ACT 178: RELATING TO SEA LEVEL RISE ADAPTATION

2021 Annual Report

Report to the Thirty-First Legislature
Regular Session of 2022

Prepared pursuant to Act 178, Session Laws of Hawaii 2021
by

Office of Planning and Sustainable Development

Department of Business, Economic Development and Tourism

State of Hawaii

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List of Acronyms

AGR	DEPARTMENT OF AGRICULTURE
B&F	DEPARTMENT OF BUDGET AND FINANCE
DAGS	DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
DBEDT	DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT, AND TOURISIM
DHHL	DEPARTMENT OF HAWAIIAN HOME LANDS
DHS	DEPARTMENT OF HUMAN SERVICES
DLNR	DEPARTMENT OF LAND AND NATURAL RESOURCES
DLNR-DAR	DEPARTMENT OF LAND AND NATURAL RESOURCES - DIVISION OF AQUATIC RESOURCES
DLNR-DOBOR	DEPARTMENT OF LAND AND NATURAL RESOURCES - DIVISION OF BOATING AND OCEAN RECREATION
DLNR-DOFAW	DEPARTMENT OF LAND AND NATURAL RESOURCES - DIVISION OF FORESTRY AND WILDLIFE
DLNR-OCCL	DEPARTMENT OF LAND AND NATURAL RESOURCES - OFFICE OF CONSERVATION AND COASTAL LANDS
DOD	DEPARTMENT OF DEFENSE
DOE	DEPARTMENT OF EDUCATION
DOE-HSPLS	DEPARTMENT OF EDUCATION – HAWAIʻI STATE PUBLIC LIBRARY SYSTEM
DOH	DEPARTMENT OF HEALTH
DOT	DEPARTMENT OF TRANSPORTATION
GIS	GEOGRAPHIC INFORMATION SYSTEM
HHSC	HAWAIʻI HEALTH SYSTEM CORPORATION
HI-EMA	HAWAIʻI EMERGENCY MANAGEMENT AGENCY
JUD	HAWAIʻI STATE JUDICIARY
KCCC	KAUA'I COUNTY CORRECTIONAL CENTER
NOAA	NATIONAL OCEAN AND ATMOSPHERIC ADMINISTRATION
OHA	OFFICE OF HAWAIIAN AFFAIRS
OPSD	OFFICE OF PLANNING AND SUSTAINABLE DEVELOPMENT
OPSD-CZM	OFFICE OF PLANNING AND SUSTAINABLE DEVELOPMENT – COASTAL ZONE MANAGEMENT PROGRAM
ORMP	HAWAIʻI OCEAN RESOURCES MANAGEMENT PLAN
PLTIS	PUBLIC LAND TRUST INFORMATION SYSTEM
PSD	DEPARTMENT OF PUBLIC SAFETY
RCUH	RESEARCH CORPORATION OF THE UNIVERSITY OF HAWAIʻI
SBAM	STATE BUILDING ASSET MANAGEMENT DATABASE
SLH	SESSION LAWS OF HAWAIʻI
SLR-XA	SEA LEVEL RISE EXPOSURE AREA
UH	UNIVERSITY OF HAWAIʻI SYSTEM

1. Introduction

This report describes the Office of Planning and Sustainable Development (OPSD)'s activities and progress related to the implementation of Act 178, Session Laws of Hawai'i (SLH) 2021, Relating to Sea Level Rise Adaptation. In addition to the activities and progress-to-date, this report includes a discussion on the findings of an initial state facility inventory and exposure assessment, considerations for future assessments, and recommendations for next steps.

This annual report fulfills the requirement in Act 178, SLH 2021 for the Office of Planning and Sustainable Development to report annually to the Governor, the Legislature and the Hawai'i Climate Change Mitigation and Adaptation Commission regarding vulnerability and mitigations assessment for state facilities and progress in implementing sea level rise adaptation in future plans, programs and capital improvement needs and decisions.

Additional information, including interactive GIS maps, can be found at the Act 178, SLH 2021 StoryMap.

1.1 Act 178, SLH 2021 Summary

The State's Thirty-First Legislature recognized that climate change and sea level rise "pose significant, dangerous and imminent threats to the State's social and economic well-being, public safety, nature and environment, cultural resources, property, infrastructure, and government functions and will likely have a disproportionate impact on low-income and otherwise vulnerable communities." Act 178 was passed in order to begin the long-term planning needed to effectively address climate impacts.

The purpose of this Act is to:

(1) Require the OPSD, in coordination with state agencies with operational responsibilities over state facilities, to:
    a. Identify existing and planned facilities that are vulnerable to sea level rise, flooding impacts, and natural hazards;
    b. Assess options to mitigate the impacts of sea level rise to those facilities; and
    c. Submit annual reports to the Governor, Legislature, and the Hawai'i Climate Change Mitigation and Adaptation Commission regarding vulnerability and mitigation assessments for state facilities and progress toward implementing sea level rise adaptation in future plans, programs, and capital improvement needs and decisions.
(2) Update and reaffirm the role of the OPSD to coordinate climate change adaptation and sea level rise adaptation among all state agencies to improve the interagency coordination of these activities; and
(3) Amend the Hawai'i State Planning Act to include sustainable development, climate change adaptation, and sea level rise adaption as objectives for facility systems.

