



The Corps

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Integrating USACE tools to help achieve Net Zero energy

By Jim Frisinger

U.S. Army Corps of Engineers Fort Worth District

Looming large for military installations are deadlines to meet energy optimization and reduction goals in the federal push toward Net Zero compliance. A two-year Department of Defense grant is helping an Army Corps of Engineers team develop a new user-friendly tool so installation managers can get there.

The \$1.22 million Environmental Security Technology Certification Program (ESTCP) grant includes funding for demonstration programs at Joint Base Pearl Harbor-Hickam, Hawaii, and Fort Hood, Texas.

“It’s my job to help our federal customers meet the mandates that came about starting in 2005 to meet the very strict and lofty goals for energy, water and waste reduction,” said Rumanda Young, master planning section chief for Fort Worth District’s Regional Planning and Environmental Center. “These are requirements that have real numbers associated with them, and real hard deadlines on when we have to see the reductions and savings.”

“It’s fair to say that’s a very challenging goal,” said Dr. Michael Case, Young’s co-investigator on the grant. He is a program manager for installations at the U.S. Army Engineer Research and Development Center, Construction Engineering Research Laboratory (ERDC-CERL) in Illinois.

The Army has set strategic goals for having nine Net Zero energy installations by 2020 and promulgated a January 2014 directive for all installations to implement Net Zero Energy, Water and Waste to the maximum extent practical and fiscally prudent. For energy, Net Zero means an installation produces as much energy on site as it uses during the course of a year.

As the largest single tenant in the country, DOD owns or operates

2.2 billion square feet and spent \$4.1 billion on energy for fiscal year 2011. At the end of the two-year grant, the USACE team will report to the ESTCP leadership in Washington, District of Columbia, to help determine viability for wider use of the technology.

Case and Young each bring a separate tool to the table, which will be merged to demonstrate their concept of integrating base energy management with master planning.

Young has worked with Fort Hood throughout the years to develop the Comprehensive Army Master Planning System (CAMPS) dashboard. It began as a mapping program to better use space to meet new mission requirements. CAMPS gives Fort Hood real-time data on how to track people and places across the sprawling Army installation, one of the largest in the world.

CAMPS has already been integrated with Fort Hood area development plans that guide future land use. They detail where new growth will be directed, where some buildings will be demolished, and how regulations restrict what can and cannot be built. These are critical factors for Directorate of Public Works (DPW) planners who develop sustainment, restoration and modernization (SRM) work plans to allocate base capital investment.

In the meantime, Case has been developing a processes tool for life-cycle energy use analysis and forecasting. More recently his Net Zero team added water and solid waste capabilities, and the tool was renamed Net Zero Planner.

“We needed a holistic view across all these things because they affect each other,” Case said.

With Net Zero Planner, building-by-building and project-by-project analysis is augmented with a broader, installation-wide vision that incorporates master planning, Case said. It combines conservation (reducing waste and cutting demand for water and power) with a fresh look



Ford Island, a Joint Base Pearl Harbor-Hickam in Hawaii, is one of two demonstration sites USACE is using to deploy its new Net Zero tool. The island hosts training and has a large historic footprint as the site of an airfield and Battleship Row, which drew the attack of Japanese bombers Dec. 7, 1941. (Photo by Seaman Johans Chavarro, U.S. Navy)



To facilitate YPG’s important mission while at the same time conserving the proving ground’s wildlife population, wildlife biologists have actively sought to determine where populations of Sonoran tortoises like this one live.

Home on the range – even for tortoises

Story and photo by Mark Schauer

Yuma Proving Ground, Arizona

At the end of October, the Yuma Proving Ground’s population of Sonoran Desert Tortoises was preparing for brumation, the reptilian equivalent to hibernation. Humans responsible for their stewardship, however, were celebrating a year of discovery about the desert creatures.

“We learned more this season about tortoises in this region than has ever been known,” said Daniel Steward, Yuma Proving Ground (YPG) wildlife biologist.

To facilitate YPG’s important mission while at the same time conserving the proving ground’s wildlife population, wildlife biologists have actively sought to determine where populations of desert tortoises live, searching for the creatures in plots of land most likely to have them present. Steward says that, unlike the Mojave Tortoise, which is not found at YPG, Sonoran Tortoises prefer rocky areas with lots of shelter sites.

“Most of the tortoise activity is up on the mountains where YPG conducts less activity,” Steward said. “That reduces a great deal of conflict with our mission because most activities are down in the flats.”

Sonoran Desert Tortoises spend most of their lives in underground burrows. They can survive for more than one year without water, getting most of their liquids from the plants they eat. They are most active in the periods that immediately follow monsoons.

“Tortoises have a slow metabolism and are well adapted to this environment, so they only have to drink a few times a year,” he said. “They can store water in their bladder. One of the risks of people

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Al Meyer, a Galveston District project engineer, holds a European Barn Owl during a visit to a dredge placement area in the Houston Ship Channel in Texas to review the bird abatement program that began March 6. The barn owl is one of nearly a dozen birds used in this innovative and environmentally sensitive effort to temporarily deter migratory birds from nesting in the project site until the construction phase concludes this summer. Meyer, who serves as the lead engineer in charge of the Houston Galveston Navigation Channel Multiple Site Repairs, said he is proud of his work. "Every time I look out of a window on the north side of the Jadwin Building [in Galveston] I can see the difference we are making. The work is tangible; you can see the results on the nautical charts or Google Earth or right outside our windows." (Photo courtesy U.S. Army Corps of Engineers Galveston District)



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Whenever possible, please enjoy
The Corps Environment
without using paper.



Tortoises

Continued from Page 1

handling tortoises is that they will urinate, and when they urinate they are giving up vital water resources.”

To track the tortoises and study their habits, biologists attach small VHF transmitters and GPS data loggers to the shell of each tortoise they find. They also paint a unique number on the tortoise’s shell, and file a small notch through one of the keratin scutes at the thin rear edge of the shell, which has a consistency similar to a human fingernail. All this is done after an examination of the tortoise’s health and weight.

Coaxing one of the creatures out of its shelter can be a challenge: if they feel threatened, they oftentimes wedge themselves against the rear wall and ceiling of their miniature caves, which can be yards deep.

“They’re shockingly strong,” said Hillary Hoffman, a herpetologist with the Arizona Game and Fish Department who has been coming to YPG since 2009. “If they don’t want to come out, they’re not coming out.”

Once the data loggers are attached, biologists seek out the tortoises with an antenna to track the transmitters. To reduce the weight of each data logger and avoid hurting the tortoise, batteries must be changed on a monthly basis, at which time the biologists retrieve stored data.

“That data can then be used to look at how far these tortoises travel from their shelter sites,” Steward said. “Plus, a lot of times when you are following a tortoise in a good area with lots of shelter sites, it will guide you to other tortoises.”

So far this season, the biologists have found 20 tortoises, a dramatic and unexpected increase beyond the two they found in the last study three years ago. Steward thinks the selection of study plots helped the effort.

“It’s always been thought that overall population densities out here were low,” said Hoffman. “Perhaps there are pockets of high density, but range-wide the habitat is just not appropriate. It’s a dry, dry, dry part of the state.”

There have been persistent rumors in recent years that the Sonoran Tortoise could be added to the federal government’s Endangered Species List. According to Steward, this possibility should not interfere with YPG’s longstanding mission if it occurred.

“The Endangered Species Act is a process-driven law,” Steward said. “It wouldn’t affect what we do; it would affect our planning process. In any wildlife conservation activity, you first want to avoid impact then minimize impact — lastly you mitigate impact. This research gives us the information we need to be able to assess future impacts on this species and allows us to better support YPG’s mission while ensuring tortoise conservation.

With YPG’s efforts to conserve tortoises and the interagency cooperation, Steward is hopeful the tortoise will not be federally listed. In the meantime, the search and tracking effort continues.

“Everything is bigger out West — Yuma Proving Ground is a monstrous range that is bigger than the state of Rhode Island,” Steward said with a smile. “We have a crew of people trying to determine the population, size and location of a small, subterranean reptile. That’s a pretty big feat.”

USACE releases robust climate change, strategic sustainability plans

By Moira Kelley

Office of the Assistant Secretary of the Army (Civil Works)

The U.S. Army Corps of Engineers released its Climate Change Adaptation Plan and annual Strategic Sustainability Plan at the end of October in response to Executive Orders 13514 and 13653.

“The U.S. Army Corps of Engineers has been factoring in climate change and its impacts to all its missions and operations for decades. The Corps of Engineers is working with the Obama Administration to identify and address the existing and future risks and vulnerabilities of climate change and ensure that communities and ecosystems are protected and flourish,” said Jo-Ellen Darcy, Assistant Secretary of the Army (Civil Works) and U.S. Army Corps of Engineers’ Senior Sustainability Officer.

“We are making sustainability a part of all the decisions we make in designing, constructing and managing water infrastructure. In the coming years we will reduce greenhouse gas emission, reduce non-tactical vehicle petroleum consumption and increase renewable electricity consumption,” she said.

The Sustainability Plan provides an overview of how USACE is saving taxpayer dollars, reducing carbon emissions, cutting waste and saving energy. USACE is concentrating on several focus areas, to include implementing energy and water conservation measures; implementing a Non-Tactical Vehicle Fleet Management Plan; implementing not less than \$10 million in energy savings performance contracts in support of the President’s Performance Contracting Challenge; and influencing visitors’ behavior at USACE recreation facilities to reduce energy and water consumption.

At the same time the plans were being released, former Corps of Engineers employee William D. Goran was recognized as this year’s GreenGov Presidential Awards Climate Champion. Goran served as the director of the Center for the Advancement of Sustainability Innovations (CASI) for the U.S. Army Engineer Research and Development Center’s Construction Engineering Research Laboratory in Champaign, Illinois.

Goran is universally recognized as a pioneer in federal agency efforts to integrate the impacts and risks of climate change into federal planning processes. His work began in 2007 when he proposed a technical focus area on climate change with CASI. Also in 2007, he co-founded with NASA the Interagency Forum on Climate Change Impacts and Adaptation, which provides an opportunity for the federal community to share technical information and best practices related to impacts of climate change on federal agencies’ resources and missions.

Goran’s award marked the second year the Army Corps of Engineers has been recognized with a GreenGov award. Last year, Kathleen White of the Institute for Water Resources and Mark Huber of the Army Geospatial Center received the Climate Champion Award as part of an interagency team that developed a Sandy Sea Level Rise tool, and Jeanette Fiess, Northwestern Division’s sustainability and energy program manager, received the Sustainability Hero Award.

The Corps of Engineers 2014 Climate Change Adaptation Plan assesses key

vulnerabilities to the impacts of climate change — such as severe weather, sea level rise or flooding — and outlines how the agency plans to address those impacts to protect its missions. It describes activities that evaluate the most significant climate change related risks to agency operations and missions both in the short and long term. It outlines actions the Army Corps of Engineers is taking to manage these risks and vulnerabilities.

“The release of these two plans demonstrates the focus the U.S. Army Corps of Engineers is placing on sustainability and on mainstreaming climate change adaptation for our constructed and natural water-resources infrastructure,” said USACE Chief of Engineers Lt. Gen. Thomas Bostick. “Addressing sustainability and climate change are critical for us as an organization and the important work we do for the nation now and into the future.”

Members of the U.S. Army Corps of Engineers are engaging in external collaboration, improving their understanding of climate change impacts and vulnerabilities, and developing new policy and guidance to support adaptation implementation based on the best available and actionable science.

Use the following links for additional information about the plans.

Sustainability Plan: <http://go.usa.gov/FAVj>.
Climate Change Plan: <http://go.usa.gov/FAV5>.

Editor’s note: Additional information was provided by the Headquarters Corps of Engineers public affairs office.

ENVIROPOINTS

New instruction building at Presidio of Monterey saving DLI water, energy

Story and photos by Patrick Bray
*U.S. Army Corps of Engineers
 Sacramento District*

When the Defense Language Institute at the Presidio of Monterey, California, asked the Sacramento District for a modern instruction building to improve its campus but also be environmentally friendly, the district looked no further than Mother Nature.

With natural features in mind such as rain and sunlight, the district constructed an environmentally sustainable building that stands out from the others on the Presidio.

Lighting efficiency was achieved by installing skylights, designing the building with an open courtyard at the center, and installing windows in every classroom and faculty office space. Natural light illuminates almost every interior space, cutting electricity costs. The open courtyard provides light to all interior-facing classrooms and the large conference room below it through skylights.

Water that will ultimately be waste water from toilets will not be pulled from the local water supply, but instead be collected by the building. Rainwater from the roof is filtered and gravity fed into two 35,000-gallon underground cisterns. The water is then pumped back into the building for use in toilets.

Working closely with the Presidio, the Sacramento District was able to officially turn over the project Oct. 17.

“There was a tremendous team effort by

all of us to get us to where we are today and being able to do this ribbon cutting,” said Capt. Andrew Boggs, Sacramento District project engineer. “It was a far bigger project than just construction.”

The new environmentally friendly building will help the Presidio achieve its Net Zero energy goal by 2030. The building was constructed to meet the Leadership in Energy and Environmental Design rating system classification or LEED-Silver certification. LEED classifies a building’s balance of economy, quality, energy and water efficiency, occupant health and waste generation characteristics. Buildings can be rated as LEED-Certified Silver, Gold or Platinum.

