficient cooling technologies recommended by the Investor Owned Utilities as part of the department's energy efficiency partnership with the utilities and Savings by Design programs. As an example, a project to replace all of the evaporative cooling with a centralized chiller is under construction in 2019 that will serve the cooling needs of Ironwood State Prison (ISP) found in **Table 2** on the previous page. This is also one of the Department's first ZNE projects, designed to address the Governor's goal of 50% ZNE at existing buildings. The Department is also addressing the need to improve the livability of prisons in desert and southern Central Valley locations by adding insulation to its roofing systems as they are replaced to help reduce interior daytime temperatures. CDCR has also begun a multi-year roof replacement program utilizing special repair and deferred maintenance funding; however, the Departments total special repair and deferred maintenance needs far exceed available funding.

While increased heat will add challenges to the operations of 30+ year old buildings in deserts and other similar terrain, it will also accelerate deterioration of building systems – especially mechanical systems - if repairs/renovation projects are delayed or deferred. Unfortunately, due to historic funding shortages, CDCR's backlog of deferred maintenance has continued to increase, delaying the replacement or repair that could bring needed upgrades and efficiencies.

Increased temperatures also add to both water and electricity demands. The effect of increased temperatures on water availability was pronounced during the drought years of 2013-2017 and CDCR took steps to reduce its water use through both operational (conservation) practices and installation of water efficiency measures, exceeding the 25 percent statewide conservation goal set by the Administration. In the case of electrical demands, CDCR established a Demand Response Program in concert with investor-owned utilities in 2002 that created a framework through which CDCR can reduce its consumption needs to

allow other utility customers to stay connected; the periods of time when this program is of greatest need is during the peak summer months. Part of CDCR's ability to reduce its load during these times and even throughout the year can be attributed to its extensive construction of on-site renewable generation.

Figure 1- Solar Canopy Installation at WSP

CDCR has over 39 Megawatts (MW) of solar generation and is in design or construction at several locations, for a planned total of approximately 118 MW of renewable generation by the close of 2022. These solar installations have assisted CDCR in substantially reducing its total carbon footprint.

Other sustainability measures incorporated into CDCR projects to assist with temperature impacts beyond LEED and ZNE efforts include its Cool Roof program designed to minimize on-site heat buildup, the installation of solar parking canopies **Figure 1** and cool (reflective) pavements to help reduce the heat island effect in CDCR parking facilities, and the installation of misting systems at several Health Care facilities to help mitigate temperature issues during outside recreation hours.

Risk from Changes in Precipitation

Table 3-Facilities that will be Most Impacted by Projected Changes in Precipitation (Inches)

Facility Name	Annual Mean Max. Precip. (1961 – 1990)	Annual Mean Precip. (2031 – 2060)	Percent Change by mid-century	Annual Mean Precip. (2070 – 2099)	Percent change by end of century	Extreme Precip. (1961-1990)	Extreme Precip. (2031-2060)	Extreme Precip. (2070-2090)
CMF	21.7	26.8	23.6%	30.4	40.2%	12	12	17
SOL	21.7	26.8	23.6%	30.4	40.2%	12	12	17
SQ	29.7	34.8	16.9%	38.4	28.9%	10	10	15
CMC	22.8	26.4	15.7%	28.9	26.6%	5	6	9
PBSP	70.7	76.2	7.8%	76.4	8%	10	11	15

*Sorted by largest percentage change in precipitation by end of century. Extreme precipitation data in Table 3 pulled from Cal-Adapt.