1.2 Hawai'i Coastal Zone Management Program

Within the OPSD, the Coastal Zone Management Program (OPSD-CZM) has been charged with coordinating the objectives for Act 178. This aligns with the OPSD-CZM's role as the lead coordinating entity for the implementation of the *2020 Hawai'i Ocean Resources Management Plan: Collaborative*

Coastal Zone Management from Mauka to Makai (ORMP), that similarly identifies the need to inventory and analyze critical facility assets along the threatened by chronic and episodic coastal hazards and future sea level rise projections.

2. Phased Approach

Adaptation planning takes place over decades and is constantly evolving as conditions change and process. In order to move towards statewide, coordinated action, OPSD-CZM has identified a proposed approach which includes three phases of implementation.

PHASE 1 is a high-level inventory of state facilities vulnerable to sea level rise. OPSD-CZM recognizes that the Act specifies the identification of "existing and planned facilities vulnerable to sea level rise, flooding impacts, and natural hazards," and has prioritized sea level rise impacts for this initial phase, consistent with Act 178, SLH 2021 legislative intent. This Phase was completed, and the process and results are described in this annual report.

PHASE 2 is to conduct more site-specific vulnerability assessments in order to prioritize adaptation actions. Due to numerous limitations including funding and capacity, it is not feasible to adapt all vulnerable facilities at the same time, therefore it is necessary to prioritize facilities in need of adaption. In order to complete this prioritization, Phase 2 will include two main steps: (1) conducting more-detailed, localized assessments, and (2) creating a standardized system/rubric to determine priority ranking. See Section 6 for more details on Next Steps.

PHASE 3 is to identify a suite of mitigation and adaptation strategies for the identified vulnerable facilities. As there is no one-size-fits-all solution, this phase would require the State to identify a variety of mitigation and adaptation strategies that would be applicable in a variety of settings, and would be acceptable to the State. These strategies would range from nature-based to hardening and incorporate short, mid, and long-term planning.

3. Activities & Accomplishments

OPSD-CZM has completed Phase 1 of this initiative. The following sections outline the completed activities-to-date.

3.1 Consultation Meetings

Subsequent to the Governor's signature of Act 178 on July 7, 2021, OPSD-CZM met with selected stakeholders to better understand the extent of existing information and related work. Consultation meetings were conducted with DAGS, HI-EMA, DLNR-OCCL, UH Sea Grant and the State Climate Commission.

Through these meetings, OPSD-CZM was provided with existing state asset and facility inventories, such as DAGS' State Building Asset Management Database (SBAM), the Public Land Trust Information System (PLTIS) and the 2018 State Hazard Mitigation Plan, which included an inventory of state facilities. Further investigation of these datasets revealed discrepancies due to differences in reporting requirements, types of data collected and varying levels of granularity. The OPSD-CZM expresses its appreciation to these two agencies for providing the relevant data for this report.

Due to the alignment of Act 178's goals and timeline with HI-EMA's 2023 Hazard Mitigation Plan update, there is a clear nexus for OPSD-CZM and HI-EMA to collaborate and coordinate efforts. Consultation meetings with HI-EMA's Hazard Mitigation Team and GIS Specialist were important for the development of the approach to conducting a state facility inventory and analyzing facility exposure to sea level rise impacts.

3.2 Kick-Off Event

The OPSD-CZM hosted an Act 178 Kick Off meeting via Zoom on September 24, 2021. 25 individuals representing 15 different agencies/departments participated (see **Table 1** for list of attending agencies/departments). OPSD-CZM presented a brief outline of the Act and its objectives, proposed project phases, potential outcomes and deliverables and the roles of OPSD and state agencies. Attendees discussed current sea level rise impacts on their facilities, as well as any adaptation or mitigation planning being done by their respective agencies. While some attendees reported recurring flooding events affecting their facilities, there were few that reported any active adaptation or mitigation plans. Attendees also had the opportunity to share feedback, concerns and considerations regarding Act 178 and the proposed phases.

Table 1: September 24, 2021, Act 178 Kick Off Attendees

Department/Agency	
DBEDT, Office of Planning & Sustainable Dev (host)	Dept of Land and Natural Resources
Dept of Accounting and General Services	Dept of Public Safety
Dept of Agriculture	Dept of Transportation
Dept of Business, Economic Development & Tourism	Hawai'i Health Systems Corp.
Dept of Defense	Hawai'i State Judiciary
Dept of Education	Office of Hawaiian Affairs
Dept of Health	University of Hawai'i
Dept of Human Services	

3.3 Data Collection & Verification

In order to remain consistent with HI-EMA, as well as leverage already existing data, the OPSD-CZM used information from the 2018 State Hazard Mitigation Plan as the basis for the state facilities inventory.

