



# Adaptation Planning for Climate Resilience

## Fort Custer Training Center

A Michigan Army National Guard Pilot Project

A demonstration project to strengthen the communities neighboring three Michigan military installations

June 2016



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Cover Photo: Michigan National Guard photos taken by Sgt. 1st Class Helen Miller



## Introduction

Domestic military installations play an essential role in the nation's defense, particularly in training and developing the men and women of our armed forces. But in a world of ever-evolving conditions and challenges, the modern military installation is tasked with much more than training activities. Today, there is an increasing recognition of the interdependence of installations with the communities in which they reside, particularly in the face of modern global challenges such as climate change that are not bound by political or geographical borders.

Several U.S. Federal agencies, including the Department of Defense (DoD), are leading pilot projects with local communities to identify shared climate change vulnerabilities and to develop local strategies to address those shared vulnerabilities. The Assistant Secretary of the Army (Installations, Energy and Environment) asked the National Guard Bureau (NGB) to identify a state to serve as the Army's pilot, recognizing the National Guard's ongoing efforts to increase the resilience of its installations in support of its disaster-response mission. Resilience is a measure of the sustained ability of a community to utilize available resources to respond to, withstand, and/or recover from adverse situations. NGB selected the Michigan Army National Guard (MIARNG) based on its ongoing sustainability and resiliency efforts and its participation in the Michigan Climate Coalition, a statewide partnership of universities, businesses, non-profit organizations and government agencies interested in climate science, adaptation, sustainability and related disciplines.

This report, *Adaptation Planning for Climate Resilience: A Michigan Army National Guard Pilot Project*, assesses current conditions, documents planning efforts, and makes recommendations to improve resilience in the Fort Custer Training Center (FCTC), Camp Grayling Joint Maneuver Training Center (CGJMTC), and Selfridge Air National Guard Base (SANGB) communities. The report details an action plan developed for Selfridge Air National Guard Base aimed at responding to and preventing the adverse impacts of climate change on the installation as well as in the greater community.

## Federal Framework

This project fulfills a number of federal directives to address climate change on Department of Defense installations. In 2013, the President of the United States charged the Department of Defense to prepare for the impacts of climate change, in part by increasing resiliency on military installations. Resiliency, according to this Executive Order, is “the ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions.”<sup>1</sup> The Department of Defense's 2014 Climate Change Adaptation Roadmap addressed some of the high-level challenges anticipated for the military's domestic activities, noting:

“Our coastal installations are vulnerable to rising sea levels and increased flooding, while droughts, wildfires, and more extreme temperatures could threaten many of our

<sup>1</sup> Executive Order 13653

training activities. Our supply chains could be impacted, and we will need to ensure our critical equipment works under more extreme weather conditions. Weather has always affected military operations, and as the climate changes, the way we execute operations may be altered or constrained.”

The Department of Defense issued DoD Directive 4715.21 – Climate Change Adaptation and Resilience (January 14, 2016) to formalize the roles and responsibilities laid out in DoD’s 2014 Climate Change Adaptation Roadmap. The Directive tasks the DoD Components (including the Army) to assess and manage risks to built and natural infrastructure, basing, and disaster-response mission planning and operations. The Directive also tasks the DoD Components to “collaborate with internal and external stakeholders to address common climate change challenges and opportunities, including regional planning efforts.”

The U.S. Army’s 2015 Energy Security & Sustainability Strategy (ES2 Strategy) calls on Department of Defense installations to integrate resiliency concepts into base operations and land-use planning. “The ES2 Vision describes a strong, mobile, and flexible force that is housed, trained, and maintained on resilient installations that are able to project power, unimpeded by disruptions to domestic utilities or land use constraints.”

The recommendations in this report respond to these federal mandates by increasing the resiliency, self-sufficiency, and preparedness of FCTC while protecting the Michigan Army National Guard’s ability to fulfill its mission in the face of a changing climate.