Only a few existing State prisons are located in settings where increased precipitation could affect ongoing operations and/or the physical safety of the prison facilities. Some correctional facilities in Los Angeles, Riverside, and San Joaquin Counties are situated adjacent to major drainage systems that if not maintained by the respective local agency could pose occasional flooding problems within the affected prisons. In some cases, CDCR may need to take the

lead in modifying these facilities to prevent and/or lessen inundation of State properties. In addition, while the **Table 3** indicates only three prisons that will experience increased precipitation, several more prisons are impacted by already high precipitation levels in their respective climate zone. The impacts from 2017's historical precipitation was widespread among CDCR facilities, with several facilities not listed above inundated with severe rains and accompanying winds that caused roofs to fail and water intrusion in parking and driving areas, making navigation to and around the prison difficult. Since a substantial portion of CDCR's infrastructure, particularly its roofing systems, needs replacement, high precipitation levels will continue to exacerbate operations until repairs or replacements can be made. Even if improvements within CDCR facilities are made, the lack of companion improvements in the surrounding community can adversely affect operations. Large transportation routes inundated with water have the potential to shut off access for extended periods of time, posing safety hazards to staff and the public trying to access the institutions or worse, transporting ill persons to needed hospitals. Other outside systems that provide CDCR with the continuity of operations can be severely impacted. Two circumstances the Department had to deal with in the aftermath of the storms of 2017: the potential breach of flood levees surrounding and protecting two of its prisons and the potential spillover of reservoirs on CDCR property that became inundated with rainwater. It will be essential that CDCR work with its local partners to ensure that they are aware of and investing as necessary in climate preparation strategies to mitigate excess precipitation.

Changes in precipitation related to a warming climate are, more often than not, going to lead to reduced precipitation as was experienced in the State's recent multi-year historic drought. As a result of reduced rainwater influx, nearly every region within California experienced some level of reduced groundwater and potable water supply availability. Even prior to the drought, proactive steps were taken by CDCR in 2007 to reduce its water consumption in recognition that some of its facilities were located in regions with limited water supplies. However, in response to these water shortages and prolonged drought conditions, CDCR immediately implemented additional water rationing and conservation at all of its facilities in accordance with Executive directives. CDCR developed a statewide Drought Action Plan and required each institution to develop a site-specific plan as well. Each institution selected a Water Conservation Manager (WCM) to lead Drought Task Force Teams. Each WCM worked closely with their water suppliers and with the Department of Water Resources to ensure coordination, especially at the institutions located in critical groundwater basins. The WCMs also worked with CDCR's FPCM to ensure water shortage contingency plans were in place. Despite the recent drought having ended, the Department continues to emphasize water conservation and pursuit of water conservation retrofits to reduce its reliance on both potable and non-potable supplies.

CDCR requires construction projects that exceed 1 acre of disturbance to have a Storm Water Pollution Prevention Plan for implementation and compliance with the National Pollution Discharge Elimination System General Permit. Each facility also has a Sewer System Management Plan in place to help manage and mitigate storm water runoff. During the design and construction of the California Health Care Facility, CDCR incorporated landscape elements (bioswales) to remove silt and pollution from surface runoff water, which will also facilitate recharge of groundwater to reduce climate impacts on groundwater supply. In another of its facilities, CDCR installed a permeable paved parking lot that also allowed surface water to percolate through the asphalt and into the water table below to recharge the table and avoid water runoff. There are still opportunities under consideration for rain catchment systems in facilities with high precipitation levels to capture and redistribute excess rain. The CAP under development will be addressing these same issues pertaining to flood, storm water runoff and landslides, including risks, adverse effects and other relevant issues with more specificity.

Risks from Sea Level Rise

Increasing global temperatures are contributing to rising sea levels. Rising sea levels will result in an inundation of water to coastal areas and increased flooding due to storm surges. The California Ocean Protection Council (OPC) has issued the State of California Sea-Level Rise Guidance (Guidance) for State Agencies on what range of sea level rise to consider. The Guidance document provides the following estimates of sea level rise for the California Coast for all active tide gauges based on a range of emission trajectories, which are based on the report, Rising Seas in California: An Update on Sea Level Rise Science, and recommends projections for use in low, medium-high and extreme risk aversion decisions.