Relevant information in the existing dataset included: building name, building description, address, coordinates, managing agency, and year of construction.

OPSD-CZM requested agency designees to verify and update the information for their respective facilities. Additionally, agencies were asked to make note of any facilities already experiencing flooding impacts, and any facilities with existing or planned sea level mitigation and/or adaptation plans. Responses were received from all but one agency.

Agencies reported facilities that were either not included in the original dataset or were no longer under the agency's management. Additionally, there were significant changes in respect to the coordinates and mapping of the facilities. Discrepancies were found between mailing and physical addresses, as well as errors in the auto-generated georeferencing. **To correct for these errors, OPSD-CZM staff manually cross-referenced facility coordinates using Google Earth satellite imagery and online resources.**

3.4 Data Analysis & Methodology

To meet the requirement to identify the number of state facilities vulnerable to sea level rise impacts, data and spatial analyses were conducted using ArcGIS to include the following datasets and GIS layers:

State Facility Locations
Verified state facilities were uploaded as a point layer into ArcGIS. 200-foot buffers were created around each facility point to account for impacts on facility accessibility, as well as building footprints (roughly).

Sea Level Rise Scenarios
Projections from the 2017 Hawai'i Sea Level Rise Vulnerability and Adaptation Report were used to represent sea level rise impacts. Sea Level Rise Exposure Areas (SLR-XA) for the 0.5 ft, 1.1 ft, 2.0 ft and 3.2 ft scenarios were used for this analysis. The SLR-XA is a combination of three chronic flooding hazards: (1) passive flooding, (2) annual high wave flooding, and (3) coastal erosion. For more information on how SLR-XA is calculated, see the 2017 Hawai'i Sea Level Rise Vulnerability and Adaptation Report.

A close up of Honolulu, which has the highest concentration of state facilities (exisitng and vulnerable), shows the various layers used in this analysis.

In addition to the four SLR-XA scenarios, NOAA projections for 6 feet of sea level rise were also used. Entities, such as the City & County of Honolulu Climate Change Commission, recommend

using 6 feet of sea level rise when making planning decisions related to critical infrastructure with long expected lifespans and/or low tolerance.

Sea Level Rise Projection Notes:
SLR-XA Disclaimer: data presented using the SLR-XA are based on modeled sea level rise projections and therefore show probable extent of impacts, not exact locations of impacts. In applying the data presented, the user retains the responsibility to understand the confidence intervals and potential sources of error in the data and assumes the risk associated with the accuracy of the results.

NOAA's 6.0 ft: NOAA's projections only capture impacts of passive flooding, unlike SLR-XA which incorporates three impacts.

Analysis
The facility buffer layer was overlaid with the SLR-XA scenarios and NOAA's 6.0-ft projection. A spatial analysis was used to identify facility buffers that intersect with each scenario projection (SLR-XA and NOAA).

4. Results & Discussion of Findings

The following summary tables and charts identify the results of the spatial analysis and provide an overview of the scope of state facilities vulnerable to the sea level rise scenarios based on island and by managing agency. OPSD-CZM has created an interactive GIS map (**link**) for users to view and explore areas of interest.

Chart 1 illustrates the changes in vulnerable state facilities by island as the sea level rise scenarios progress. Statewide, there is exponential growth in the number of impacted facilities as the scenarios progress with Oʻahu and Maui seeing the most significant increases. Kauaʻi's decrease in vulnerable facilities between the 3.2 ft SLR-XA and the 6.0 ft NOAA scenario can be attributed to the change in modeling type between SLR-XA which incorporates three types of sea level rise-related hazards, and NOAA's modeling which only accounts for passive flooding (see Section 3.4). **Table 2** summarizes the state facilities located within each of the five sea level rise scenarios by island. It also includes a count of the total number of state facilities; however, it should be noted that the total number is an underestimate due to underreporting (see Section 5.1 on Data Limitations for further details).