“This move gets us closer to our vision of having a walkable campus in the middle of the Presidio,” said Steve Collins, the Foreign Language Center’s chief of staff. “Additionally, we are meeting Department of Defense standards for building green, while providing students with a state-of-the-art facility that is equipped with the most modern technology.”

This building, along with two others constructed by the district, adds 205 classroom spaces to a more centrally located campus on the Presidio. Previously these classrooms were spread out among several buildings. Faculty, staff and students moved into the new 110,000 square-foot four-story building mid-September.

The classrooms, where students will spend the majority of their time, are also designed to provide an optimum learning



The interior courtyard of the new general instruction building for the Defense Language Institute Foreign Language Center at the Presidio of Monterey in California Oct. 16. The skylights are designed to provide natural light to the conference room below it, cutting electricity costs. The building incorporates the latest energy and water conservation technologies in order to operate more efficiently and in a sustainable, environmentally friendly manner.

environment. The Defense Language Institute Foreign Language School is the largest foreign language training facility in the western world, which is under the command of the U.S. Army Training and Doctrine Command. It is currently training about 3,000 resident students in more than 75 languages and dialects.

“Everything is done with ergonomics in mind,” said Debbie Owen, a district interior designer. “We want students and teachers to be able to move around and prevent things such as carpal tunnel. Ultimately, it is really about the students.”

How it works



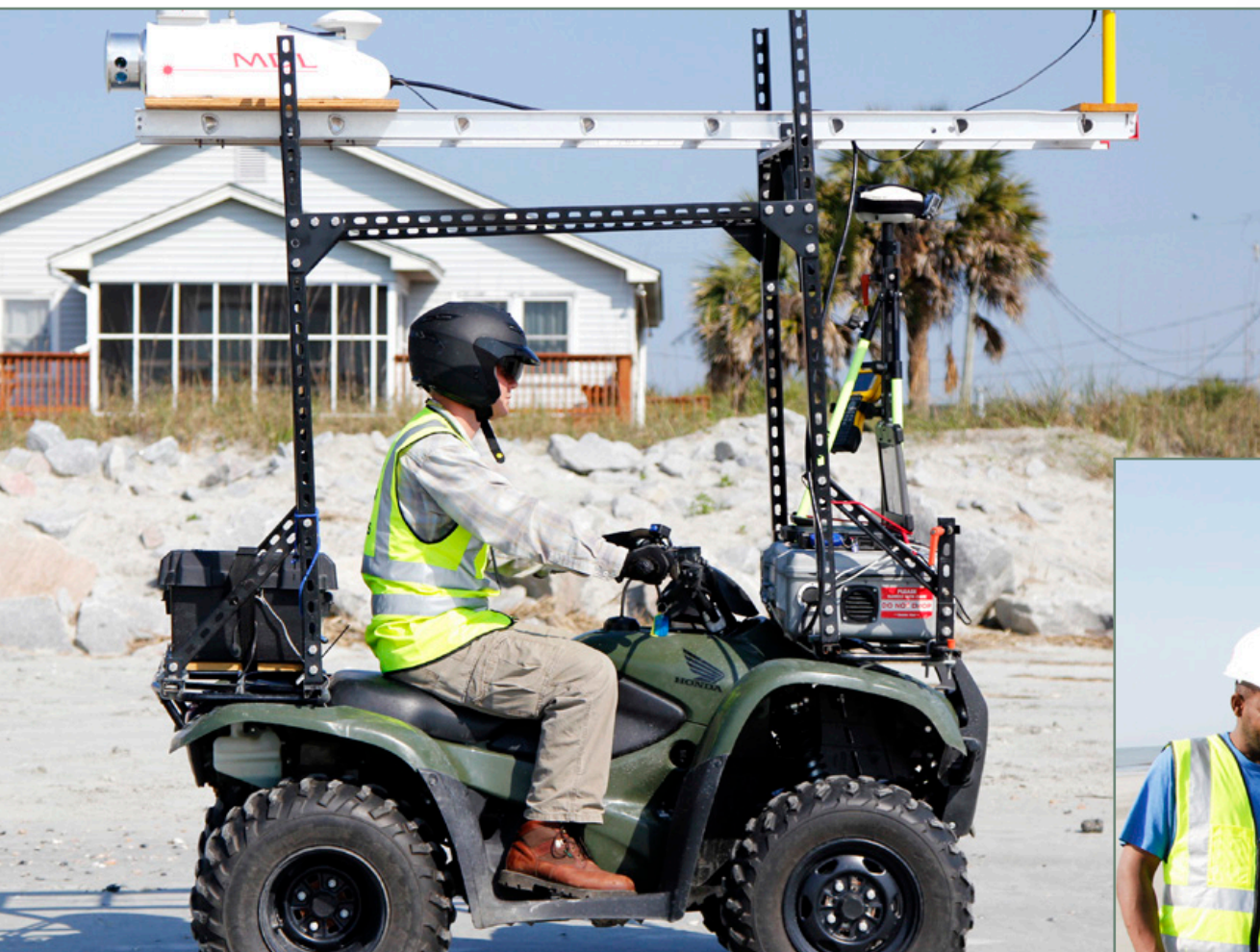
Water that will ultimately be used in toilets will not be pulled from the local water supply, but instead the building will collect it by recycling rainwater from the roof.



The rainwater is filtered and gravity fed into two 35,000-gallon underground cisterns. The water is then pumped back into the building for use in toilets.



Meet the RAMbLr



ABOVE: Matt Boles rides along Folly Beach collecting data using LiDAR. **RIGHT:** Kenny Millbrook, Matt Foss and Matt Boles analyze data that was recently collected on Folly Beach using LiDAR. (Photos by Sara Corbett)



By Matt Foss
U.S. Army Corps of Engineers
Charleston District Survey Section

Charleston District's survey section is no stranger to using advanced visualization technologies to support the district's decision makers. Recently, while hosting a seafloor mapping STEM (science, technology, engineering and mathematics) outreach event with the College of Charleston's Marine Geology Mapping Group in South Carolina, the survey team was introduced to the Dynascan mobile Light Detection and Ranging (LiDAR) mapping system. The district's surveyors saw significant benefits to using this technology for their mission.

Following the event, the team collaborated with the equipment vendor to perform a test and evaluation of the mapping system. The team mounted the LiDAR system on its 23-foot survey vessel and quickly configured the systems for operation. After a few uses, it quickly became evident this would be an excellent tool to improve maintenance and management of district projects.

The need for accurate, time-sensitive topographic data arose at the Morris Island disposal site in Charleston Harbor soon after the district acquired a LiDAR system in 2013. The large and remote site posed access difficulties that would be costly to overcome using conventional methods. A traditional GPS survey of the project area would have taken several days to complete.

To surmount these challenges, the survey crew designed and fabricated a frame to mount the LiDAR on an all-terrain vehicle. With the ATV, the team was able to complete the survey in one day, collecting significantly more data points than could have been collected otherwise. The ability to move the unit from a vehicle to a vessel, with full functionality achieved in less than an hour, was an obvious benefit. That was the official birth of the Rapid Assessment Mobile LiDAR, or RAMbLr.

Anyone who has worked with LiDAR can attest that its benefits cut both ways: More data can be a positive (in terms of detail provided) or a negative (when managing massive data sets). The survey crew and

design engineers collaborated to develop procedures that ensure a balanced data acquisition strategy of prioritizing the collection of high-value data necessary for project design while reducing processing time.

With the integration of the RAMbLr, the team has capitalized on its newest ability by providing an efficient long-term beach monitoring solution. The South Carolina coast is characterized by wide beaches. Of these beaches, USACE has periodic storm damage reduction projects in Myrtle and Folly beaches. Using this system to collect snapshots in time of beach conditions allows scientists and engineers to understand the complicated dynamics of the sea and shore interface.

Many of the natural processes on these beaches are complicated by the use of shoreline stabilization structures and the data obtained with this technology will enable improved understanding and assessment of the structures' performance.

In addition to long-term monitoring, the system can be deployed quickly before and after a major storm to quantify damage, in terms of material lost,

from protective beaches. This could help in long-term planning in an era of predicted increased storms.

The system was employed during the Folly Beach shore protection project to provide accurate condition assessments in addition to traditional quality assurance checks.

The data collected with the system has been invaluable to project managers in assessing the current state of the project. The graphics generated from this data provide easy-to-read topographic maps that can be used to document and explain before and after conditions of storm impacts on our beach projects.

The RAMbLr system continues to prove its effectiveness and efficiency on a day-to-day basis. To date, the system has been used for project design, verifying construction as-built, environmental surveys for military construction projects, flood control projects and beach monitoring surveys.

The uses for this system and the data it provides keep growing and increasing the Army Corps of Engineers' ability to rapidly assess and manage its current and future projects.

INVASIVE SPECIES EDUCATION

Stopping species before they invade

By Mark Cornish, John Pribilla, Linda Nelson and Davi Michl
U.S. Army Corps of Engineers
Invasive Species Leadership Team
Education and Outreach Committee

Should we post signs at our Midwest boat ramps saying, “Enter at your own risk?” Recreational boaters in the lower Illinois River are all too familiar with silver carp — the leaping invasive fish, pelting their boat, sliming passengers and generally wreaking havoc. The locals call it “catching fish the easy way” when the fish jump into the boat. It’s entertaining, that is until someone gets hurt.

While the anecdote may be amusing, invasive species are a serious threat to America’s ecosystems, decreasing biodiversity, impacting human health and imposing significant financial costs to the economy. Aquatic nuisance species are impacting U.S. Army Corps of Engineers missions involving the maintenance of harbors, waterways, locks and dams, flood control and ecosystem restoration. Stopping the introduction and spread of an invasive species before it damages the environment is the next major challenge on the horizon.

The National Invasive Species Council identified an answer: education. An enlightened mind, once expanded, cannot contract. People who understand the risk of transporting and releasing non-native

plants and animals are less likely to do so in the future. The USACE Invasive Species Leadership Team’s (ISLT) Education and Outreach Committee is developing tools to help educate the public to combat invasive species.

This month the ISLT Education and Outreach Committee will distribute the Invasive Species Leadership Team business cards to each district. The card features pictures of seven vexing invasive species:

- zebra mussel,
- silver carp,
- Japanese knotweed,
- feral hog,
- Burmese python,
- emerald ash borer, and
- hydrilla.

These cards were created as a national educational aid for the USACE Natural Resource Management staff and the visiting public. The goal is to promote the prevention, introduction and spread of invasive species on project lands and waters. Most importantly, the card displays the USACE Invasive Species Management website with information about invasives, such as current news, issues, reports and best practices in dealing with invasive species. The card displays the motto “Prepare, Prevent, Protect,” which contains the goals of the USACE and the National Invasive Species Council.

The ISLT is requesting that park rangers

hand out cards when engaging the visiting public at boat ramps, boat inspection stations, visitor centers and water safety events and to discuss the significance of protecting our land and water from invasive species. This public engagement will make the greatest impact in preventing and protecting our land and water from invasive species.

The ISLT Education and Outreach Committee also is developing an interactive Traveling Trunk interpretive program to educate the visiting public about invasive species and the effects they have upon our natural environment and their management by the Army Corps of Engineers. The program will be presented to the general public at visitor centers, meeting rooms, classrooms and outdoors events. The Traveling Trunk Program is designed to be a hands-on environmental educational experience where park visitors and students will be exposed to an array of activities, specimens and handout materials.

The ISLT Education and Outreach Committee is using the Gulf and South Atlantic’s Regional Panel on Aquatic Invasive Species Traveling Trunk as a model for expanding a regional program into a national invasive species traveling trunk for USACE. All developed materials (activity guide, specimens, posters, pamphlets and



The graphic for the Invasive Species Leadership Team business card features the US Army Corps of Engineers logo in the top left. To its right is a grid of seven small images showing various invasive species: a zebra mussel, a silver carp, Japanese knotweed, a feral hog, a Burmese python, an emerald ash borer, and hydrilla. Below the grid, the text reads "Invasive Species Leadership Team" in a large, bold font, followed by the motto "PREPARE • PREVENT • PROTECT" in red. At the bottom, a URL is provided: <http://www.usace.army.mil/Missions/Environmental/InvasiveSpeciesManagement.aspx>. A QR code is located in the bottom right corner.

This month the ISLT Education and Outreach Committee will distribute the Invasive Species Leadership Team business cards picture here to all USACE districts.

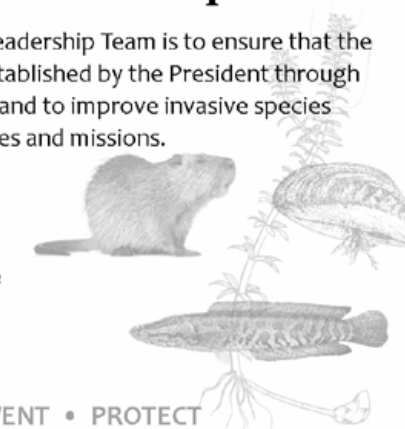
Invasive Species Leadership Team

The purpose of the Invasive Species Leadership Team is to ensure that the Corps of Engineers meets the goals established by the President through the National Invasive Species Council, and to improve invasive species management in all agency business lines and missions.

These goals include:

- Leadership and Coordination
- Prevention
- Early Detection and Rapid Response
- Control and Management
- Restoration
- Research

PREPARE • PREVENT • PROTECT



handouts) will align with agency goals, objectives and themes. Later this year the traveling trunk will be available for loan to USACE offices for a period up to three weeks.