## Regional Climate Trends

As stated by the Intergovernmental Panel on Climate Change (IPCC), significant changes in the Earth’s climate have been observed. The impacts of climate change on agriculture, infrastructure and human health can be felt across the Great Lakes region.

The Great Lakes Integrated Sciences and Assessments Program (GLISA) is a partnership between the University of Michigan and Michigan State University, housed in the Graham Sustainability Institute’s Climate Center at the University of Michigan. As one of 10 regional centers funded by the National Oceanic and Atmospheric Administration (NOAA), GLISA builds capacity to manage risks from climate change and variability in the Great Lakes region.

According to GLISA, temperatures in the Fort Custer region are expected to increase, both in terms of averages and extremes. Assuming current greenhouse gas emission rates continue to rise, South Central Lower Michigan is expected to see a 4.5°F to 5.0°F increase in average air temperature between 2041 and 2070. An additional 30 to 40 days per year are expected to exceed 90°F. The growing season (frost-free season) will likely extend to include an additional 40 to 50 days each year by 2100.

Precipitation is projected to increase on average but concentrate in more intense and frequent precipitation events, likely resulting in greater periods of both extreme flooding and extreme drought. An additional 2 to 3 inches of annual precipitation is expected for

South Central Lower Michigan, and the number of days each year experiencing heavy rain falls is expected to increase by at least 1 day per year.

## Process

To develop this report, the project team conducted a two-day planning exercise at Fort Custer Training Center on March 23 and 24, 2015. The process included two public meetings designed to investigate ways that the MIARNG and the surrounding communities could work together, leverage resources, and develop a common understanding of shared risks and how they could be addressed. A wide range of stakeholders, including installation leaders, state and local agencies, and the general public, were invited to participate in order to develop a clear understanding of local risks and opportunities associated with climate change. Participants worked to identify priorities and actions to reduce the risks associated with climate change. The project team conducted a series of scenario activities to identify local solutions to a series of potential climate futures. Finally, participants reviewed climate resilience ideas from around Michigan to identify which specific projects and actions could improve local readiness.

A detailed assessment of the Fort Custer community's vulnerability to the potential impacts of local climate change was also conducted. A summary of the vulnerability assessment is provided in the full project report.

## Fort Custer at a Glance

Fort Custer is home to the 177th Regiment, Regional Training Institute, and the Regional Maintenance Training Site. The facility is federally owned and state operated and is also home to United States Navy Reserve and United State Army Reserve units.<sup>2</sup> These relationships allow Fort Custer Training Center to support strategically-valuable assets in addition to fulfilling its mission as a Michigan Army National Guard installation. The Training Center contains over 7,500 acres of land, including 4,225 acres of maneuver land. In 2014, the installation served as a training site for a total of 156,313 individuals. Fort Custer's training facilities are among the most heavily used in the Midwest by the Michigan National Guard and other branches of the armed forces.

Notably, Fort Custer is taking a proactive approach to increase its resilience by reducing its greenhouse gas emissions and increasing its energy security posture. Fort Custer Training Center is implementing a series of alternative energy projects, including a 144 kW solar array and a wind funnel. Additional solar projects, a micro-grid and energy storage capability is planned for 2017.

Fort Custer Training Center is the recipient of numerous awards for its environmental

<sup>2</sup> Fort Custer responds to decades of challenge and change, March 28, 2005, The Battle Creek Enquirer, Jim Richmond, <http://archive.battlecreekenquirer.com/article/20050328/LIFESTYLE08/503280302/Fort-Custer-responds-decades-challenge-change>. Fort Custer Training Center, accessed on March 3, 2015, Michigan Army National Guard, <http://minationalguard.com/fort-custer-training-center/>. U.S. Department of Veterans Affairs: Fort Custer National Cemetery, accessed on March 20, 2015, <http://www.cem.va.gov/cems/nchp/ftcuster.asp>.

stewardship. The installation is home to at least 32 of Michigan's threatened and endangered species, including a variety of native butterflies and moths, cerulean warbler, prairie vole, Indiana bat, eastern box turtle, eastern massasauga rattlesnake, bald eagle, and trumpeter swan. Many of these species live in the relatively undisturbed wetland habitats on the installation. These wetland areas, along with other important habitat lands, are monitored for potential impacts from human activity.