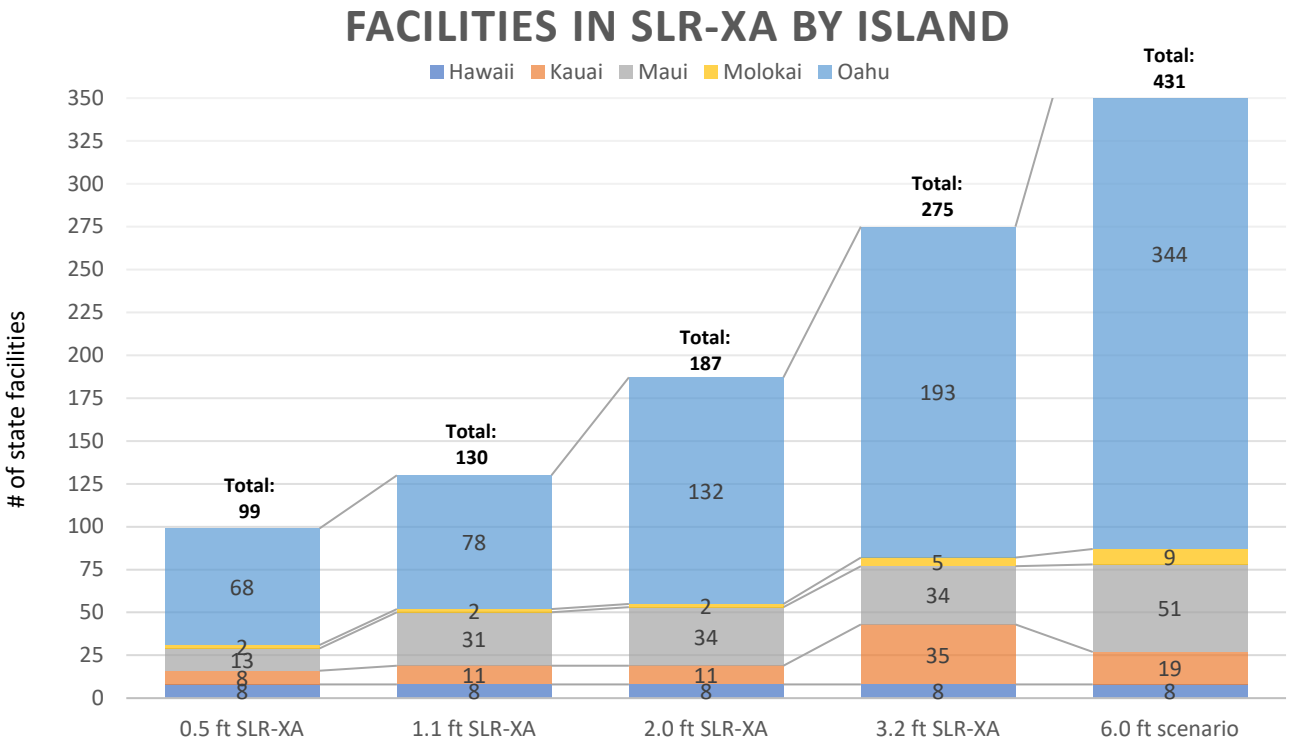

Chart 1: State facilities in sea level rise scenario by island

Table 2: State facilities located within the sea level rise scenarios by Island

Island	Total # of State Facilities*	# of State Facilities in 0.5 ft SLR XA	# of State Facilities in 1.1 ft SLR XA	# of State Facilities in 2.0 ft SLR XA	# of State Facilities in 3.2 ft SLR XA	# of State Facilities in 6.0 ft (NOAA)
Hawai'i	1,359	8	8	8	8	8
Kaua'i	532	8	11	11	35	19
Maui	653	13	31	34	34	51
Moloka'i	69	2	2	2	5	9
O'ahu	3,483	68	78	132	193	344
Lāna'i	39	0	0	0	0	0
Grand Total	**6,135**	**99**	**130**	**187**	**275**	**431**

*Note: The total number of state facilities is an underestimate, see Section 5.1 on Data Limitations.

Chart 2 takes a closer look at the 3.2 ft SLR-XA scenario with a breakdown of vulnerable facilities by Department/Agency. **Table 3** summarizes the state facilities located within each of the five analyzed sea level rise scenarios by managing Department/Agency. It should be noted that the total number is an underestimate due to underreporting (see Section 5.1 on Data Limitations for details). DOE has the greatest number of vulnerable facilities in all of the sea level rise scenarios, followed by DOT and DLNR. All but five agencies have vulnerable facilities in the 6.0 ft scenario.