Future information on the traveling trunk will be posted on the Invasive Species Management Community of Practice website at <https://eko.usace.army.mil/usacecop/environmental/subcops/invasive/>.

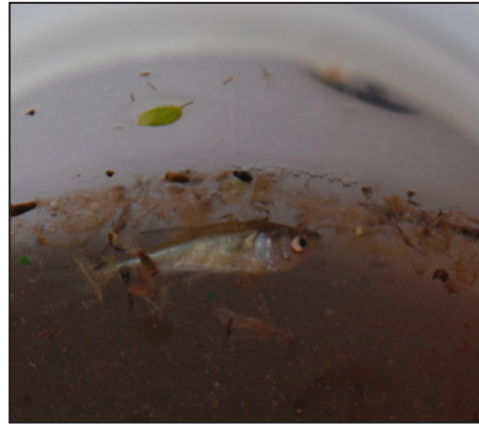
You can also find current news information on the Invasive Species Management Web page (<http://go.usa.gov/FHWx>). This website proves a valuable

resource for students, educators, policy makers and management teams on USACE programs and projects.

The Invasive Species Leadership Team was assembled by a CECW-CO Memorandum dated July 13, 2005. The team comprises USACE biologists, planners and research scientists from across the nation. Their purpose is to minimize the introduction and spread of invasive species on USACE projects through the development of comprehensive policy, methodologies, techniques and educational materials.

Counting fish on Middle Mississippi River

**Story and photos by
Mike W. Petersen**
*U.S. Army Corps of Engineers
St. Louis District*



At first glance, the fish in the quart-sized jar Ryan Foley was holding were hard to distinguish from the flotsam and jetsam in the muddy Mississippi River water. A tiny silver minnow, no more than a centimeter long, bobbed to the surface for a second, and then submerged again into the cloudy water.

“There’s one, right there,” Foley triumphantly said as the contents of the jar swirled in his hand.

After months of slowly trawling a few select spots on the Middle Mississippi, there was still excitement in his voice. Hardly trophy-worthy, the tiny fish is still a keeper.

Foley served as part of a team that performed a larval fish sampling study under the purview of the U.S. Army Corps of Engineers’ St. Louis District. From May until August, a team of biologists contracted by USACE collected samples from the Middle Mississippi River to establish estimates of fish density in the navigation channel.

The fish sampling study will inform and improve navigation on the river as part of St. Louis District’s Regulating Works project, a multifaceted project that provides for reliable navigation on the unique Middle Miss through maintenance dredging, rock removal, revetment and river training structures.

“Most of what we do happens under the surface of the river,” said Mike Rodgers, project manager for the St. Louis District’s Regulating Works. “We’re maintaining a major artery for American commerce that most people don’t see.”

Nearly two-thirds of the nation’s agricultural exports — corn, soy and other

grains — find their way to the international market through the inland waterways transportation system, as well as other bulk commodities like coal, fertilizer, construction material and metals. The largest system in the world, America’s inland waterways move 566 million tons of commodities, creating an economic impact of more than \$180 billion annually.

Despite being one of the oldest missions of USACE, navigation continues to be an evolving task. As science and innovation move forward, USACE scientists and engineers strive to apply the best science to their work, incorporating studies from academia, state and federal agencies.

“There are tremendous environmental benefits to river transportation compared to rail or road in terms of reducing fuel use and carbon emissions to move cargo,” Rodgers said. “We need to always strive for a better understanding of all the environmental impacts, on and off river.”

In the case of the larval fish sampling, St. Louis District was presented the opportunity to gather new information about the river ecosystem.

“We’re doing this to find out the density of the larval fish that are in the main channel,” said Kip Runyon, district fisheries biologist. “It gives us better idea of what all the potential impacts are on fisheries

“Most of what we do happens under the surface of the river. We’re maintaining a major artery for American commerce that most people don’t see.”

*Mike Rodgers
St. Louis District*

resources in the Mississippi River.”

Before nets went in the water, the team performed water quality tests, checking turbidity, temperature and dissolved oxygen. Once the conditions are documented, the biologists lowered the nets for 10 minutes, keeping a steady, slow velocity facing upstream since larval fish are too small to swim against the current. Sampling runs were performed along both sides and in the middle of the navigation channel, as well as varying times of day and night, which presented other challenges to the biologists.

“When you’re on the river at 1:30 a.m. doing a sampling, you have to really be aware of barge traffic,” Foley said. “With higher flows, you may even be drifting backwards to make sure you’re sampling at the same velocity. It can get a little nerve racking.”

Once the nets were removed from the water, the samples were preserved for a more thorough count and taxonomic identification in a laboratory environment. Further analysis is underway and a sampling report is expected to be complete in the fall.

“We need to know what the impacts of our actions are on the environment, and part of that are fishery resources on the Middle Mississippi,” Runyon said. “This is one of the ways we do that.”

Biologist Emily Grossman lowers a sampling net into the Middle Mississippi River as part of larval fish sampling conducted by the St. Louis District.



Where There's Water, There's a Way Engineering with Nature in the Arid West

By Ariane Pinson
*U.S. Army Corps of Engineers
Albuquerque District*

What if you could make something good happen, and do so cost-effectively, sustainably and on a grand scale? You'd leap at the chance, wouldn't you?

Engineering with Nature (EWN) can make this happen. The U.S. Army Corps of Engineers EWN Program is a holistic approach for planning, designing, constructing and operating engineering projects that relies on natural forces and processes to help create and maintain the projects. The end result is a sustainable, resilient, long-term solution to ecosystem restoration, navigation and other problems.

Not a novel concept, EWN has become an increasingly important strategy for redressing ecosystem damage over large landscapes. The Middle Rio Grande in Albuquerque is one such damaged landscape. The remaining floodplain in this 41 mile-long reach looked like a war zone, littered with jetty jacks and abandoned construction rubble. Invasive species dominated the understory. Gone was the riparian gallery forest mosaic (bosque), with its park-like vistas interspersed with grassy meadows and wetlands. Gone was the wide, braided river with its spring overbanking floods. The change was profound, transformative. What was lost through dredging, levee-building and dams couldn't



Native willows in a flooded willow swale — one of the features of the Middle Rio Grande Restoration Project. (Photo by Chad McKenna, GeoSystems Analysis Inc.)

be restored in a day or a year. The scale is too vast, the cost too high.

EWN offered a cost-effective and sustainable way for Albuquerque District Planner Alicia Austin Johnson and Ecologist Ondrea Hummel to restore portions of this floodplain. EWN features were established under three projects:

- The BioPark Section 1135 project restored 9 acres of wetland and 48 acres of bosque.
- The Route 66 Section 1135 project restored 121 acres of bosque.
- The Middle Rio Grande Restoration Section 3118 project restored 916 acres of habitat in 18 areas along a 26-mile stretch of the river.

Central to their EWN strategy has been the reintroduction of spring floodwaters to re-create a hydrologic environment more favorable to the establishment of native willow and cottonwood.

Bringing floodwater into the bosque means bringing the land down to water level through bank terracing, construction of high-flow channels and backwater channels, and connecting unused irrigation ditches to the river. As the spring flood rises it spills into these features, saturating the ground, recharging the near-surface water table and creating slackwater nursery habitat for the endangered Rio Grande silvery minnow. As floodwaters recede, young-of-year minnow migrate to the main channel, and the roots of native willow and cottonwood seedlings track the summer water table decline.

"Although we focused on a multi-species approach to the restoration, we expect the

year-on-year success of these channels in creating minnow nursery habitat to be phenomenal."

Away from the river, the land was lowered to the water table by creating depressions that intersected the spring water table. Willows established in these swales are maintained indefinitely by seasonal water table fluctuations.

"Within a year of establishing our first swale, the willows were attracting endangered Southwestern willow flycatchers," Austin Johnson said.

Because of water scarcity in a fully allocated basin, open water wetlands have been recreated at only one site but the results are stunning. At the BioPark, excavation to the water table coupled with natural water table fluctuation and native seed dispersal resulted in the establishment of wetland and wet-meadow habitat.

"This scarce habitat has provided a haven for waterfowl, no matter the season or time of day," Austin Johnson said.

By creating a partnership with nature, Austin Johnson and Hummel have re-created far more acreage of self-sustaining habitat in the Middle Rio Grande than they could have otherwise afforded. Monitoring these projects under an adaptive management paradigm ensures best practices are identified and replicated in subsequent district projects and those of sister federal and state agencies in the region.

"This is truly a case of, 'If you build it, they will come,'" Austin Johnson said. "If you enable the river to flood the bosque with something resembling historical seasonal norms, native plants and animals will find their way to this site on their own. Because EWN is so cost-effective, we are able to effect this change at the landscape scale, which is truly exciting to me."

For more on EWN, visit the webportal at <http://el.ercd.usace.army.mil/ewn/>.



The Lange's Metalmark Butterfly is just one of the endangered species of the Antioch Dunes ecosystem.

Ship channel dredging helps endangered butterflies

By Todd Plain

U.S. Army Corps of Engineers Sacramento District

Lurking below Central Valley waters lays a hidden enemy for California's waterborne commerce requiring annual assistance from the South Pacific Division to keep it at bay. Roving piles of sand, or shoals, collect along channel bottoms and wreak havoc for barge pilots trying to make their way in and out of the Sacramento River Deep Water Ship Channel and the Stockton Deep Water Ship Channel.

Since the 1960s, USACE has regularly dredged the channels to their authorized depths — 30 feet for the 43.5-mile Sacramento ship channel, and 35 feet for the 41-mile Stockton ship channel — to keep commodities smoothly flowing in and out of the valley.

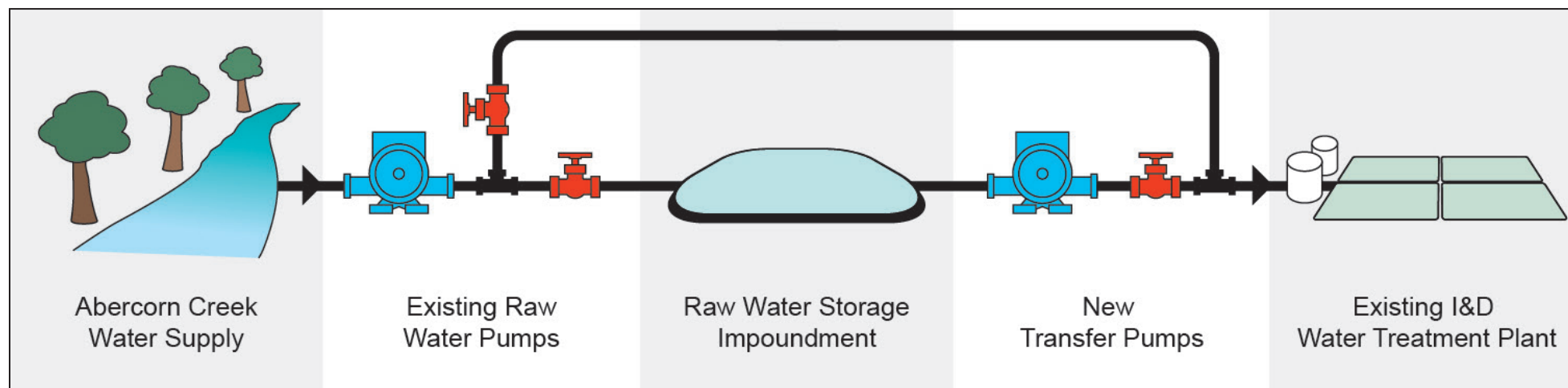
This year that enemy — sand piles dredged from the San Joaquin River — became an ally. Thanks to a partnership between USACE, the U.S. Fish and Wildlife Service (USFWS) and the Port of Stockton, material dredged from Stockton's ship channel will be pumped to the Antioch Dunes National Wildlife Refuge to improve habitat for the endangered Lange's metalmark butterfly, as well as the Antioch Dunes Evening Primrose and Contra Costa Wallflower. In all, about 40,000 cubic yards of sand is expected to be collected and placed on more than 10 acres of a 41-acre parcel of the wildlife refuge.

"The ports are responsible for locating placement sites for dredged material and the Corps is responsible for keeping the channels at their authorized depths," said Gary Kamei, project manager for the district. "The Port of Stockton coordinated with the U.S. Fish and Wildlife for the sand placement — it was their idea."

Frequently, dredged materials are used to improve the stability of delta levees. But the ports are always looking for the best and most environmentally friendly place to deposit the mud, silt and sand.

"Finding positive ways to reuse dredged material is an ongoing mission for the Port of Stockton," said Jeff Wingfield, the port's director of environmental and government affairs. "The newly provided sand should really help to restore the ... ecosystem."

"It's really a win-win for everybody," said Doug Cordell, USFWS. Cordell added that the refuge gets free sand and the port is not charged a fee for depositing the material at the dunes. "It may take a couple years to become fully established but it's a big step in the right direction for the refuge."



An illustration showing water flow from Abercorn Creek to the city's water treatment plant once the raw water storage impoundment is constructed.

Experts gather water data before harbor expansion

By Billy Birdwell
U.S. Army Corps of Engineers Savannah District

Scientists and technicians recently completed intensive water quality monitoring in the Savannah harbor and estuary in preparation for the upcoming deepening of the harbor and shipping channel in this coastal Georgia city.