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

Global climate change is already contributing to sea level rise, which is projected to continue at increasing rates as warming continues. Along California's coastline, the average sea level rose approximately seven inches during the 20th century (CEC 2012). Assuming sea level rise along the California coast continues to track global trends, projected sea levels along the State's coastline south of Cape Mendocino are expected to increase from 12 to 61 cm (5 to 24 in.) by 2050, and 42 to 167 cm (17 to 66 in.) by 2100, as compared to 2000 levels North of Cape Mendocino, geologic forces are causing much of the land to uplift, resulting in a slower projected rate of sea level rise than California's coastline to the south. Between 2000 and 2100, sea level north of Cape Mendocino is projected to rise approximately 10 to 143 cm (4 to 56 inches) (California Ocean Protection Council [OPC] 2013). Accelerating sea level rise, especially at the increasing rates projected for the 21st century, may result in the loss of substantial areas of coastal

land area. Erosion and inundation from rising sea levels would threaten structures, roads, and other supporting infrastructure located along the coastline and at nearby low elevations.

According to Cal-Adapt data, there are no CDCR correctional facilities that are at risk from rising sea levels; however, CDCR has identified one of its three correctional facilities situated near coastal zones, San Quentin State Prison (SQ), which it believes could be impacted by sea level rise and potential flooding along the coastline and delta. SQ is situated on a low bluff on the shoreline of San Francisco Bay and has experienced erosion of its protective seawall over the years. An improvement project fortifying its walls was completed several years ago to fortify this structure. Changes in sea level could result in destruction of some support areas outside of the main prison grounds and the influence of storm waves could require further remediation of the existing perimeter seawall. Sea level rise could also disrupt major transportation routes, such as State Route 580 and U. S. Highway 101, which are main thoroughfares for inmate transport, visitor trips, employee commutes, and vendor deliveries. CDCR's Deuel Vocational Institution (DVI) prison in San Joaquin County and Pelican Bay State Prison (PBSP) in Del Norte County are located in coastal zones; however, both prisons are well inland of tidal influence and are situated at base land elevations (20-70 feet) above sea level. While these prisons are not currently considered at risk of sea rise, CDCR remains cognizant of the potential for seawater rise influences and will continue to evaluate the risks associated with these locations.

Risks from Wildfire

Wildfire is a serious hazard in California. Several studies have indicated that the risk of wildfire will increase with climate change. By 2100, if greenhouse gas emissions continue to rise, one study found that the frequency of extreme wildfires would increase, and the average area burned statewide would increase by 77 percent. To start to understand how wildfire could affect facilities, complete the following table for all facilities, using data from CalAdapt. In identifying facilities most at risk, considerations can include: location, operations, impacts of current precipitation events, the impact of disruption, and criticality of the facility and/or its operations.

Table 4- Top five Facilities that will be Most Impacted by Projected Changes in Wildfire Facility Data Workbook Table 1.5

Facility Name	Hectares Burned (1961-1990)	Hectares Burned (2031-2060)	Hectares Burned (2070-2099)
CTF	6	43	44
SOL	3	39	46
CSP-SAC	2	35	31
CCWF	2	34	37
SVSP	3	34	30

*Sorted by largest hectares burned 2031-2060. Hectares burned data in Table 4 pulled from Cal-Adapt.

Areas burned by wildfires have increased with rising average temperatures. California forests have been changing, showing a decrease in number of pine trees and an increase in small trees and oaks in response to the decreasing water availability and warmer temperatures (CNRA 2018a). Areas burned by wildfire are expected to continue to increase because of climate change throughout California. This increase in risk is caused by several climatic changes, including expected earlier snowmelt, higher temperatures, and longer dry periods resulting in a longer fire season. Potential climate-related changes in vegetation (e.g., reduced moisture content in vegetation), and ignition potential from lightning may indirectly contribute to increases in wildfire risk.