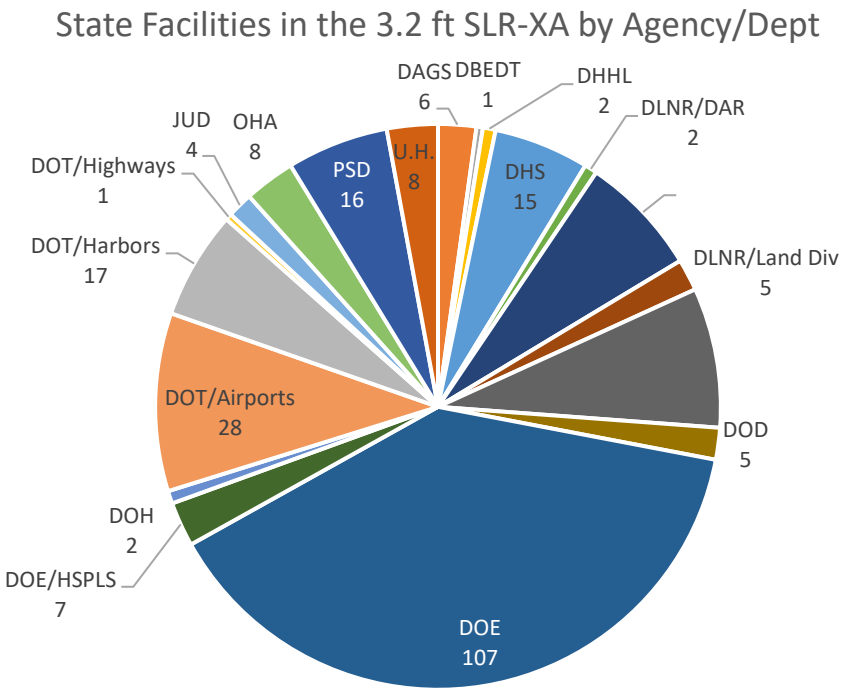

Chart 2: State facilities in the 3.2 ft SLR-XA by Agency/Dept. (275 facilities total)

Table 3: State facilities located within the sea level rise scenarios by State Dept/Agency

Dept/Agency	Total # of State Facilities*	# of State Facilities in 0.5 ft SLR XA	# of State Facilities in 1.1 ft SLR XA	# of State Facilities in 2.0 ft SLR XA	# of State Facilities in 3.2 ft SLR XA	# of State Facilities in 6.0 ft (NOAA)
AGR	69	0	0	0	0	0
B&F	1	0	0	0	0	1
DAGS	79	0	0	2	6	18
DBEDT	57	1	1	1	1	6
DHHL	7	0	0	1	2	2
DHS	413	2	4	5	15	9
DLNR/DAR	4	2	2	2	2	2
DLNR/DOBOR	29	18	18	18	19	29
DLNR/DOFAW	9	0	0	0	0	0
DLNR/Engineering	2	0	0	0	0	0
DLNR/Land Div	6	0	3	5	5	5
DLNR/State Parks	65	13	18	20	22	22
DOD	123	3	3	5	5	5
DOE	4,055	12	30	67	107	199
DOE/HSPLS	52	2	4	5	7	10
DOH	34	1	1	1	2	3
DOT/Airports	127	21	21	25	28	25
DOT/Harbors	38	16	16	16	17	33
DOT/Highways	21	0	0	1	1	3
HHSC	70	0	0	0	0	0
JUD	33	0	0	1	4	6
OHA	17	4	4	5	8	9
PSD	153	0	0	2	16	4
RCUH	3	0	0	0	0	0
UH	668	4	5	5	8	40
Grand Total	**6,135**	**99**	**130**	**187**	**275**	**431**

*Note: The total number of state facilities is an underestimate, see Section 5.1 on Data Limitations.

Table 4 summarizes the state facilities located within each of the five analyzed sea level rise scenarios by island. It should be noted that the total number is an underestimate due to underreporting (see Section 5.1 on Data Limitations for details).

Table 4: State facilities located within the sea level rise scenarios by Island and State Dept/Agency

Dept/Agency	# of State Facilities in 0.5 ft SLR XA	# of State Facilities in 1.1 ft SLR XA	# of State Facilities in 2.0 ft SLR XA	# of State Facilities in 3.2 ft SLR XA	# of State Facilities in 6.0 ft (NOAA)
Hawai'i	8	8	8	8	8
DHS	1	1	1	1	0
DLNR/DAR	1	1	1	1	1
DLNR/DOBOR	2	2	2	2	2
DLNR/State Parks	3	3	3	3	4
DOH	1	1	1	1	1
Kaua'i	8	11	11	35	19
DHS	0	2	2	12	1
DLNR/DOBOR	2	2	2	3	3
DLNR/State Parks	2	2	2	2	2
DOD	2	2	2	2	2
DOE/HSPLS	1	2	2	3	2
DOH	0	0	1	1	1
DOT/Harbors	0	0	0	0	7
OHA	1	1	1	1	1
PSD	0	0	11	11	0
Maui	13	31	34	34	51
DAGS	0	0	0	0	2
DLNR/DOBOR	3	3	3	3	3
DOD	0	0	1	1	0
DOE	0	18	18	18	28
DOE/HSPLS	1	1	2	2	2
DOT/Harbors	9	9	9	9	15
JUD	0	0	0	0	1
OHA	0	0	1	1	0
Moloka'i	2	2	2	5	9
DHHL	0	0	0	1	1
DHS	0	0	0	0	1
DOE/HSPLS	0	0	0	0	1
DOT/Harbors	2	2	2	2	2
JUD	0	0	0	0	2
OHA	0	0	1	1	1
UH	0	0	1	1	1
O'ahu	68	78	132	193	344
B&F	0	0	0	0	1
DAGS	0	0	2	6	16

DBEDT	1	1	1	1	6
DHHL	0	0	1	1	1
DHS	1	1	2	2	7
DLNR/DAR	1	1	1	1	1
DLNR/DOBOR	11	11	11	11	21
DLNR/Land Div	0	3	5	5	5
DLNR/State Parks	8	13	15	17	16
DOD	1	1	2	2	3
DOE	12	12	49	89	171
DOE/HSPLS	0	1	1	2	5
DOH	0	0	0	0	1
DOT/Airports	21	21	25	28	25
DOT/Harbors	5	5	5	6	9
DOT/Highways	0	0	1	1	3
JUD	0	0	1	4	3
OHA	3	3	3	5	7
PSD	0	0	2	5	4
UH	4	5	5	7	39
Grand Total	**99**	**130**	**187**	**275**	**431**

4.1 Discussion of Findings

The results of this initial phase provide an overview of the scope and scale of the state's vulnerable facilities, as well as offers insight into areas in need of further analysis.