The monitoring program, part of the Savannah Harbor Expansion Project (SHEP), gives the U.S. Army Corps of Engineers valuable data on water conditions in the harbor and surrounding areas. The data establish a baseline of existing conditions before any changes occur from the harbor deepening. By deepening the harbor from 42 to 47 feet, the SHEP will allow larger ships to call upon Savannah's Garden City Terminal with heavier loads and with fewer tidal restrictions.

"The data we collected give us a comprehensive snapshot of the current existing conditions of the Savannah River and the estuary," said Bryan Robinson, a Savannah District hydraulic engineer. "The data will give us a good baseline — a good tool — to measure our mitigation efforts as the harbor is deepened."

In the \$1.1 million research effort, the Savannah District gathered data from sensing devices placed temporarily in the river and estuary, according to Robinson. It also collected data from existing gauges permanently in use by the U.S. Geological Survey and funded separately. Contractor Dial Cordy and Associates of Jacksonville Beach, Florida, conducted the field work and data collection. The USGS captures continuous data through a system of permanent gauges in the Savannah River. Under the SHEP pre-construction monitoring effort, workers temporarily deployed another 13 gauges at additional depths and locations. The added gauges measured dissolved oxygen, water temperature and salinity. Workers also gathered velocity and flow readings on the ebb and flood of the river during autumn tides in 2013.

"The information we gathered will help us refine our computer models," Robinson said. "Few models have this much data to work with. Collecting such a robust dataset helps show our dedication to protecting the water quality in the Savannah River by creating the most accurate predictive tool for adaptive management possible."

The water quality monitoring program is the most expensive of the pre-construction monitoring programs for the SHEP.

Understanding, mitigating impacts of Savannah Harbor deepening a priority

By Chelsea Smith
U.S. Army Corps of Engineers Savannah District

Understanding the reverberating environmental impacts of the Savannah Harbor Expansion Project (SHEP) has been a sizable undertaking for the U.S. Army Corps of Engineers and its partners. Preserving high water quality standards stands at the forefront of the Corps of Engineers' efforts to minimize adverse environmental effects resulting from the project.

By deepening the Savannah River to the Garden City, Georgia, terminal, slightly elevated levels of salinity may extend further upstream. This could increase chloride concentrations in Abercorn Creek, a vital water source for Savannah residents and local industries.

Studies indicate that extreme spring tides combined with drought conditions — such as when the Savannah River flow at Clyo, Georgia, falls below 4,000 cubic feet per second — could temporarily increase chloride concentrations in Abercorn Creek at high tide. If left unmitigated, the higher chloride levels could increase maintenance costs for industries and water quality for municipal users of Savannah River water.

The planned construction of an impoundment to store raw water solves this problem. The city's treatment plant can use water from the impoundment when high tides and low stream flow result in higher chloride levels.

"During normal operations, all of the water withdrawn from Abercorn Creek will pass through the storage impoundment," said Joseph Hoke, a Savannah District civil engineer. "This will provide an operational benefit by mixing the intake water and minimizing the twice daily fluctuations of pH and turbidity that are presently seen at the water treatment plant due to the tidal

influence at the Abercorn Creek intake."

If chloride levels climb, the city's water treatment plant operator will turn off Abercorn Creek intake pumps and take raw water from the storage impoundment. The impoundment will serve as an intermediate holding pond for raw water from Abercorn Creek before reaching the city's water treatment plant.

"Dependency on surface water sources is expected to increase due to requirements to reduce groundwater pumping from the aquifer combined with population growth," said Bryan Robinson, also a district civil engineer. "The raw water is pumped about 7 miles from the Abercorn Creek intake in Effingham County, Georgia, to the treatment plant in Port Wentworth, Georgia."

The U.S. Geological Survey (USGS) Savannah field office has pre-monitored fluctuations in chloride levels at the intake since July. From July 25 to Oct. 20, the average chloride level at the intake was 10.2 milligrams per liter (mg/l). The maximum chloride level was 15 mg/l recorded July 27 and Aug. 23-24, according to the USGS National Water Information System website. According to model projections by USACE, the USGS and the Georgia Ports Authority, the maximum daily average chloride levels in Abercorn Creek are expected to be 62 mg/l as a result of the harbor deepening. City regulations prohibit chloride concentrations exceeding 250 mg/l according to drinking water standards established by the Environmental Protection Agency. The long-term average chloride level is predicted to increase from 11 to 13 mg/l.

"Even considering both the maximum and long term average increases, levels remain well below the drinking water threshold of 250 mg/l," said Jason O'Kane, SHEP project manager.

There is no potential for salinity to increase to a level where it could be detected by taste, Hoke said. "The concern is for potential chemical by-products resulting from prolonged contact of elevated chlorides with copper pipe and lead-based solder in older water lines. The availability of the water in the storage reservoir will alleviate those concerns."

Higher chloride also raised municipal concerns for the pipelines and industrial processes that are sensitive to heightened concentrations.

According to city estimates, corrosion damage to the city's 750 miles of water distribution pipeline, comprised of 60 percent steel, could amount to \$22 million in replacement costs.

In response, the Corps' Assessment of Chloride Impact from Savannah Harbor Deepening (2011) report concluded that corrosion to copper and lead is unlikely, and impacts to steel can be controlled by raising the pH of the treated water supplied to the distribution system.

The district will monitor water quality in Abercorn Creek for five years post-construction to assist the city in refining its operational controls and determine the frequency of needing to use the impoundment storage. The City of Savannah will assume maintenance and operations responsibility for the impoundment once the facility is accepted from the contractor, Hoke said.

The 97 million-gallon impoundment will occupy land on the northeast quadrant of Interstate Highway 95 and Georgia Highway 21, which is approximately the midpoint of the 7.5 mile raw water pipeline system.

The approximately two-year construction project is scheduled to begin this summer and be operational before the completion of inner harbor dredging.

Additional information can be accessed at the district's SHEP site: <http://go.usa.gov/FAdF>.

Net Zero.....

Continued from Page 1

at the supply and distribution side. For example, should a central plant with heating and cooling loops and cogeneration be built? Or would a decentralized system be better? Net Zero Planner can predict the impact of making changes to the installations, he said. It empowers the installation to answer the fundamental question: Do the incremental projects being considered fit into a feasible and cost-effective trajectory to reach installation goals?

Net Zero Planner, however, requires trained engineers to collect data and to use the tool. The reports are not especially user-friendly from the point of view of planners and installation personnel.

The ESTCP grant combines the two tools: the web-based, user-friendly CAMPS Dashboard, with the Net Zero Planner in the background, Young said. Data currently residing in CAMPS, including facilities, real-time energy metering and monitoring data will now be available electronically for Net Zero Planner analysis, nearly eliminating the data collection step previously required.

Reports and analyses will be generated in a matter of weeks compared to months, and it provides flexibility to re-run an analysis if the data changes.

“Our DPW folks are going to be able to sit down with this information warehouse at their fingertips,” Young said. “They can use the dashboard and be able to make real-time assumptions and analysis on what they can do to save energy and water, and cut their waste.”

During workshops, participants at the two pilot sites will be asked to establish an energy baseline and identify facilities and systems consuming excessive amounts of energy. They will project a base case for energy consumption and develop alternative scenarios for energy efficiency measures, distribution and generation. They will finish with an ordered list of candidate projects.

“It will save a lot of money, a lot of time and help us meet those Net Zero goals,” Young said.

At Joint Base Pearl Harbor-Hickam, the demonstration site is the Ford Island area development plan. The 441-acre site is a tangle of tenants, from base housing and training to the large historic footprint created when Japanese bombers attacked the airfield and Battleship Row in World War II.

Installation Energy Manager Katie Ramirez said her overriding issue is the high cost of electric power.

“We rely on diesel fuel to generate electricity. Our



Rumanda Young, master planning section chief of Fort Worth District's Regional Planning and Environmental Center, is the Army Corps of Engineers' 2013 Morris Civilian of the Year Award recipient. Click the photo to learn more about her and the Net Zero pilot program.

electric rates are three or four times what you pay on the mainland,” she said.

By identifying excessive energy and water users, the new tool will help select conservation targets. Ramirez anticipates good guidance for building a Net Zero model, then translating it into work plans with the right mix of such technology as photo-voltaic cell placements, cool building roofs and advanced air-conditioning systems. Fort Hood planners have embraced CAMPS throughout the years. Real-time metering and monitoring will be fed into CAMPS with the Net Zero Planner capabilities so they can see tenant energy use data at a glance. Until now they've had to rely on an energy data dump every couple of months from another system, said Alan Howard, master planner and CAMPS administrator. The new tool makes energy data more accessible to commands across the installation. Engineers will generate reports more easily, and perform database queries and computations that until now have been very time consuming.

“As we get more and more data, we'll be able to pinpoint where adjustments need to be made. Patterns may emerge that systems with a certain type of HVAC system, or buildings built in a similar time period, or built by a certain contractor doing a lousy job,” Howard said.

“It will help us develop the annual work plan in the out years,” said Kristina Manning, chief of Fort Hood DPW's Real Property Planning Division. “It will help us identify the facilities to see if there is an issue to look further into: ‘Is it the user? Is it the building?’ That takes time.”

The best answer might be a complete building replacement rather than a bandage. The tools will help provide the answer.

Fort Drum generating electricity from on-post renewable source

By Michelle Kennedy
Fort Drum, New York

As the Army moves to more sustainable forms of energy, Fort Drum remains ahead of the curve. Department of the Army, Fort Drum, New York, state and local leaders gathered at the end of October to officially mark the beginning of a new era in renewable energy.

Fort Drum has a new contract with ReEnergy Black River LLC, a subsidiary of ReEnergy Holdings LLC, to provide power to Fort Drum.

“Today, we will ceremonially begin the contract with ReEnergy for the purchase and provision of 100 percent of Fort Drum's electricity requirements over the next 20 years,” said Brig. Gen. Michael L. Howard, Fort Drum and 10th Mountain Division acting senior commander. “Beyond the obvious advantage of generating our energy on post at a secure location, this brings us in line with the Army's commitment of sustainability, and I'm proud that Fort Drum is leading the way.”

“This is a small city where 33,000 [people] work, train and live,” he added. “There's no question that our transition to renewable energy represents a big step for the installation, for the Army and for the North Country. Fort Drum is leading the Army into the future with this sustainable energy project. I am very pleased with our place at the front of the pack.”

Fort Drum is the Army's only installation to consume 100 percent of its electricity from a renewable source generated on post — a biomass generating facility. In addition, it is the only installation that is totally eliminating greenhouse gas emissions associated with creating electricity, Howard explained.

Katherine Hammack, Assistant Secretary of the Army for Installations, Energy and Environment, thanked those whose hard work led up to the contract signing. “It really takes a team working on the ground at the installation to

recognize the benefits that this offers,” she said. The Oct. 29 date of the contract signing was timely because it marked the second anniversary of Super Storm Sandy, Hammack added.

“We all heard about the challenges to communities when they did not have power,” she said. “Those kinds of storms are increasing in frequency and intensity. Being able to generate power on site from a renewable resource is critical to the Army so we may continue to serve this great nation and serve the communities that surround us.”

The ReEnergy plant generates almost twice the amount of power that Fort Drum requires. The plant is not only located in a secure location on post, but the residual power will support the surrounding communities, too.

While Fort Drum will rely on ReEnergy for all of its energy requirements, it will still be connected to the power grid. In the event that the plant needs to go down for repairs or maintenance, the post will still receive seamless service with [local power company] National Grid to help ensure that Fort Drum Soldiers, Civilians and Family Members continue to receive the power they need.

“Resilience is really a major priority for the Army,” Hammack said.

“That's what this is about — making this installation more resilient. We work hard to be more responsive to the physical, social and economic challenges that are a growing part of the 21st century.”

“Ensuring our forces have energy and the water to meet the mission requirements is really a fundamental enabler of national security,” she continued.

Hammack said the Army pledged to produce one gigawatt of renewable energy by 2025.

“That really is to ensure that our country is less dependent on foreign sources of oil and we're making the best use of resources that are available,” she said. “This is the best example I can think of.”

Shifting river, national policy change community's role

Floodplains manipulation is so yesterday

By Amy Echols
U.S. Army Corps of Engineers
Portland District

After Oregon's statewide flood of 1964, the U.S. Army Corps of Engineers began work to "put the [Sandy] river back in the channel it was in prior to the Christmas flood." Clackamas County commissioners asked property owners on the western slopes of Mount Hood to allow the Army Corps of Engineers to tackle flood recovery efforts on their property with bulldozers and backhoes, manipulating river channels and moving massive accumulations of debris.

"In an era when highly-engineered recovery work is a remote option for the Corps, reducing flood risks in vulnerable and dynamic river basins takes a collaborative effort."

Julie Ammann
Portland District floodplain services manager

"The Sandy River in 1964, as in many floods preceding it, scoured a new river channel," said Julie Ammann, Portland District's floodplain services manager. "In a basin like the Sandy, composed of unstable volcanic deposits from Mount Hood and steep slopes that produce fast river currents, the river's course is unpredictable."

This geomorphology means that controlling floods using heavily engineered riverbank stabilization will only work for a while, especially in dynamic river systems like the Sandy. Army Corps of Engineers' embankment work in 1965 helped reduce flood impacts for a few decades but came with costs to the environment and proved no match for future large rain and flood events.