- Longer fire season trends over the last three decades and increased number of large, intense wildfires are projected to continue due to changes in precipitation and temperature. This would increase the risk of localized air quality effects due to smoke generated by wildfires that can affect both inmates and employees, especially during outdoor operations. Stresses on indoor air filtration systems could also occur.
- Wildfires may also affect accessibility of facilities located in remote areas that may only be accessed through forested land or lands otherwise susceptible to wildfires.

Table 4 identifies the top five CDCR facilities that have the potential to be most impacted by projected changes in wildfires.

In addition, the following facilities located adjacent to or within a Wildland Urban Interface (WUI) area (CALFIRE 2003) may also be considered at-risk.

- Avenal State Prison
- California Correctional Center

- California Correctional Institution
- California State Prison, Corcoran
- High Desert State Prison
- Mule Creek State Prison
- Pleasant Valley State Prison
- California State Prison, Sacramento
- California State Prison, Solano
- Salinas Valley State Prison
- California Men's Colony
- California Medical Facility
- Sierra Conservation Center

Most CDCR institutions have on-site fire departments that are capable of fire responses under a number of circumstances. Furthermore, some institutions have adjacent CALFIRE conservation camps and/or agreements with local fire departments that can provide additional wildfire response support.

In addition, through the CDCR Investor-Owned Utility (IOU) partnership, the department keeps up to date on Wildfire Mitigation Plans and Public Safety Power Shutoff (PSPS) protocols. As wildfires have increased over the years, the utilities PSPS programs have enhanced accordingly. For example, PG&E released a forecasting tool in August 2019 that includes a seven-day forecast for PSPS, as well as an interactive weather map with live views from weather stations and cameras.

CDCR maintains utility protocols for shut downs, rolling blackouts, repair work, etc., in the Emergency Operations binder at each institution. Each institution also has emergency back-up generator power for essential operations. In the event back-up power is insufficient, CDCR proceeds with the Emergency Contract process for additional generator equipment.

Heating and Cooling Degree Days

A Heating Degree Day (HDD) is defined as the number of degrees by which a daily average temperature is below a reference temperature. The reference temperature is typically 65 degrees Fahrenheit, although different utilities and planning entities sometimes use different reference temperatures. The reference temperature loosely represents an average daily temperature above which space heating is not needed. The average temperature is represented by the average of the maximum and minimum daily temperature. Similarly, a Cooling Degree Day (CDD) is defined as the number of degrees by which a daily average

temperature exceeds a reference temperature. The reference temperature is typically 65 degrees Fahrenheit, although different utilities and planning entities sometimes use different reference temperatures. The reference temperature loosely represents an average daily temperature below which space cooling (e.g., air conditioning) is not needed.

Table 5- Top five Facilities that will be Most Impacted by Projected Changes in Heating Degree Days-Facility Data Workbook Table 1.6

Facility Name	Heating Degree Days (1961-1990)	Heating Degree Days (2031-2060)	Heating Degree Days (2070-2099)
CCC	6308	4644	3806
HDSP	6308	4644	3806
CCI	4770	3566	2849
PBSP	4322	3048	2167
SCC	3817	2445	1789

*Sorted by projected HDD 2031-2060. HDD data in Table 5 pulled from Cal-Adapt.

Table 6- Top five Facilities that will be Most Impacted by Projected Changes in Cooling Degree Days-Facility Data Workbook Table 1.7

Facility Name	Cooling Degree Days (1961-1990)	Cooling Degree Days (2031-2060)	Cooling Degree Days (2070-2099)
CAL	3744	5276	6353
CEN	3706	5131	6160
SYCC	1836	3298	4243
NKSP	2036	3037	3794
KVSP	1969	2966	3717

*Sorted by projected CDD 2031-2060. CDD data in Table 6 pulled from Cal-Adapt.