Key Takeaways from the Data

The findings, grouped into two main takeaways, indicate that the impacts of sea level rise on state facilities will be statewide, but with impacts concentrated on O'ahu and three specific government agencies (DOE, DLNR and DOT).

Key Takeaway #1: Almost all islands and agencies are vulnerable in all future sea level scenarios.

- All islands, except Lāna'i, have vulnerable facilities in all the analyzed sea level rise scenarios (See Table 2)
- Of 25 agencies with facility management responsibilities, 20 agencies have vulnerable facilities in the 3.2 ft scenario (See Chart 3)
    - Budget & Finance, HDOA, HHSC, RCUH and DLNR-DOFAW are the five agencies with *no* facilities in the 3.2 ft scenario
- Statewide, there is an exponential increase in the number of vulnerable facilities as sea level rise impacts increase (See Chart 2).

Key Takeaway #2: O'ahu and DOE will be the most impacted

- O'ahu is the island with highest number of vulnerable state facilities in all sea level rise scenarios (See Chart 1)
- DOE has the highest number of vulnerable state facilities in all sea level rise scenarios
- After DOE, DLNR and DOT are the agencies with the next highest numbers of vulnerable facilities in each sea level rise scenario

Impacts to facility access must be considered when assessing vulnerability. Ka'a'awa Elementary School, separated from the shoreline by Kamehameha Highway, is partially within the 3.2 ft SLR-XA. This projection suggests that the main building, as well as access may be impacted. (Photo Credit: OPSD-CZM)

Reports of Current Flooding

During the data verification phase of the initiative, agencies were asked to indicate facilities that have experienced flooding impacts (sea level rise and rain event-related), as well as any facilities conducting (at any stage) mitigation or adaptation planning. Sixty-six (66) facilities reported experiencing flooding impacts-to-date. Departments and agencies with currently impacted facilities represent a range of uses including DHS public housing complexes in Kāneʻohe and Honolulu, DLNR-State Park's Hulihe'e Historical Place and the Kauaʻi and Oʻahu Community Correctional Centers (PSD). However, only three facilities reported considering mitigation and adaptation planning: Ala Wai Harbor (DLNR-DOBOR), OR&L Building (DAGS) and the Kapaʻa Public Library (DOE-HSPLS).

Molokaʻi has one of the fewest number of total state facilities (69), but it has the highest percentage of vulnerable state facilities in the 3.2 ft SLR-XA scenario (7.25%). Kaunakakai is the primary port of entry for ocean cargo into Molokaʻi and is vulnerable in all sea level rise scenarios. Inset photo from June 2021 King Tides shows complete inundation of the pier. (Photo Credit: Hawaii Sea Grant King Tides Project)

Sea level rise impacts affect not only shoreline parcels, but also low-lying areas, such as The Kauaʻi Community Correctional Center (KCCC) which experiences flooding during heavy rains. Inset photo is from a March 2020 rain event. (Photo Credit: Dept of Public Safety)

5. Considerations

The OPSD-CZM is appreciative of the cooperation from all the participating agencies for this initial effort. The data provided by HI-EMA and DAGS were instrumental in achieving the outcomes of this assessment. Future next steps should address the following considerations for a more robust understanding of state facility risks to sea level rise.

5.1 Data Limitations

While this inventory provides a general understanding of the scope and scale of sea level rise impacts on state facilities throughout the state, there are several data limitations that should be taken into consideration when planning the next steps of this initiative.

Under-Reporting

Preliminary findings provide an overview of the state facility vulnerabilities; however, agencies had varied levels of granularity in their reporting of facilities. All *parcels* with state-managed facilities are represented in this inventory, however the level of detail to which *individual buildings* within the campus style parcels (i.e. apartment complexes, school complexes, airports & harbors) are reported varies. This data accuracy is dependent of the level of reporting detail that is collected by each agency.

Additionally, non-facility assets that are critical for functioning, such as airport runways, are not captured in the inventory. While in most cases the 200 ft buffer included building footprints, it was not large enough to encompass entire campuses, thereby leading to a potential underestimate of vulnerable facilities. In order to account for these limitations, there is a need for more localized assessments with a more granular level of building and asset identification.