In accordance with DoD directives to further the conservation of such species, the installation's Integrated Natural Resource Management Plan identified a series of high priority projects. Installation staff are working with the US Fish and Wildlife Service (FWS), the Michigan Department of Natural Resources (MDNR) and all other cooperating agencies on monitoring and tracking these projects. Plants currently being monitored include invasive species like garlic mustard and purple loosestrife. There are also a number of projects focused on larger-scale land management objectives, including erosion and sediment controls, surface water monitoring, wetland monitoring, and fire management activities.

Due in part to the installation's proximity to Chicago, Detroit, and Indianapolis, Fort Custer Training Center is in a strong position to serve the community during times of emergency. The installation temporarily housed displaced citizens in the weeks after Hurricane Katrina in 2005. In 2010, Fort Custer Training Center housed emergency responders and State employees following the Kalamazoo River oil spill. Notably, the Michigan Emergency Management Plan for Evacuation and Mass Shelter Support (2014) refers to Fort Custer Training Center as a facility that may have capacity for temporary mass shelter during a statewide or national emergency.

## Key Issues

Fort Custer is home to a number of tenants, many of whom are considered strategically-valuable assets to agencies outside of the Michigan Army National Guard. Therefore, climate-related events will impact the Michigan Army National Guard as well as the other Federal and State missions that Fort Custer's tenants serve. Fort Custer's efforts to become more resilient (e.g., to be able to maintain critical operations during disruptions to the electricity and water grids) are even more strategic given the many missions the installation supports.

Fort Custer is a finalist in consideration as an East Coast Missile Defense site. If selected, there will be significant implications for the installation's overall operating budget, energy footprint, natural resources and ecology, and economic impact on the larger community. These factors present both positive and negative impacts that must be thoroughly evaluated.

Fort Custer has a history of water runoff issues, and an increase in precipitation will have an adverse effect on the installation. On one occasion, severe rain events caused flooding on the installation's training grounds and ranges as well as flood damage to surrounding residences.

The installation is also home to a variety of threatened and endangered species that must be carefully managed given warmer temperatures and increases in invasive species. Ensuring the health of native, threatened, and endangered species will become increasingly challenging as the climate continues to change.

If the intensity and frequency of severe storms increases, the installation's capacity to shelter displaced citizens and provide vital support to surrounding communities will be even more important to maintain. Currently on the installation, outdated structures and insufficient communication systems may impede the emergency response capability and readiness to complete Defense Support for Civil Authority missions. There are additional communications infrastructure issues that inhibit the MIARNG's to communicate that can be affected by heavy rain events and severe storms.

## Action Plan

The following goals and actions are a result of a series of in-depth stakeholder interviews, public input from a two-day planning charrette focused on the Fort Custer Community, a Vulnerability Assessment conducted for the Fort Custer Community, and recommendations made by installation leaders and the project steering committee, the Michigan Climate Coalition (MCC). Not all recommendations and actions are the MIARNG's responsibility, as several are community-wide recommendations that would be best led by local governments, watershed groups, or other NGOs.

### Natural Resources

**Goal:** *Better manage the urban tree canopy in surrounding communities to maximize cooling and flood control.*

- **Action:** Update the tree canopy assessment with the most recent aerial photography.
- **Action:** Explore methods to measure the quality of the urban tree canopy.
- **Action:** Increase the tree requirements for public infrastructure improvements and private development.
- **Action:** Identify areas of the community with limited access to air conditioning units, and focus tree-planting programs there to increase tree canopy and decrease average temperature.