Table 5 and **Table 6** identify the top five CDCR facilities most impacted by projected changes in heating and cooling degree days. Some of the adaptation activities that CDCR has engaged in to date include:

- Reducing water usage through both conservation efforts and installation of water efficiency measures.
- Installing solar parking canopies and reflective pavements in parking lots to minimize heat island effects for employees and visitors.
- Adding insulation to building envelopes in the San Joaquin Valley and Desert regions to help reduce interior daytime temperatures.
- Replacing roofs with cool roof materials that reduce building temperatures and cooling requirements.
- Constructing additional facilities to ZNE standards to reduce cooling requirements and reduce operating costs during hot days.

- Preparing storm water management plans for each facility to manage and mitigation storm water runoff.
- Installing permeable pavement at the Mule Creek State Prison facility to reduce runoff.
- Heat plan protocols have been developed to reduce harm to building occupants during extreme heat events.
- Installation of misting systems at several healthcare facilities to mitigate temperature issues during outside recreation hours.

Additional adaptation measures and strategies are outlined in the CDCR Climate Action Plan 2030 that is in development.

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)).

As described above, climate change may increase the risks of impacting institutional operations and some of the strategies mentioned above serve to guard against these risks. For example, planting additional trees to reduce heat island impacts is an appropriate mitigation consideration for new projects. Reducing the heat island effect within a prison yard is also under way, as the Department has completed several gardens inside prison walls with more planned. These gardens are also meant to be therapeutic and provide vital rehabilitation skills and will serve to help educate our offender population about the value of preserving the natural environment. Other natural infrastructure solutions to combat against the effects of climate change included assisting with the funding of levee improvements to widen and raise an existing earthen levee protecting two of CDCR's prisons in the Central Valley that were at risk of flooding during last year's historic rains.

Understanding the Potential Impacts of Facilities on Communities

CDCR facilities are often located in remote rural locations where their presence is significant in terms of population, footprint, and/or as an economic driver in that location. Climate change that could lead to a prison closure could potentially cripple the economic stability of some of these areas. As mentioned earlier, CDCR has created a substantial renewable portfolio that reduces reliance on the electricity grid as one key area in which CDCR can mitigate its operational effects

and the effects climate change will have on operations within its local communities.

Vulnerable Populations

Climate change disproportionately impacts vulnerable communities, with certain populations experiencing heightened risk and increased sensitivity to climate change and 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.

While there is no single tool to identify vulnerable populations in an adaptation context, there are a number of state-wide, publicly available tools that when overlaid with climate projection data can help identify communities most at risk to a changing climate. Some of these tools, including a definition for vulnerable communities, are available in a resource guide developed by the Integrated Climate Adaptation and Resiliency Program in the Office of Planning and Research.

CDCR's incarcerated population is varied. A significant number of its offenders have either mental or medical health issues and those often include learning disabilities. They are more likely to have experienced some neglect prior to being housed with CDCR. Some of these individuals may be prescribed medications that do not react well with extreme heat conditions. Because these individuals are within the care and custody of CDCR, the unique needs and circumstances of this population are addressed as part of the standard offering of services, including provision of food, housing and education, or as part of their case management plan for those with mental and medical health needs. Once released and/or paroled, these same individuals may once again be subject to risks other vulnerable population's experience. However, CDCR is trying to combat this cycle of vulnerability by emphasizing rehabilitation and employment-building skills during incarceration. These efforts are intended to reduce the chances of an offender reoffending and returning to prison, but also are intended to provide the means to live in a self-sustaining manner after they have served their sentence.

CDCR staff and inmates have also recognized that the community at large, and particularly within proximity to some of our prisons, may struggle with issues of poverty, incarcerated parents, mental health issues and the like, and have

volunteered thousands of hours and raised substantial sums of money to assist these vulnerable populations in dealing with a myriad of issues affecting their quality of life.

Disadvantaged Communities

California is required to invest resources in Disadvantaged Communities (DACs). Many state programs that have DAC funding requirements use CalEnviroScreen, a tool that ranks census tracts based on a combination of social, economic, and environmental factors to identify DACs. 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, DACs are more likely to suffer damage under changing climate conditions, including extreme events. It is recognized that the Department's facilities located in these communities can contribute or alleviate the vulnerability of these communities.