Agency Response

Agency response also created limitations on the dataset. The DOE data for this inventory was taken from the 2018 State Hazard Mitigation Plan. To the extent possible, OPSD-CZM cross-referenced the DOE dataset with desktop research and Google Satellite imagery. To the knowledge of OPSD-CZM, all DOE schools are represented in the inventory, however OPSD-CZM could not externally verify the number of individual buildings located within each school campus and was reliant on the 2018 information. DOE verification of the data is pending.

DLNR provided a response to the request for data verification by submitting a list of only facilities vulnerable to sea level rise. While providing information in this format does not affect the final count of vulnerable facilities, it does result in an underrepresentation of DLNR facilities in any counts of the total number of state facilities.

Potential impacts to state facilities will affect a wide range of public services. This section of Waimea, Kaua'i has several vulnerable state facilities, including public housing, a small boat harbor, a public library, and a recreational pier.

State tenants

The data included in this report addresses vulnerabilities to facilities

but *does not take into account the tenants within the facilities that also provide key state services*. For example, many DAGS-operated buildings are occupied by a range of other agencies that are not listed in Table(s) 3 and 4, such as DHS and DBEDT. Future assessments of state vulnerabilities to SLR, should ensure that impacts to tenant agencies that do not have operating or management responsibilities for the facilities are included.

5.2 Out-of-Scope Assets

Pursuant to Act 178, this inventory was limited to state-operated facilities. However, it is important to acknowledge that there are other key assets and forms of infrastructure that are essential for the identified state-operated facilities to continue functioning. The following table lists major categories of assets that were out of the scope of Act 178, but whose vulnerability to sea level rise impacts could have direct or indirect effects on the functionality of state-operated facilities. This table does not include federal assets.

Table 5: Critical out-of-scope assets and their managing entity.

Asset	Managing Responsibilities		
	State (non facility)	County	Private
Wastewater Treatment (facilities & pipes)		x	x
Solid Waste Management		x	
HEER sites (link)	x		
Water (potable) System (facilities & pipes)		x	
Energy generating sites	x		x
Communications (facilities & transmission cables)			x
Roads and Highways	x	x	x
Agricultural Lands & Fishponds	x	x	x
Shoreline Public Access	x		
Recreational Assets	x	x	x
Cultural Sites	x		
Historic Properties	x		
Unencumbered State Lands	x		
State-Owned Lands leased to private owners	x		

Critical Facilities

Critical facilities were not included within the scope of Act 178; however, it is important to mention that these facilities and services are essential to state operating functions. Thus, an inventory of identified critical facilities throughout the state from HI-EMA is presented here. The identified critical facilities were divided into ten (10) core functions as defined by HI-EMA and includes facilities under the management of federal, state, county, private and non-governmental entities. Similar to the analysis conducted by OPSD-CZM, each critical facility was mapped in ArcGIS, given a 200 ft buffer, then overlaid with the 3.2 ft SLR-XA scenario. The

buffers of 195 critical facilities intersect with the 3.2 ft SLR-XA; however, only 20 of those critical facilities are managed by the state (**Chart 3**). This further underscores the need to consider the vulnerabilities of out-of-scope assets, as well as coordinate with non-state government entities, when assessing the effects of sea level rise on state facilities.