Similar to what occurred in the 1964 flood, utilities, roads and structures along the Sandy, Zigzag and Salmon rivers and their tributaries suffered extensive erosion and damage during the flood of 2011. The recovery approach in 2011, however, was very different from that of 1964: the agency sent in no bulldozers and realigned no stream banks. Instead the district used a specific tool to assist the upper Sandy River communities with recovery: issuance of a regional general permit under its regulatory authority. This permit allows specific repairs, reconstruction or restoration activities by property owners themselves. Representatives from county,

state and federal agencies participated in many local discussions with property owners to support applying for these permits on their own.

This regional permitting approach helps ensure the balance between property owners' needs and those of the community, while minimizing cumulative actions up and down the river. Simply put, the action a homeowner takes to recover a portion of the stream bank cannot impact property or public infrastructure downstream. Compared to individual permit processes, a regional general permit also ensures compliance with federal and state laws, reduces paperwork and saves time.

In addition, the USACE National Flood Risk Management Program in 2009 formally shifted flood responses from highly engineered solutions to using a variety of strategies to reduce risks before a flood. Ammann explains to communities that USACE no longer simply manipulates the land at the expense of the environment.

"In an era when highly engineered

recovery work is a remote option for the Corps, reducing flood risks in vulnerable and dynamic river basins takes a collaborative effort. This requires property owners, residents, communities and all levels of government to understand their roles and responsibilities in reducing risks — ideally in advance of actual flooding," Ammann explained. In her position with the district, Ammann reminds state and local governments of their authority and responsibility to determine how to use land in floodplains and to enforce "flood-wise" requirements.

Today, Clackamas County's Emergency Management Office is leading an effort to turn this challenge into an opportunity, with the formation of a community-based flood risk management work group among the upper Sandy River communities. This effort could integrate environmental, social and economic factors involved in reducing flood risk and consider all available tools and information to improve safety in the area.

"Our hope is that alongside residents and property owners in the basin, the county can better understand the short- and long-term implications of land use on floods and reduce risks while fostering a more sustainable relationship with the river," said Jay Wilson, the county's hazard mitigation coordinator and lead planner for this project.

The district is supporting the community efforts to reduce flood risk by providing technical, regulatory and public involvement experience. Wilson and Ammann remind the upper Sandy River communities that even new flood studies, using modern surveying and mapping technology, cannot accurately predict the Sandy River's course during the next flood. They preach the best defense for these conditions, be they in the shadow of Mount Hood or the flatland of the Willamette Valley: prepare for flooding and strive to reduce long-term risks now.



Five years after the Army Corps of Engineers rechanneled the upper reaches of Oregon's Sandy River with heavy equipment (as seen in the 1967 aerial photo above), the river reclaimed the area with newly braided routes in the floodplain. Meanwhile, residential development takes shape on its eastern, and ever-changing, bank. (Photos courtesy of Clackamas County, Oregon)



RESTORING FORMER ATLAS MISSILE SITE

By Jennyann Noack

U.S. Army Corps of Engineers Omaha District

Using an innovative remediation process, the Omaha District restored unused and potentially hazardous grazing land in Arlington, Nebraska, and the U.S. Army Corps of Engineers took notice.

The Award

An Omaha District Environmental Restoration team led by Project Manager Hector Santiago won the Chief of Engineers Awards of Excellence in Environmental Restoration-Installation for 2013, recognizing “excellence in the development, management and transferability of environmental programs that increase environmental quality, enhance the mission, and support Army sustainability.”

The Project

In 2008, the Omaha District hired ITSI Gilbane Company to begin remediation efforts for a 62-acre area of trichloroethene-impacted groundwater on privately owned grazing land approximately 30 miles northwest of Omaha. The area is a Formerly Used Defense Site located at the former Offutt Air Force Base Atlas D Missile Site 2. In addition to Santiago, Omaha District team members include Molly Maxwell, chemist; Melissa Kemling, hazardous waste disposal and safety; Cheryl Davis, risk assessment; Carl Nardin, geologist; and Quang Le, environmental engineer.

Initially, the team detected only groundwater TCE contamination and no soil impacts. The projected remediation time frame for the known impacts was 10 years with an anticipated site closure in 2018.

In 2009 and 2010, the Omaha District and ITSI Gilbane began further soil and groundwater investigations to support the planned site-wide groundwater remedy — *in situ* enhanced bioremediation. The team’s pre-treatment investigations exposed a substantial soil and groundwater contamination source. Analytical results for TCE in soils were several orders of magnitude higher than previously detected at the site and indicative of a significant Dense Non-Aqueous Phase Liquid (DNAPL) source area. The source area and elevated soil and groundwater impacts threatened to delay the site-wide groundwater remedy by as much as 100 years and add millions of dollars to the life cycle costs.

The Technique

Omaha District and its contractor ITSI Gilbane selected an innovative thermal technology to accelerate cleaning up the TCE DNAPL source. Crews implemented an *in situ* thermal treatment using a large-diameter auger and Zero-Valent Iron to remediate the site.

This unique and integrated system advanced an 8-foot diameter auger to depths of more than 40 feet at multiple cells across the treatment area. Crews treated 163 cells; 57 cells with the large-diameter augers and ZVI to create a barrier around the site, and 106 cells with the large-diameter auger, steam, hot air and ZVI.

USACE selected this integrated remedial technology to address the TCE DNAPL source area for multiple reasons.

“This *in situ* remedy provided the least disruptive alternative to the current landowner and minimized worker exposure to the soil and groundwater impacted with hazardous levels of TCE,” Santiago said.

USACE based its choice on worker safety, the preferred using “green” technologies (eliminating off-site transport and disposal of hazardous waste), depth of impacted media, contaminant concentrations, treatment time frame considerations, site-specific geologic and hydrogeologic conditions, cost, permitting considerations and the likelihood of success.

Initial drilling times of two to three hours were common to reach a depth of 40 feet. The team implemented several modifications to improve the drilling rate. These modifications and the addition of steam during the thermal treatment portion improved drilling times to 30 to 45 minutes to reach a depth of 40 feet. This technology has proven to be implementable and successful in both sandy and clayey lithologies, according to the project delivery team. The Army award team recognized this transferable solution.

Pre-treatment and post-treatment soil results indicate the technology was 99.98 percent effective in reducing TCE concentrations within the source area soils. The pre-treatment and post-treatment groundwater results indicate the technology was 99.72 percent effective in reducing TCE concentrations within the source area groundwater.

The History

Atlas D was used for maintenance, storage and the potential launch of Atlas D Intercontinental Ballistic Missiles. Constructed in 1960, the Air Force used the complex for about two years and declared it excess, an underused property that was disposed through demolition, transfer or sale, in 1966. Rocket fuel systems were periodically cleaned with TCE during routine maintenance. The waste TCE and residual rocket fuel was washed into the Atlas D flame pit areas (FPAs) and presumably burned.

Additionally, the FPAs would seasonally fill with water, which eventually leached into the soil and groundwater. Omaha District’s primary contaminant concern was TCE, along with the breakdown products of cis-1,2-dichloroethene and vinyl chloride.

The Public

Before treatment, the landowner was unable to use the approximate 1-acre site because of contamination in the FPA and a steeply embanked ephemeral pond. The area had been problematic for the tenant after several small calves were lost in previous years in the FPA. Because the treatment technology required a flat working surface to implement, the problem area was filled and leveled beforehand and re-vegetated afterward. The current tenant now uses the site as pasture land for cattle grazing.

The team’s choice — subsurface heating and ZVI placement — benefitted the bioremediation efforts not only in groundwater at the treated DNAPL source area, but also in the surrounding areas facilitating a site-wide remedy. The site is on schedule for closure in 2018.

Tripler Army Medical Center recognized for energy efficiency

By Ana Allen

Pacific Regional Medical Command

Tripler Army Medical Center (TAMC) received a \$270,000 incentive from Hawaii Energy to help offset the cost to upgrade the hospital’s central plant with two new energy-saving chillers and a comprehensive electronic control system.

The upgraded central plant, which provides chilled water to cool the hospital, is expected to reduce energy usage by an estimated 616,140 kilowatt hours per year — the equivalent to saving about \$150,000 in energy costs based on \$0.2434/kwh.

TAMC Commander Col. David Dunning accepted a ceremonial check in November from Hawaii Energy, the ratepayer-funded energy conservation and efficiency program administered by Leidos Engineering under contract with the Hawaii Public Utilities Commission.

“As the largest military medical facility in the Pacific, it is important that we are good stewards of the energy resources within our local community. This conservation effort lessens fossil fuels and correspondingly lowers greenhouse gas emissions, making TAMC a clean energy ally to the state of Hawaii,” Dunning said.

The new plant also will operate more reliably for the hospital. TAMC’s facility management staff worked with technology experts at the U.S. Army Corps of Engineers’ Engineering and Support Center, Huntsville in Alabama, to identify project partners, including Johnson Controls, leading similar energy and technology updates for other federal agencies.

Previously, the central plant was running on two systems with some of the functions controlled manually by TAMC plant operators. The updated chillers will be managed by a digital controls electronic control system, giving plant operators a real-time look at the plant’s performance to make operation easier and more effective.

“We proudly salute the U.S. Army for its commitment to a cleaner energy future by adopting energy conservation and efficiency measures at the hospital,” said Lily Koo, Hawaii Energy.

Still waters run deep on Staten Island

By JoAnne Castagna

U.S. Army Corps of Engineers
New York District

Residents of Grimsby Street in Midland Beach, Staten Island, New York, noticed a large puddle of water in their neighborhood. Days went by — there was the puddle, a few months go by — there still was the puddle. The body of water was there so long residents began counting the days: 280. One resident said it got to the point the neighborhood named it Grimsby Lake.

How that puddle appeared on Grimsby Street really wasn't a mystery to the residents, who for decades have been frustrated by chronic flooding problems. This flooding comes from the fact that the island, which is a borough of New York City, is low lying and has no conventional underground storm sewer system.

To help with this problem, the New York City Department of Environmental Protection (NYCDEP) created the successful stormwater management system: the Staten Island Bluebelt Program. So far, many residents have benefited from it and the agency wants to expand the program to more communities, such as flood-prone Midland Beach.

To assist with the effort, New York District developed an innovative permitting mechanism that is helping the Bluebelt Program move along faster, which will help reduce flooding, save taxpayer money and improve the environment and wildlife habitats.

The Staten Island Bluebelt Program is preserving and restoring streams, ponds and other wetland areas — called Bluebelts — in 16 of the island's natural watershed systems. These watershed systems are being used to collect stormwater runoff during rainstorms, hold it, filter it and gradually release it into the Raritan Bay and Arthur Kill.

During a rainstorm, water on the streets needs to be able to drain off into a storm sewer system so that roads, homes and businesses do not flood. In many parts of Staten Island, there is no such system and the rainwater has no place to go. In the areas served by a Bluebelt Program, conventional storm sewers are built in the beds of city streets, but instead of draining into a large trunk storm sewer, the water is channeled into the



ABOVE: Streets in Staten Island's Midland Beach neighborhood failed to drain even days after a storm in 2013. **RIGHT:** Aerial view of New Creek Bluebelt. New Creek meanders through the Midland Beach neighborhood. (Photos courtesy NYCDEP)

Bluebelt wetland systems.

At every point where the storm sewer pipe ends and the Bluebelt begins, NYCDEP builds special drainage facilities called Best Management Practices (BMPs) that minimize the impacts of urban storm water discharges into wetlands.

Many of these BMPs are man-made wetlands that include weirs to help reduce the water speed, so the water is much less destructive. Wetland native plants are planted in these wetland areas to help clean and purify the water of sediment and pollutants. These contaminants eventually settle to the bottom of the water in specially designed sumps and are regularly removed by the NYCDEP.

The stormwater is detained in some of these wetland areas during the peak of a storm and then slowly released downstream into the ocean after the storm has passed. The amount of water released downstream is carefully controlled in order to prevent flood surges to communities living downstream.

The program not only is successfully controlling flooding, but is also beneficial to the environment and cost effective when compared to conventional storm sewer systems.

Constructing conventional storm sewer systems can have an adverse impact on the environment. The Bluebelt Program is less intrusive and actually improves the environment and provides for wildlife habitats and



community open space.

Not only is the environment preserved, but also considerable tax payer money is saved. According to the NYCDEP, the Bluebelt Program has already saved the city more than \$80 million in sewer construction costs.

Presently, two-thirds of the island drains into the Bluebelt system. To build out the system, NYCDEP has to design and construct additional BMPs, but must first submit permits to the New York District for review and approval.

New York District is responsible for reviewing permit applications for work that is going to be performed in any of the waterways, including wetlands that are within the district's boundaries. These permit applications need to be reviewed to make sure there will be no adverse environmental impact to the aquatic environment and the work proposed is not contrary to the public interest.

For the Bluebelt Program, the NYCDEP has been sending the Army Corps a large number of permit applications every year to perform their work.

"Reviewing these applications and having them

done within the NYCDEP's time frame can get very time consuming and resource intensive to the Army Corps and also the NYCDEP," said Jodi McDonald, chief of New York District's Regulatory Branch. "These permit applications include a variety of activities such as replacing outfalls, doing minor dredging and creating micro pools."

Many of these permit applications can also be repetitive because they are to perform similar work.