Table 7- Facilities Located in Disadvantaged Communities

Facility Name	CalEnviroScreen Score	Is it located in a disadvantaged community? Yes/No
CHCF	96-100%	Yes
KVSP	96-100%	Yes
NKSP	96-100%	Yes
NCYCC	96-100%	Yes
CCWF	91-95%	Yes
VSP	91-95%	Yes
ASP	76-80%	Yes

Figure 2 - Solar Parking Canopy Installation at CCWF

As evidenced in **Table 7**, several CDCR facilities are located within a DAC as identified by the CalEnviroScreen. In total, approximately 19 percent of the Department's total institutional portfolio is located in a DAC. As mentioned above and earlier, many of CDCR's facilities are located in remote and/or rural areas.

CDCR is often the largest employer within the region. To ensure local residents were afforded the opportunity to obtain employment with CDCR, its last three major construction projects included contract language that required the construction firm to prioritize local hiring to build the projects. Additionally, CDCR's Division of Administrative Services held both job recruitment and procurement fairs to provide additional opportunities for local residents to find employment or provide services. These on-site hiring fairs have continued at facilities throughout the State. CDCR also has Mutual Aid agreements with local first responder organizations to assist as needed in public service emergencies. Additionally, the Department provides community work crews comprised of inmates that will assist local partners with needed cleanup and infrastructure repairs.

There may still be other avenues for CDCR to pursue in working with these communities, particularly in light of climate change. These opportunities will continue to be evaluated in future projects and planning efforts.

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 reduced through tree planting and greening measures, cool roofs (e.g., lighter roofing materials that reflect light), cooler pavements, and other measures.

Table 8- Top five Facilities Located in Urban Heat Islands (Sorted by highest UHII)

Facility Name	Located in an urban heat island (yes/no)
CRC	Yes
CIM	Yes
CIW	Yes
CMF	Yes
SOL	Yes

The nature of CDCR facilities is such that large portions of the property are covered in paved areas and structures. A typical prison can include up to 1,000 acres and housing between 3,000-5,500 inmates, not including a staffing figure between 2,000 – 5,000 employees at a given site. **Table 8** lists CDCR's top five facilities located in Urban Heat Islands.

As mentioned earlier, CDCR has already undertaken a number of measures to ensure that the heat island effect is reduced, through such design features as solar-equipped parking canopies **Figure 2** and cool roofs. Reductions to heat

islands have also included installing more energy efficient systems that consume less energy and installing renewable generation that relies solely on solar power and eliminates carbon emissions. More of these efforts will be implemented in the near future, and with the Department's ZNE policy, all new projects are to be planned as ZNE.

An analysis of statewide effects of climate changes pertaining to extreme heat and local heat islands including risks, adverse effects, and issues that are relevant to the Department's existing facilities as well as potential climate adaption strategies shall be included in the CAP.

Understanding Climate Risk to Planned Facilities

CDCR is not contemplating a significant expansion of its footprint in the near future. For any new projects proposed in the Governor's Budget, the Department's Design and Construction Policy Guidelines establishes minimum siting requirements to avoid or mitigate adverse effects of extreme climate conditions (i.e., floods, heat, wind, snow, and drought). Factors to be considered include:

- Avoid sites in coastal/deltaic settings where an increase in sea level, coastal erosion or other coastal hazards could result in deterioration of the building and support areas of the new facility. Avoidance of areas that could be affected by increases in sea level is preferred over sites that would require levees and other similar hydraulic barriers. (Reference: State of California Sea Level Rise Guidance).
- Avoid sites prone to extreme heat and/or the potential for the heat island effect. Implement strategies to reduce the heat island effect due to climate change; cool roof systems, cool pavements (reflective or permeable), parking canopies, and increased trees and vegetation when feasible. (Reference: Preparing California for Extreme Heat Guidance and Recommendations).
- Avoid sites within a mapped 100-year floodplain and/or sites in the pathway of watersheds that might be subject to increased periods or magnitude of seasonal storm events including monsoonal/hurricane events. Also, avoid placement of new facilities in close proximity to levee and/or storm water channels that may eventually be determined inadequate due to the increasing frequency and/or magnitude of rainfall events. Where feasible, avoid sites that require construction of stand-alone levee systems and/or storm water channels to prevent site inundation. (Reference: Department of Water Resources Statewide Flood Management Program).
- Avoid sites situated within areas of chaparral plant communities, coniferous forest, and/or mature landscaping that may pose the risk of catastrophic wild fires and/or would be difficult to protect from wild fires. (Reference: California

Department of Forestry and Fire Protection's Fire and Resource Assessment Program).

- Avoid sites that, due to unique terrain and/or topographic setting, present solar exposure in excess of that typical of the respective climatic area and/or potentially expose new structures to excessive wind levels, dry lightning, snow, or other extreme weather conditions. (Reference: California Office of Emergency Services State Hazard Mitigation Plan).

As new facilities are planned, this information will be evaluated along with other information CDCR uses in its decision-making process and any impacts will be evaluated and addressed as appropriate. The CAP currently under development will serve as an overall framework for this effort.

Natural Infrastructure Solutions for Planned Projects

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, storm water management, 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 majority of past sites used for construction of new and/or expanded correctional facilities did not contain significant natural resources such as wetlands, old growth forests, critical habitat for endangered species, etc. However, when such resources are present, CDCR typically provides appropriate direct or indirect mitigation. For example, because of the unavoidable loss of grassland habitat at an expansion site on the Richard J. Donovan Correctional Facility in south San Diego County, the Department secured 35 acres of burrowing owl habitat conservation credits.

CDCR has implemented a number of natural infrastructure solutions to mitigate the environmental impacts of its projects, some of which were described above. Earlier projects have funded and planned wetlands restoration or preservation projects such as the installation of bioswales at the California Health Care Facility in Stockton or, more recently, wetlands avoidance and restoration at a construction site completed in 2016.

CDCR utilizes vermiculture to compost organic waste at RJD instead of diverting waste to the landfill. SVSP and CEN are in the process of developing vermiculture composting to divert their respective organic waste. Compost and mulch help California adapt to climate change by sequestering carbon, reducing

greenhouse gas emissions, conserving water, reducing erosion, reducing flooding and mudslides, reducing energy use, and providing natural flood control.

CDCR also provides for the long-term protection of sensitive and/or declining wildlife species that may be lost due to the operation of the lethal electrified fencing used within the secure perimeter of many State prisons. In conformance with the Department's Habitat Conservation Plan, habitat that will serve to maintain and/or enhance the target sensitive wildlife species is acquired in non-profit conservation banks approved by State and Federal wildlife regulators. In instances where CDCR projects are unable to fully avoid effects to natural resources, off-site mitigation is typically implemented through purchase of conservation credits within various habitat preserves. In addition to mitigation required for the direct effects of new or expanded facilities, the Department previously secured habitat to compensate for the loss of wildlife as a result of its perimeter security systems. Through the later program, CDCR has preserved over 800 acres of wildlife breeding/foraging habitats and sensitive ecosystems through direct land acquisition, funding conservation easements, purchasing mitigation credits at state/federal agency approved mitigation banks, and has funded the restoration/creation of nearly 2,500 acres of various natural habitats and farmland; this approximately 3,300 acres is held in perpetuity by natural resource agencies, land conservancies or other reputable environmental stewardship organizations.

Integrating Climate Change into Department Planning and Funding Programs

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.