**Goal:** *Enhance management of natural resources.*

- **Action:** Identify climate-related stressors and priority habitat connectivity areas at Fort Custer and incorporate proactive management strategies into installation real property master plans.
- **Action:** Survey land and schedule projects as necessary to manage water runoff to prevent future flooding of nearby residential areas.
- **Action:** Integrate climate change trends and data into updates of the Integrated Natural Resources Management Plan in order to best manage sensitive ecosystems at Fort Custer, such as fens.
- **Action:** Submit a project request to the National Guard Bureau's Installations, Logistics and Environmental Division for funding for prairie restoration in the southern portion of Fort Custer.
- **Action:** Build on the coalitions already in place in the Kalamazoo Watershed Council and the Total Maximum Daily Load working group to increase watershed-wide natural resource enhancement.

- *Action:* Enhance education efforts to foster better environmental stewardship by engaging zoos, nature centers, and museums.
- *Action:* Restore ecosystem services wherever possible.
- *Action:* Identify adaptation goals and projects to increase natural resource resilience.

## Infrastructure

**Goal:** *Collaborate with the Michigan Department of Transportation (MDOT) to reduce vulnerabilities of the road and infrastructure network in the region.*

- *Action:* Assess the opportunity to apply green infrastructure in the region similar to efforts underway in Grand Rapids.

**Goal:** *Support expansion of clean energy infrastructure and development.*

- *Action:* Look for opportunities in the private and public sector to take advantage of P.A.C.E. (Property Assessed Clean Energy).
- *Action:* Conduct an assessment of energy efficiency opportunities and implement findings throughout the installation, especially in new construction.
- *Action:* Continue to generate additional alternative energy under the \$2 million Environmental Security Technology Certification Program (ESTCP) project, lowering the installation's reliance on outside power sources and its utility costs in alignment with the U.S. Army's Energy Security & Sustainability Strategy.
- *Action:* Continue working with Consumers Energy for alternative energy opportunities, including ways to manage excess electrical output from planned renewable projects.
- *Action:* Partner with 110th Air Wing and Marine Reserve facility to support their future energy requirements with electrical output from planned renewable projects.
- *Action:* Work with the Missile Defense Agency to synchronize plans for future development on Fort Custer to provide electrical output from planned renewable projects for their future operations.
- *Action:* Document the lifecycle cost savings of high-performance sustainable building design to justify potential up-front incremental cost (if any) to renovate existing structures and build new construction according to green design standards.

**Goal:** *Improve or remove dams along the Kalamazoo River so they are no longer rated structurally insufficient.*

- *Action:* Conduct a vulnerability assessment of dams to prioritize improvements to dams and identify the potential impact of dam failure on Fort Custer.

**Goal:** *Identify and reduce the vulnerability of existing and new homes and infrastructure to impacts of heavy rain, flooding, high wind, and severe winter storms both on and near the installation.*

- *Action:* Coordinate with Kalamazoo County and Calhoun County Drain Commissioners and other key stakeholders to develop a water runoff, draining, and wetlands management plan around key sites, including possible missile defense sites and nearby homes and buildings.
- *Action:* Assess whether MIARNG training and operational activities may disrupt infiltration, increase stormwater runoff, and affect nearby homes and buildings.
- *Action:* Document and evaluate the impact of severe storms and high-wind events on the communication systems of armories and installation command centers.
- *Action:* Identify and prioritize backup supply and maintenance of any critical infrastructure on-post at risk during severe weather including important roadways, helicopter landing areas, and ranges.

- *Action:* Integrate higher wind speeds, and updated flood maps and rain standards, into upcoming capital improvement projects on the installation.
- *Action:* Explore strategies to reduce the vulnerability of homes, especially mobile homes, to storm events. This may include mechanisms like building codes and landowner guidelines.
- *Action:* Submit a project request to the National Guard Bureau's Installations, Logistics, and Environmental Division to address soil erosion issues on Fort Custer to protect on-post and downstream homes, infrastructure and water quality.
- *Action:* Reevaluate storage and equipment needs for road salt and snow plowing equipment and develop a plan to disseminate resources to the most essential locations on the installation.