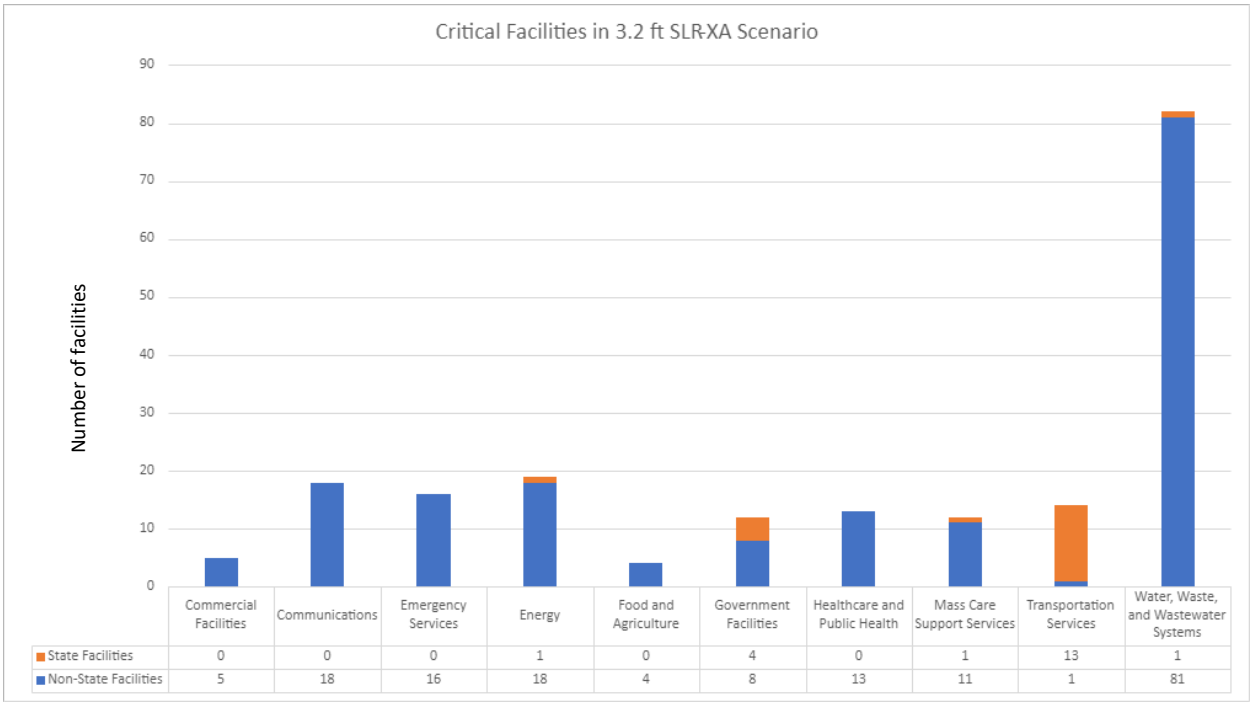

Chart 3: Critical facilities, grouped into 10 core categories, found within the 3.2 ft SLR-XA. The blue represents non-state managed facilities, the orange represents state-managed facilities.

6. Assessment of Mitigation and Adaptation Options

As described in Section 2, this initiative is an on-going and dynamic process. Additionally, the process of adaptation is inherently continuous as conditions change and understanding evolves. With the Phase 1 high-level inventory completed, OPSD-CZM is looking towards Phase 2 and facilitating in-depth, localized vulnerability assessments in order to prioritize facilities in need of adaptation and mitigation strategies. The following outlines next steps as recommended by OPSD-CZM, including considerations necessary for effective implementation.

<u>Further levels of assessment</u>
The analysis and findings in this annual report represent an Exposure Assessment, which assesses where facilities are located, and which are exposed to risk. To fully understand the impacts and vulnerabilities, more detailed and localized assessments should answer the following questions:

- *Vulnerability*: What is the probability of impact?
- *Sensitivity*: To what degree is a facility impacted? (ie. Does temporary flooding cause minimal impact/disruption or complete loss of the facility?)
- *Impact*: What are the direct and secondary impacts if a facility is temporarily or completely lost?

- *Cost*: What are the costs to repair or replace a facility? What are the economic and societal costs associated with service disruption?
- *Adaptive capacity*: What is the ability for a facility to be adapted to sea level rise impacts without significant modifications?

Currently, OPSD-CZM does not have the capacity to conduct this level of in-depth analysis for each vulnerable facility identified in Phase 1. The OPSD-CZM has initiated a literature review for other states and government entities that are planning for sea level rise adaptation and intends to reach out to stakeholders for input. Further time is needed to provide a more robust discussion.

However, as an example, as a part of the OneSF Initiative, the City and County of San Francisco created a set of instructions and resources to guide agencies on how to conduct various levels of vulnerability assessments (link). This guidance ensures that sea level rise planning and adaptation implementation is carried out in a consistent and comprehensive way across agencies and capital planning projects. This initiative is comprised of several components:

ONESF INITIATIVE

- **"Guidance for Incorporating Sea Level Rise into Capital Planning":** a brief report outlining coastal hazards, the steps to preparing for climate change, permitting and regulatory considerations, and examples of capital improvement projects with integrated climate adaptation planning.
- **"Sea Level Rise Checklist"**: a step-by-step form which provides links to resources, equations, datasets, etc. needed to accurately assess new construction, capital improvement and maintenance projects for sea level rise impacts.
- **Agency Trainings**: Agencies are provided trainings on principles of adaptation, sea level rise projections and how to use the guidance and checklist.
- **"Vulnerability Matrix"**: Responses from Sea Level Rise Checklists are input into a "Vulnerability Matrix" to identify those facilities most in need of adaptation.

Their approach creates one standardized form of evaluation that encompasses the various aspects of risk that allow for consistent assessments across agencies and state facilities. Assessments based off a standardized set of criteria provide information necessary for prioritizing facilities in need of adaptation. Due to more familiarity with the facility, the managing agencies are better equipped to conduct these assessments with guidance from a coordinating entity.

State Facility Database Standardization

Through the activities of Phase 1, it became clear that while each agency has, to an extent, their own facilities inventory, there is not one complete statewide database. The DAGS' SBAM database does capture statewide facilities; however, due to it being voluntary self-reporting, agencies report different information, and many fields are left blank. For example, there are many entries comprised of only a building name with no location information. As Hawai'i moves towards more comprehensive, statewide adaptation planning, not just for sea level rise, but other climate impacts and hazards as well, it is critical to have an up to date, standardized statewide facilities database, including coordinates for GIS mapping, that can serve as foundational information. This would ensure that plans are coordinated in their use of

a standardized and verified dataset. Such a resource would be managed by one entity and would require each agency to update their facility information with basic information.