"Most of these tasks have minimal environmental impact. So we decided to create a Regional General Permit that allows the NYCDEP to move forward and perform these minimally environmentally invasive projects without having to submit dozens of individual permit applications to the Army Corps," McDonald said. "After years of working with the NYCDEP and other federal and state agencies, we now have a Regional General Permit that allows the NYCDEP to immediately move forward on a whole suite of activities for the Staten Island Bluebelt Program. They can just go and

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Sifting through the past

Cleanup of buried bomblets continues at Scioto Ordnance Plant

By Katie Newton

U.S. Army Corps of Engineers Louisville District

Sifting through mounds of soil and safely detonating M74 bomblets, or World War II-era bombs, has been a daily task for environmental workers on site at the former Scioto Ordnance Plant (SOP) in Marion, Ohio.

Workers have safely detonated 2,883 M74s discovered in a burial pit on the property and have run approximately 2,000 cubic yards of soil through a high energy sifter to clear it of any munitions debris.

"This was a complex removal action," said Dr. David Brancato, Louisville District technical manager for the project. "Safety of the community and the workers has been our top priority, and with over 13,000 person hours spent removing and decommissioning the M74s, we are proud to say that worker and community protection was achieved."

The U.S. Army Corps of Engineers oversees the cleanup of the nation's Formerly Used Defense Sites (FUDS), and the Scioto Ordnance Plant has been an ongoing environmental restoration effort for the past 17 years. In the fall of 2013, small M74 bomblets were successfully cleaned up from a lagoon on the property, but that effort led to the discovery

of more buried M74s that needed to be unearthed when the weather warmed in the spring of 2014.

The 3-acre area was surveyed in late April with geophysical mapping that confirmed one burial pit of M74s left on the site in the 1940s. Pit excavation began May 16 to unearth the bomblets, which were four feet below the ground level.

USACE's contractor, CAPE Environmental Management, destroyed the munitions debris, which involves a three-step process. First, workers safely detonate the unearthed bomblets to inert the white phosphorous by simply exposing them to air.



Contractors use the Thermal Flash Unit, which processes the remaining metal to remove any particles of white phosphorous. (Courtesy photo)

"The detonation of the M74s vents the white phosphorus to the air, causing it to safely burn out," Brancato said. "Detonations were controlled to ensure neighboring citizens and businesses were informed and protected from the blasts."

Next, the remaining metal is processed in a Thermal Flash Unit (TFU) to remove any remaining particles of white phosphorous. Lastly, the surrounding soil that has been excavated is processed through a high energy sifter to expose any particles of white phosphorous to the air, causing deactivation of the white phosphorous.

"Only a few TFUs are available this side of the Mississippi and we were fortunate through the efforts of our contractors to procure the unit, which offset any safety concerns of the bomblets' casings retaining any particle of white phosphorous," Brancato said.

Detonations were complete June 6 and site restoration was finished the end of June. The Remedial Action Construction report was approved Dec. 5. This area of former Scioto Ordnance Plant will close upon completion of the No Further Action Proposed Plan/ Decision document, which is expected in June.



Staten Island

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build them, without having to stop and wait for a permit application to be reviewed and authorization granted.

The regional general permit process saves both the district and the NYCDEP time and resources and leaves the district more time to scrutinize permit applications for projects that potentially have more of an environmental impact, McDonald added.

"This permit will really give us tremendous momentum and this is very significant and important to us. We will be able to construct and get things done much more quickly than if we had to go the individual permit route," said Dana Gumb, chief, Staten Island Bluebelt Program, New York City Department of Environmental Protection.

The new permit is already starting to move the Bluebelt Program ahead — specifically in Midland Beach — the location of "Grimsby Lake."

Midland Beach is located within the New Creek Watershed. The NYCDEP is restoring the West Branch of New Creek so it can be used as a channel to move stormwater away from streets. This includes removing large amounts of silt that have accumulated in the channel and moving the channel away from homes.

Next, they will restore an approximately 5-acre wetland complex. This will include removing approximately 5 acres of an invasive plant species called *Phragmites australis* and replacing it with a diverse array of native wetland plants. In addition, there will be construction of culverts under streets, control structures and sediment clean-out locations called forebays and micropools.

"This construction work wouldn't have started for years if it

Tying into Hurricane Sandy response

Supporting the Bluebelt Program also is helping New York District's Hurricane Sandy recovery efforts. The district is working in collaboration with the Staten Island Bluebelt Program to construct seawalls along the Staten Island coast to help protect communities from storm surges from the sea. These walls are being constructed in a way that will not only block the sea from reaching communities, but will also allow the stormwater runoff from the Bluebelts to run off into the ocean.

wasn't for the Regional General Permit. We are easily saving years," Gumb said. "When you are building a drainage system for thousands of acres in an urban setting, it's a real big ticket item. And it's something that costs lots of money and takes a lot of time to do. So whatever savings in time we can have is very significant. If you're saving time, you are saving money."

Moving the program faster along means quicker results for Staten Island communities.

"The Regional General Permit streamlines the permit process so that the remaining Bluebelt BMPs can be constructed faster and the public can realize benefits sooner," McDonald said. "This includes reduced flooding of homes, roads and neighborhoods as well as improved water, fish and wildlife habitat quality."

Gumb calls the permit a win-win-win situation for everyone.

"It's a win for the NYCDEP because we can advance our construction program much faster. It's a win for the Army Corps because they are saving staff time, and they don't have to review the same kind of applications over and over again. And it is a win for the public because they get these things built more quickly and can have the benefits in a faster time frame."

Former Staten Island Borough President, James P. Molinaro once said at a press conference that he has visited Staten Island communities after rainstorms and to his amazement actually saw ducks swimming in the street.

The hope is that with the expansion of the Staten Island Bluebelt Program and the help of the district's Regional General Permit these large bodies of water will no longer appear and the ducks will find refuge at one on the preserved wetland habitats.

Motor pool cleanup demonstrates unique technology

U.S. Army Corps of Engineers
Engineer Research and Development
Center

Cleanup efforts on the former motor pool site at the U.S. Army Engineer Research and Development Center (ERDC) in Vicksburg, Mississippi, were recently completed and incorporated some new, cutting-edge technology, making the process more environmentally friendly and economical.

The motor pool operation used mechanics to perform maintenance and repairs on vehicles and heavy equipment from the early days of the Waterways Experiment Station until 1996, when the station transitioned to leased and rented vehicles and equipment. The motor pool building served a variety of other purposes, including logistics offices, until 2009, after which time it remained empty until its demolition in 2012.

The ERDC enlisted the assistance of Omaha District and its Environmental Remediation Branch to conduct a three-phase cleanup project on the motor pool site.

The key component of the cleanup was the Vapor Energy Generator (VEG) soil remediation system at the site. The patented VEG technology houses a completely enclosed treatment chamber within which the soil and associated contaminants are heated by introducing steam at temperatures as high as 1,100 degrees Fahrenheit into the chamber. As an internal auger rotates the soil, the steam causes contaminants to be released and captured by a vacuum system inside the enclosed treatment chamber. The captured gases are then run through a series of patented acid gas and emission-reducing filters before being routed back to the generator to be burned as fuel to run the treatment system.

Using this process, the plant actually uses less and less fuel as project time goes on. The system operates completely on recycled water, making it environmentally

friendly. Most significantly, once the contaminated soil is treated — in this case to achieve non-detectable levels for all chemicals of potential concern at the site — the clean-treated soil is then placed back into its original location and compacted for reuse, eliminating the need and expense of offsite transportation and disposal of soils at a landfill.

At ERDC, the need to purchase fill soils was eliminated through full reuse of treated soils, and the organization's liability for contamination was eliminated through complete treatment rather than by transporting contamination to a landfill, where ERDC would remain responsible for its ultimate fate.

All of these accomplishments occurred while achieving remediation carbon footprint reductions on the order of 80 percent over the transport and disposal of soils at an off-site landfill.

"This project is a great example of both USACE's and ERDC's commitment to implementing effective and innovative remedial actions in a timely and sustainable manner," said Dezso Linbrunner, contracting officer's representative for Omaha District.

"Using this soil remediation system resulted in the removal and onsite treatment of a significant amount of contaminant mass that otherwise was slated for disposal at a landfill," said Douglas Simpleman, Omaha District project manager. "As a result, fully treated soils were reused onsite without restrictions, generating significant reductions in cost, liability, vehicle traffic through residential areas, and significant reductions in carbon dioxide and other atmospheric emissions that would



Some 2,500 cubic yards of soil were excavated, treated for contaminants and replaced during cleanup of a former motor pool site at the U.S. Army Engineer Research and Development Center in Vicksburg, Mississippi. The Vapor Energy Generator soil remediation system was used for the project, coordinated by the Omaha District. (Photo by Kerry Larsen)

otherwise have occurred throughout the soil remediation process."

The full treatment and soil reuse helps minimize the potential for future groundwater impacts from chemicals leaching through soils, thereby aiding groundwater treatment activities in achieving site closure.

"To the extent that the technology is applicable to all organic compounds, we have expanded our interest in testing and applying this technology for treatment of other chemicals, including munitions constituents in soil," Simpleman said.

Phase one of the project involved groundwater testing on the site, followed by *in situ* treatment of chlorinated solvents present in groundwater from approximately 20 to 35 feet below grade. The groundwater treatment implemented was purposely aggressive to help meet an expedited project time line, involving the injection of microorganisms that feed on contaminants, a micro-emulsion food source for the microorganisms, and a chemical reducing substrate which degrades contaminants

rapidly by introducing ferrous iron into the groundwater system. This treatment was accomplished over a one-week period.

Phase two of the cleanup targeted soils from the ground surface to approximately 20 feet below grade and was completed in mid-August. Approximately 800 of the 2,500 cubic yards of soil excavated from the site were found to contain chlorinated solvents consistent with those in the groundwater, including trichloroethylene (TCE), perchloroethylene (PCE), and several of their byproducts, such as vinyl chloride. TCE and PCE have both been used extensively as solvents in the automotive and dry cleaning industries for many years, among other uses. TCE was also used as an anesthetic until the 1980s, routinely mixed with nitrous oxide.

"The soil contamination at ERDC presented an interesting scenario," Simpleman said. "The chlorinated-contaminated soils were below Resource Conservation and Recovery Act characteristic waste levels, but the levels

were above migration to groundwater risk-based screening levels. They were contributing to a small groundwater plume at the site. As such, we understood soils would have to be cleaned up to below migration to groundwater risk-based screening levels.

"It is relatively easy to achieve a large mass reduction of contaminants with a technology when contaminant levels are high, however, it is often difficult to treat contaminated media down to very low levels. We were optimistic that the VEG technology would allow us to treat soils to the very low required levels. The team was especially pleased when we were able to treat the soils down to no detectable contamination, which were even better results than we had originally hoped to achieve," Simpleman added.

The final phase of the cleanup involves routine monitoring of groundwater quality to ensure that the treatment efforts, especially those associated with the expedited groundwater injection activities, were adequate to sufficiently treat the groundwater and achieve closure of the environmental case at the site.

"We have been working with the U.S. Environmental Protection Agency (EPA) for years on a variety of cleanup issues around the facility, actually since 1988," said Jerry Haskins, chief of the ERDC Safety and Environmental Management Office. "Ultimately, our goal is to have EPA approve our recommendation of 'no further action' for the old motor pool area. That approval will come after several rounds of groundwater sampling demonstrates that any contamination has been reduced to a very low level."

Specifically, four rounds of quarterly monitoring of groundwater quality are planned, begun in the fourth quarter of fiscal year 2014 and going through the third quarter of fiscal year 2015. This information will be used to finalize recommendations for further action, if any, relative to groundwater quality treatment at the site.

District approves wind turbine construction permit requests

By Timothy Dugan
U.S. Army Corps of Engineers New England District

New England District approved the Deepwater Wind Block Island and Deepwater Wind Block Island Transmission System permit request in September to construct five wind turbine generators and perform other work off the southeast coast of Block Island, Rhode Island.

Deepwater Wind plans to construct and maintain the Block Island Wind Farm, a 30 megawatt offshore wind farm located in Rhode Island waters. The wind farm will consist of five 6 MW wind turbine generators (WTG), a submarine cable interconnecting the five WTGs, and a 34.5-kilovolt submarine transmission cable. Deepwater Wind Block Island Transmission System plans to construct the Block Island Transmission System, a 34.5-kilovolt alternating current bidirectional submarine transmission cable from Block Island to the Rhode Island mainland (approximately 25.1 miles). There are two separate permits. One authorizes the five wind turbine generators and the cable linking them to Block Island. The other permit is for the cable from Block Island to Narragansett, Rhode Island, where it will hook up to the power grid.

The authorized work includes:

- 1) installation of five offshore wind turbine generators and associated foundations including the placement of 0.35 acre of permanent fill;
- 2) installation of two linear miles of submerged Inter-Array Cable including the placement of up to 0.1 acre of fill for cable armoring;
- 3) placement of up to 355 cubic yards of fill for armoring of the Inter-Array Cable at the base of the foundations;
- 4) installation of 6.2 linear miles of submerged Export Cable including the placement of up to 0.3 acre of fill for cable armoring;
- 5) Export Cable aerial crossing of approximately 45 linear feet over Trims Pond in the town of New Shoreham (Block Island); and
- 6) a temporary trench excavated between mean low water and mean high water for the Export Cable landfall at Crescent Beach on Block Island with a temporary disturbance area of approximately 0.01 acre.