## Economic Development and Population Shifts

**Goal:** *Convene a group to identify strategies to increase regional economic resilience.*

- *Action:* Identify which sectors of the local economy may be most impacted by climate change and work to address threats to these industries.
- *Action:* Partner with the Southwest Michigan Sustainable Business Forum to identify opportunities for economic growth and development using renewable resources and reducing dependency on foreign oil.

**Goal:** *Prepare for a potential influx of climate refugees to Michigan as climate conditions worsen elsewhere in the country.*

- *Action:* Work to update the zoning ordinance in rural areas of the community to limit sprawl and poorly planned development in anticipation of development pressure.
- *Action:* Establish a working group with local community leaders, universities, and NGOs to identify additional ways to prepare the community for increases in population.

## Emergency Response and Preparedness

**Goal:** *Ensure emergency shelters are meeting the current and projected needs of the population.*

- *Action:* Work with local health departments to identify gaps in community shelter locations and services.
- *Action:* Provide free bus fare during an emergency weather event.

**Goal:** *Increase interagency collaboration and foster multijurisdictional collaboration in times of emergency.*

- *Action:* Seek additional funding to improve and increase the resiliency of the installation for State domestic response missions, including backup power, energy storage, cooling centers, and water purification means.
- *Action:* Develop a revised domestic response plan for Battle Creek and the surrounding community.
- *Action:* Revisit installation emergency management plans and evaluate current operations for mission readiness during times of weather-related emergencies like severe rain storms, high winds, and blizzards.
- *Action:* Update Continuity of Operations (COOP) or Continuity of Government Plans and synchronize at the local, state, and federal levels to ensure all efforts harmonize.
- *Action:* Rehearse emergency operations strategies to identify interdependencies and opportunities to improve communication networks.
- *Action:* Synchronize communication plans and identify needed improvements to maintain emergency communications with Civil Support Teams, the Army G6, and A6 of the Air Wing, and other nearby agencies including airports and the Michigan State Police.

- *Action:* Continue funding and work to expand the Response Consortium, part of the Battle Creek Police Department, which was created to foster collaboration among social services and government departments with regard to emergency response.

**Goal:** *Better meet the needs of vulnerable populations in the community.*

- *Action:* Bring together a diversity of community advocates to address transportation and housing needs of socioeconomically disadvantaged and elderly populations.
- *Action:* Build website and Story Board to educate the public about resilience and Fort Custer renewable projects and partnerships.

## Land Use

**Goal:** *Promote local, sustainable farming techniques that can adapt based on climate change impacts.*

- *Action:* Partner with existing Farmer's Markets to establish pop-up farm stands in neighborhoods with increasingly limited access to fresh, local food.
- *Action:* Work with farmers to identify existing agricultural products that are intolerant to projected climate conditions in order to increase the resiliency of agricultural land uses.
- *Action:* Work with farmers to identify strategies to reduce or eliminate fertilizer runoff that is contaminating the Kalamazoo River.
- *Action:* Look for opportunities to establish community gardens in underserved neighborhoods in order to strengthen the local food economy.
- *Action:* Examine ways to further reduce waste, such as a composting program and a more rigorous recycling program.

**Goal:** *Explore a Joint Land Use Study (JLUS) for Fort Custer.*

- *Action:* Use a JLUS as an opportunity to integrate climate-related data into analysis of energy compatibility, natural resources, water, and land restrictions.

**Goal:** *Work with local and regional jurisdictions to grow in a way that is in line with climate adaptation best management practices.*

- *Action:* Implement low impact development practices in all new development.
- *Action:* Incorporate bike lanes and other multi-modal infrastructure in all road repairs.
- *Action:* Establish a resilience task force for collaboration during non-emergencies.

## Next Steps

MIARNG will continue to engage in ongoing state and local planning efforts both in Michigan and in the greater Fort Custer area. Fort Custer leaders plan to continue to monitor the most up-to-date and emerging climate trends and regional projections, and share the information with state/local planning entities.