Unlike more traditional real property that may have an identified timeline of between 30-50 years, often coincident with either its financing scheme or the life of its major systems, CDCR does not consider its existing correctional facilities to have a specific end of life term. While the majority of existing State correctional facilities have been built since 1985, the Department currently has two correctional facilities over 125 years old yet remain serviceable for inmate housing and programs. CDCR is able to continue operation of the entire span of historic

and contemporary facilities through periodic upgrades/replacements of infrastructure, housing units, and program support areas. The design standards of all renovation projects, and for replacement/expansion projects, are the requirements of the State Building Code and, if feasible, additional commitments that exceed these standards such as those of the Leadership in Energy and Environmental Design program.

For all third-party energy conservation/generation projects, such as new on-site photovoltaic installations, CDCR performs life cycle costing to account for all costs related to construction, operation, maintenance, and disposal at the end of the useful life of a structure. Economic metrics used for energy efficiency projects include; Simple Payback, Return on Investment, Life Cycle Cost Analysis, Savings to Investment Ratio, Net Present Value, and Internal Rate of Return. CDCR leverages a formal partnership with California's Investor Owned Utilities to identify and implement energy efficiency projects that utilize rebates and zero percent loans to realize cost savings.

Table 9- 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?
Climate Action Plan in development process	Yes - In progress	N/A	See below

Table 10- 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?
Climate Action Plan in development process	As necessary	TBD	Yes

Funding of Projects to Reduce Climate Risks

State agencies are required to pursue all available financing and project delivery mechanisms to achieve executive order goals and mandates including, but not limited to: State revolving loan funds, utility On-Bill Financing (OBF), Power Purchase Agreements (PPAs), Green Seal (GS) $Mart, Energy Service Contractors, or other available programs.

CDCR has been successful in fulfilling many of the State mandates of energy efficiency and sustainability by seeking out various funding opportunities as they become available. CDCR is proactive in promoting additional funding opportunities by participating in policy discussions on topics such as OBF and On-Bill Repayment (OBR).

CDCR has utilized and will continue to explore multiple funding opportunities for projects that aid in climate adaptation including GS $Mart loans, OBF, Municipal utility company loan and incentive programs, American Recovery and Reinvestment Act (ARRA) loans, , Department of Water Resources loans and grants, and Solar or Wind PPAs.

Measuring and Tracking Progress

For the last several years, CDCR has incorporated climate action planning into its *Five-Year Infrastructure Plan*. Carbon emissions data has been tracked since 2007. The Department also regularly reports its electricity consumption data into an Energy Star Portfolio, where its progress can be tracked on a public-facing website. Additionally, CDCR executed an agreement in 2016 with an environmental consulting firm to prepare a CAP to analyze statewide climate change effects as they relate to CDCR facilities and operations. CDCR's consultant is required to identify potential climate adaption strategies that could be implemented to address increased risks and improve the resilience of CDCR facilities and operations. The consultant will use existing guidance and tools including, but not limited to, the following: online Cal-Adapt tool, reference guides such as California Natural Resources Agency *Safeguarding California Plan* and associated Implementation Action Plans, California Environmental Protection Agency *Preparing California for Extreme Heat Guidelines and Recommendations,* and the California Coastal Commission Sea Level Rise Policy Guidance. The CAP will also provide a GHGe inventory, emissions reduction plan, and a comprehensive analysis of the environmental effects of the potential adoption of measures that would further reduce GHGe to contribute to the statewide goal of reducing the long-term potential for climate change. Upon completion, the CAP will serve as a guideline along with required activities under the California Environmental Quality ACT (CEQA) for CDCR when making new facility investment decisions that may have environmental impacts.

CDCR recognizes the importance of understanding the current and future impacts of climate change in the State when planning, designing, building, operating, maintaining, and investing in correctional facilities and infrastructure. Proactive planning for future climate change is necessary for resiliency and protection of the Department's assets, as well as providing a better use of resources, improving self-sufficiency, and maximizing the efficient use of fuel, water, and other resources while carrying out the CDCR mission and vision.