The district issued a public notice Oct. 2, 2012, seeking public comment on the proposed wind farm and transmission system. The application for the federal permit was filed with the district in compliance with Section 10 of the Rivers and Harbors Act, which provides for federal regulation of any work in, or affecting navigable waters of the U.S.; and with Section 404 of the Clean Water Act, which regulates the discharge or fill of material in U.S. waters, including wetlands. The wind farm and transmission system were subject to joint review under the National Environmental Policy Act.



Fort Irwin planning sustainable future

By Gustavo Bahena
Fort Irwin, California

The Fort Irwin Directorate of Public Works strives to keep the post not only operational, but also modern for personnel to conduct the mission of the National Training Center (NTC) in California.

In the past two fiscal years, DPW has been involved with numerous projects that continue the sustainability and upgrading of the installation, said DPW Director Mohammed Bari. Installation Management Command headquarters funded 86 recovery projects (22 completed) at a cost of \$82 million to repair damage by rain and windstorms from 2013 and 2014.

In addition, the directorate received funding to study the 100-year flood scenario for the installation. The new stormwater management plan will update the original plan (created in 1979) and recommends an estimated \$100 million in renovations and repairs with the Army Corps of Engineers and Army Reserve units.

Fort Irwin also received a continuation of funding for a study that locates additional sources of groundwater, Bari said. The U.S. Geological Survey funds the study that will be completed in the next three years.

Bari explained that several new energy projects received \$10 million in funding in fiscal year 2014. Insulation of 18 augmentee barracks will result in a 30 percent energy cost savings. Lighting renovations in parking areas within cantonment will remove inefficient bulbs and introduce LED lights. Car ports at NTC headquarters and Operations Group headquarters will not only provide shaded parking, but the port roofs will hold solar panels generating 750 kilowatts. The car ports will also serve as vehicle charging stations for government electric vehicles; they are scheduled to be completed by January.

Another project involves installing solar-powered lighting on a bike path in the housing area.

Two larger energy projects, with separate funding, include a concentrated photovoltaic (CPV) array and a waste-to-energy plant. The Environmental Security Testing and Certification Program is funding the CPV project, which will use advanced solar panel equipment to create 1 megawatt of electricity for the fort, Bari said. Construction is slated to begin in mid-January.

The waste-to-energy facility will also use innovative technology to incinerate refuse and would be unique for California and the Army. Construction was expected to start by January.

The new hospital and water treatment facility construction also continues. Fort Irwin will have one of the most state-of-the-art hospitals when it's completed in mid-2016, said Bari. The hospital's 2 megawatts generated by photovoltaic panels will make it near Net Zero — meaning it will almost power itself with solar energy. It will have a platinum certification in Leadership in Energy and Environmental Design from the United States Green Building Council.

Also by mid-2016 — and also one-of-a-kind — the new water treatment facility will be operational, Bari said. Water will be treated in three steps and most of it, 99.6 percent, will be available for use. Traditional facilities treat water once and waste 20

percent of the water in the process. The current Fort Irwin two-pipe water system — one for drinking and one for domestic use — will no longer be required.

Almost every project, be it repair to storm damage or a modernization initiative, requires DPW staff to generate a justification for funding, said Bari. The garrison here is limited to funding some emergency projects, so the majority of projects get financed by big Army. Surveys, studies and cost assessments must be completed by DPW staff and reviewed by local command before a proposal can be sent to Installation Management Command headquarters. If funding is approved, the contract process begins and eventually repairs or construction takes place.

Bari, who has served at Fort Irwin for 22 years, said fiscal year 2014 was a good year in terms of funding. He credits the command here and his staff for positive results.

"I'm really blessed that I always have command support in executing the Fort Irwin public works mission," Bari said. "I have a very dedicated, very hard working, and very capable staff. Yes it does take time, but at the end of the day we've been able to improve the quality of life at Fort Irwin and have a good share in mission success at the NTC."



Artist's rendering of Fort Irwin's replacement hospital, which will have a LEED Platinum certification. Construction, scheduled to be complete in mid-2016, is being managed by Los Angeles District.

Santa Clara Pueblo, Albuquerque District partnership working

Story and photo by Ronnie Schelby
*U.S. Army Corps of Engineers
Albuquerque District*

Albuquerque District began building a relationship with the people of the Santa Clara Pueblo in northern New Mexico in the late 1990s. That effort grew following the Cerro Grande Fire in 2000. The fire, which began as a controlled burn in Bandelier National Monument, quickly spread throughout the Jemez Mountains. It was, by far, the largest wildfire the state had seen up to that time. The fire burned approximately 43,000 acres and took two months to extinguish.

Santa Clara Pueblo was one downstream community that suffered a significant amount of fire damage. So much had been burned that the entire village of Santa Clara was vulnerable to post-fire flooding. The pueblo requested a consultation from the district tribal liaison, anthropologist Ron Kneebone, regarding salvaging their ceremonial land. The U.S. Army Corps of Engineers was tasked by the Burned Area Emergency Response Team, along with many other federal and state agencies, to assist in implementing projects to mitigate post-fire effects, primarily flooding. While that was underway, the Federal Emergency Management Agency (FEMA) tasked USACE among other federal and state agencies to assist in implementing projects to mitigate post-fire effects. As FEMA's planning and operating agent for Emergency Support, Public Works and Engineering, USACE jumped into action. Together, USACE, the tribe and FEMA initiated flood protection measures.

As a result of the close coordination between the Pueblo and USACE during the Cerro Grande Fire, Santa Clara Pueblo leaders and staff learned about other opportunities and programs the district had to offer. In 2005, the pueblos of Santa Clara, San Ildefonso and Ohkay Owingeh, three tribes on the Rio Grande, assumed leadership of the Española Valley, Rio Grande and Tributaries Feasibility Study. This was a multi-purpose planning project to identify ecosystem restoration, flood risk management and incidental recreation alternatives on the Rio Grande through these tribal lands.

Consultation with Santa Clara Pueblo continued on many levels and district and Santa Clara leaders began to meet regularly. Kneebone, USACE technical

personnel and district leaders were invited to attend tribal council meetings to explain the various USACE programs that could assist the Pueblo with further fire/flood mitigation. In turn, Santa Clara Pueblo experts continued enhancing their skills, knowledge, abilities and capabilities in areas such as project management, hydrology, environmental issues and disaster management. In fact, they became experts in understanding many of the USACE programs.

In 2009, the pueblo initiated a request for watershed planning assistance for all the tribal lands. Ironically, in 2011, as watershed study negotiations were being finalized, the Las Conchas Wildfire occurred.

Ferocious winds kicked up throughout mountains and plains of New Mexico June 26, 2011, and within hours a downed power line started the Las Conchas Wildfire. In its first 12 hours burning, at the rate of 1 acre per second in some areas, the fire surpassed the total amount of the burn area of the Cerro Grande Fire. Exacerbated by the region's persistent drought, approximately 156,000 acres of forest had been burned before the fire was brought under control more than two months later. The wildfire burned so hot and so severely that all trees, plants and anything in the fire's path were consumed. As a result, almost 50 percent of the watershed above Santa Clara Pueblo was damaged. Fully aware of what the fire's aftermath would bring, and relying on a decade of experience in working with USACE, the pueblo contacted the district for assistance on the first day of the fire.

Operating under Public Law 84-99, the district's Readiness and Contingency Operations Section began providing immediate technical assistance by providing a flooding vulnerability assessment for the community, several thousand sandbags and training in the construction of improvised flood protection facilities.

Then, as the 2011 New Mexico monsoon season loomed closer and the extent of damage to the watershed became more obvious, USACE support to the tribe intensified. A vast amount of soil within the burn scar area had become hydrophobic, meaning that even when miniscule amounts of water hit the ground,



South Pacific Division Commander Brig. Gen. Mark Toy and Santa Clara Governor Michael Chavarria discuss flood mitigation at the Santa Clara burn scar.

nothing was absorbed. This hydrologic effect meant that, when monsoon season did arrive, runoff would be 10 times greater than only days before. Within these few months, the entire landscape had changed from the fire that had so ravaged the land.

Army Corps of Engineers personnel developed a Technical Assistance Report for Santa Clara Pueblo, which documented the newly altered hydraulics and associated increased flood risk of the fire damaged watershed. The Corps then identified several measures to mitigate that risk, and estimates of the resources needed to implement those measures.

Less than a month after the fire ceased, the rains began to fall. The first flooding of the season was caused by only a quarter-inch of rain. What began as 50 cubic feet per second became 5,000 cubic feet per second when it arrived at the door of the pueblo. (See a video of the flood at www.youtube.com/user/spausace).

Within days the district was providing direct assistance to the tribe in its flood fight. The district performed a technical analysis of the damaged area, or burn scar. District personnel provided expertise and instruction as the tribe began building temporary levees, clearing previous damage and obstructions, and holding sandbag training in hopes of preventing some of the damage that the ferocious floods would bring. Other help came from the surrounding area: 1,000 neighbors from the non-Indian community arrived at the pueblo to

help with sandbagging, including district employees.

With the USACE assessment in hand, FEMA determined that potential impacts done by the fire put the Santa Clara Pueblo and other areas within and around the burn scar at a high flood risk.

While discussions before the Las Conchas wildfire centered on the Section 203 watershed study, following the fire and ensuing flooding the scope of the Section 203 partnership agreement was changed to adjust to the new needs of the tribe. In September 2011, the Section 203 Tribal Partnership Agreement Program Watershed Study Assessment was signed with many additions to the original scope.

The relationship has been a work in progress and has built into a trusting relationship throughout the years. It has now become a relationship not of consultation, but of partnership.

On his recent trip to the Albuquerque District, South Pacific Division Commander Brig. Gen. Mark Toy had the opportunity to meet with Michael Chavarria, Santa Clara Pueblo governor, and view the damaged land.

"Our Corps team is working hand-in-hand with Pueblo leaders to reduce the imminent risk of major flooding caused by erosion, after the wildfire in 2011," Toy said. "The district is developing evacuation plans, improving stream channel capacity and armoring embankments. It is important work and we are proud to assist."

Chavarria said it has been a tremendous honor to work with USACE.

"They came and worked with the tribe on a personal, face-to-face basis. The Corps has really listened to us, and to the needs of our people," he said. "In order to help fulfill our needs, the Corps had to 'think differently' to provide solutions for us."

This partnership has been extremely beneficial for USACE and all of its customers.

"USACE is better at delivering water resource services to the nation because we are better at delivering these services to tribes," Kneebone said.

Most recently, the Santa Clara Pueblo and USACE have initiated a Continuing Authorities Program Section 205 Small Flood Risk Management project.

"As we face the future together, we stand shoulder to shoulder with the tribe," Kneebone said. "Together we will continue to help stabilize the canyon over the next decade and assist the people of Santa Clara feel safe in their homes."

Public Works employee helps Fort Drum ‘think green’

Story and photo by Michelle Kennedy
Fort Drum, New York

Soldiers in the field aren’t the only ones concerned about energy management and mission accomplishment. Way across the installation in Public Works, one Fort Drum Civilian is managing the energy use and cost savings for the roughly 40,000 people who live, work and train on the installation.

Steve Rowley, Public Works energy manager, has been working at the New York installation for nearly 30 years. From upgrading buildings with more energy-efficient equipment to promoting cost-saving designs on new construction, Rowley is helping the

post save money from the type of light bulbs being used, the updated heating and cooling systems, solar power energy and more.

“I’ve been here 28 years; I started in 1986,” he said. “I’ve always considered myself one of the new guys. I looked around the other day and I realized I’m now one of the old timers.”

From upgrading existing buildings to promoting energy-efficient designs in new facilities, Rowley is finding ways to save money across the installation. Many of the new buildings use high-tech methods to keep its occupants warm and happy.

“Due to the Corps of Engineers’

proactive focus on energy efficiency and sustainability, we are seeing energy-efficient buildings with geothermal heating and cooling, optimal insulation values and high-efficiency lighting, pumps and motors, and condensing boilers in their designs,” Rowley said. “We’ve been very proactive at that over the past 28 years. I’m concentrating now on the legacy buildings, which were built in the 1980s during the first expansion.”

Rowley said he is now seeing an emphasis on retro-commissioning, or upgrading, existing buildings’ heating and air conditioning systems.

“That’s a major part of what we do,” Rowley added. “I’ll continue the retro-commissioning until I retire or the day I die, whichever comes first!”

Some smaller projects do not require buildings to be uninhabited because the change is as simple as changing a light bulb.

“The future is LED lighting,” Rowley said. “The Electric Shop at Public Works — Scott Murphy and his crew — have done a fine job on upgrading the airfield tarmac/runway lighting to LED. It saved 73 percent on energy use and cost and provided improved lighting. We are going to do more of that in the coming years, with the goal of replacing all of the yellow high-pressure sodium lighting (HPS lighting) with LED lighting.

The first project will be at the airfield at the request of Joe White, airfield manager.”

The Corps of Engineers has incorporated projects to make Fort Drum more energy independent with photo voltaic solar panels to produce electricity. There are four solar power systems located on the installation, the largest being at the Operational Readiness Training Complex Site located off of Route 26. The four rows of solar panels, which were commissioned in July 2013, power the ORTC site and barracks facilities.

“On peak sunny days, it provides more than enough power for the buildings,” Rowley said. “The excess goes to our grid. At nighttime, it’s the other way around.”

Fort Drum is at an advantage because it has its own non-privatized power grid, he added.

“We just use the power that we make,” Rowley explained. “If we don’t use it on one building, it goes on through the wires and goes into the next building. All of these are tied into Fort Drum’s electrical distribution system. The system runs more efficiently in cooler weather, balanced by the fact that we have less sunlight in the winter.”

In all, the four solar power systems have saved Fort Drum more than \$81,000 in electric costs to date, according to Rowley.

In addition to solar panels, 53 buildings on post use solar walls to preheat incoming ventilation air.

“You put the solar wall to the south of the building, the sun shines on the metal skin and a fan pulls air through little holes in the solar wall, captures the heat and ducts it into the building,” Rowley said. “On a single-stage solar wall, you can get a 50-degree rise in temperature on a nice sunny day. If it’s 30 degrees outside, we’ll get 80 degrees discharged to the building.”

Of the 53 buildings, eight boast two-stage solar walls, which can achieve a 100-degree rise in temperature, he said. The solar walls save the installation \$32,000 in natural gas costs every year.

“I put them anywhere I can find a spot,” Rowley said, with a laugh. “Mainly, solar walls are on large metal buildings like hangars or the hazmat building, because you need a lot of surface area on the wall and it has to face south.”

While solar walls can be used on any type of building material, most of the larger buildings are metal, Rowley noted. Offices, unit headquarters and barracks buildings are not good candidates for solar walls because there are too many windows.

The other facet of Rowley’s job is promoting energy awareness, which he does through classes. Each building on post should have an energy monitor to help

look for common-sense solutions to prevent energy waste, Rowley explained.

“My intent on energy awareness is to make friends, not enemies,” he said. “Energy awareness is a lot like safety awareness. It’s a matter of developing good habits, both at Fort Drum and at home.”

In the class, Rowley discusses such topics as the different types of light bulbs that are available and how much cost-savings each provides, and setting computers to “sleep mode” when not in use.

“People can do simple things — shut off the lights when they leave,” he said. “When computers are left on, the CPU will draw 30 watts of electricity. If you put it on sleep mode, it will draw 3 watts of electricity.”

Even the newer homes on Fort Drum are energy-efficient, Rowley said, adding that the Residential Communities Initiative contractor has built more than 1,500 New York State Energy Research and Development Authority (NYSERDA) Energy Star homes.

“The new Energy Star-certified housing showed an annual relative savings of 6,959 million BTUs for gas and electric and \$77,863 over comparable leased housing.”

The contractor, Mountain Community Homes, will continue to refurbish existing homes to incorporate energy-efficient upgrades, including air sealing, lighting and HVAC systems, Rowley said. “The goal is to bring all the housing units — new and old — up to the NYSERDA Energy Star standards,” he said.

Finally, in November, the installation awarded a contract to ReEnergy, which will provide power to Fort Drum for the next 20 years (see page 10).

“In the event of the next ice storm and area-wide grid outage, we can isolate from the utility grid and ReEnergy will continue to make power to serve Fort Drum. That gives us an immense amount of energy security.”

“It is good for Fort Drum and good for the Army,” he said.



Steve Rowley inspects a fluorescent light at an office on Fort Drum, New York. Replacing high-pressure sodium lighting with LED bulbs is one way he promotes energy savings.

West Point on track for Net Zero achievements with USACE help

By Julia Bobick

U.S. Army Corps of Engineers
Engineering and Support Center, Huntsville

The U.S. Army Engineering and Support Center, Huntsville Energy Division met with Director of Public Works (DPW) Matt Talaber at the U.S. Military Academy at West Point, New York, in October to chart a way ahead for helping the institution achieve Net Zero.

The meeting was held in response to a West Point request in July for assistance in charting a course to execute projects that will enable the DPW to reduce energy demand and consumption, and address increased energy security risks. Huntsville Center will provide a Capital Investment Strategy and road map that clearly identifies the yearly projects and steps needed to help West Point approach Net Zero.

Huntsville Center dispatched an engineering team to West Point the week of Oct. 27 to gather and assess past, current and future energy, infrastructure and modernization projects. The team is reviewing current energy operations, management control systems and opportunities for renewable energy projects. The team is also analyzing their on-site findings, as well as the myriad of energy studies that have been conducted at the historic 16,068-acre campus.

“Huntsville Center will assess where West Point is right now — what’s been done, what’s underway, and what’s planned — as the first step in building a comprehensive, integrated strategy and viable road map to Net Zero,” said Paul Robinson, chief of Huntsville Center’s Energy Division.

West Point DPW has taken many steps to reduce energy consumption and improve efficiency of its nearly 8 million square feet of buildings. DPW recently completed an extensive rebuild of the campus energy management control system, which resulted in the addition of state-of-the-art controls to West Point’s heat and cooling systems, steam line repair and installation of better lighting. Building upon West Point’s prior success and plans will enable the dedicated team to accelerate results, Robinson said.

“I remain confident that by leveraging the resources and knowledge of the Directorate of Public Works, the Corps of Engineers, West Point’s academic departments, and Cadets, as well as our industry partners, we can realize our goal of net zero energy,” Talaber said.

Huntsville Center’s Energy Division is the organization tasked to lead this initiative. The division has assembled a project delivery team (PDT) comprised of Huntsville Engineering and Support Center, U.S. Army Construction Engineering Research Lab, and North Atlantic Division/New York District to strategically partner with West Point to holistically evaluate USMA’s energy operations and provide coordinated solutions to achieve Net Zero.

From investigation and planning phase through acquisition, execution and sustainment, the division has a full suite of energy programs in its toolbox to help installations identify conservation measures, reduce consumption, improve energy efficiency, enhance energy security and ensure equitable utility rates from reliable utility sources. The Commercial Utility Program team (CUP) is one of the programs the division is using to conduct a utility service assessment of West Point’s commercial utility providers. CUP’s scope of work will involve summarizing West Point’s contractual obligations going forward, conducting an assessment of the utility provider transmission study and a utility rate analysis.

Moving forward, the PDT will continue meeting monthly with the West Point DPW staff to evaluate recommendations and define projects for implementation to ensure USMA remains on track to meet the Army’s Net Zero goal.

West Point is one of the Army’s nine Net Zero pilot installations. Installations are using a variety of tools and resources in addition to the Army Corps of Engineers to achieve the Army’s Net Zero goals. For more on the Army’s initiatives, visit the Assistant Secretary of the Army for Installations, Energy and Environment’s Net Zero website: www.asaie.army.mil/Public/ES/netzero/index.html.

For more about Huntsville Center Energy Division programs, visit <http://go.usa.gov/FtZG>.



Drums of used fuel are loaded onto a truck at an Army Field Support Battalion-Bagram yard in Afghanistan to be taken to the hazardous materials yard to process for potential reuse. (Photo by Patrick LeBlanc)

Potential pollutants become useful energy

By Summer Barkley

3rd Army Field Support Battalion,
401st Army Field Support Brigade

It’s no surprise that the thousands of people who call Afghanistan’s Bagram Airfield home create a lot of refuse — some of which is classified as hazardous material. What may be surprising is that more than would be expected can be recycled or reused in a number of ways. One way is a fuel reclamation process managed by Logistics Civil Augmentation Program (LOGCAP) contractor Fluor, which has realized a cost savings/avoidance of \$6.69 million since 2010 while keeping potential pollutants out of the waste stream.

“This effort initiated by our LOGCAP contractor partners is a superb example of how we as a nation value the environment,” said Col. Matthew Ferguson, 401st AFSB commander. “The message is visible to our Soldiers, our coalition partners and most importantly the Afghan people.”

The industrial nature of Army Field Support Battalion-Bagram operations results in a certain amount of hazardous materials as waste. These materials are collected at the various job sites and picked up twice daily. Medical waste is taken directly to an incinerator specifically designated for medical waste disposal. Petroleum, oil and lubricants are taken to the hazardous materials yard Fluor operates as one of the LOGCAP services on Bagram under the 401st Army Field Support Brigade. Each day the Fluor hazmat shop accepts oil, petroleum and other hazardous materials from contractors, units and maintenance facilities. The aggregated material is segregated into holding areas for usable and non-usable refuse. Usable fuel — JP8, diesel and motor oil — begins a new life and ultimately results in a cost avoidance of approximately \$9 per gallon to bring

new fuel into the theater, as well as the disposal cost of approximately \$400 per drum of fuel sent to Defense Logistics Agency Disposition Services. Non-usable materials such as batteries, gasoline and contaminated fuels are transferred to another contractor who will reclaim usable materials through their processes and sell or properly dispose of the remaining material.

“LOGCAP is always striving to identify opportunities to reduce our energy, water and waste consumption in our operations,” said Matthew L. Sannito, LOGCAP deputy executive director.

All fuel taken to the hazmat shop is tested and any usable is transferred to holding drums. About every four days 36 drums are moved to the filtering area where it is filtered and transferred to a large holding container. It will then be transferred to 50 gallon drums that are taken to the solid waste incinerator for use in burning Bagram’s refuse.

“Not only is this a good news story for the taxpayer, it’s a great news story environmentally,” said Patrick LeBlanc, AFSBn-Bagram contracting officer’s representative for safety and environmental. “Finding a way to safely reuse a hazardous waste in a non-polluting manner is a win for everyone, both in the U.S. and in Afghanistan.”

Fluor sought approval from U.S. Forces Afghanistan for several alternative disposal methods to include fuel and oil recycling, product re-use and on-site incineration, according to Christopher Waechter, Fluor’s country environmental manager.

“The actions simply made sense,” he said.

Waechter said he foresees this initiative continuing as long as usable fuel is turned in to the hazmat yard and there is a need for it elsewhere.

“These efforts will help ensure the Army maintains its operating flexibility,” Sannito added.

Secretary of Army recognizes excellence in energy, water management

By Dennis Bohannon

*Office of the Assistant Secretary of the Army
(Installations, Energy and Environment)*

Eight Secretary of the Army awards recognizing outstanding achievements in Energy and Water Management were presented to installations and personnel during a Pentagon ceremony October 29.

“Today we celebrate excellence in Energy and Water Management on our installations. We are very proud to present some of our heroes who have embraced the principles of Net Zero and are leading their installations to increased resiliency with energy and water security,” said Hon. Katherine Hammack, assistant secretary of the Army for Installations, Energy and Environment.

The awards were presented for achievements in several energy efficiency, energy management and water conservation categories on behalf of the Secretary of the Army by Hammack, who was assisted by Lt. Gen. David Halverson, assistant chief of staff for Installation Management.

The Secretary of the Army Energy and Water Management Awards Program was established in 1979. Installations, small groups and individuals from the Army, Army Reserve and Army National Guard are eligible for consideration. Categories for the award include Energy Efficiency/Energy Management, Innovation and New Technology, Renewable/ Alternatives, Water Conservation, and Demand Side Management/Load Shedding.

There were four awardees in the small group category for achievement in Renewable and Alternative Energy: Fort Hood, Texas; Picatinny Arsenal, New Jersey; White Sands Missile Range, New Mexico; and U.S. Army Engineering and Support Center, Huntsville, Alabama. Three installations were recognized: the Presidio of Monterey, California, and Fort Stewart, Georgia, were recognized for achievements in Energy Efficiency and Energy Management, while Fort Carson, Colorado, was recognized for achievements in Water Conservation. Todd Dirmeyer of Fort Hunter Liggett, California, received an individual achievement award.

Fort Hood

Fort Hood invested \$1.8 million of Energy Conservation and Investment Program funding to replace more than 3,600 permanent split capacitor motors (PSC) with electronically commutated motors for a projected lifetime savings of over \$2.5 million. The

motors have a brushless permanent magnet design that is more efficient than the PSC motors commonly found in air handlers, furnaces, heat pumps, air conditioners and refrigerating applications. Various benefits include greater efficiency, less heat generation, less noise, soft ramp up, less power factor penalties and a longer lifespan. The effort resulted in an annual cost avoidance of \$172,000 and saved 9 billion BTUs of energy per year.

Picatinny Arsenal

Focusing on one building, Picatinny Arsenal implemented human behavior modification plus replaced low efficiency lamps with high efficiency ones, installed occupancy controls on light switches, removed unnecessary electrical heating and retro-commissioned heating, ventilating and air conditioning (HVAC) systems. These energy conservation measures were accomplished through service orders at a cost of about \$10,000 and resulted in building 65 earning second place in the Federal Energy Management Program fiscal year 2013 Federal Better Building Competition, while also becoming Picatinny Arsenal's first Energy Star Certified Building.

White Sands Missile Range

White Sands Missile Range constructed a \$16.8 million, 4.5 megawatt ground-mounted solar photovoltaic power plant system spread across 42 acres. Construction was completed in December 2012, which was funded through an Energy Savings Performance Contract (ESPC). The system includes the ability to track the sun across the sky and a solar carport with a two-car charging system, and it can provide power for the headquarters building — making it a Net Zero energy building. Power not consumed by the headquarters building is redirected to the government owned distribution system for use by other facilities. All energy generated is consumed by the installation. These efforts resulted in annual cost avoidance of \$698,000 and savings of 30,000 million BTUs of energy per year.

Engineering and Support Center, Huntsville

The Army Corps of Engineers ESPC team at Huntsville Center awarded 16 ESPC projects in 2013 with a combined capital investment of \$188.6 million. Huntsville Center is uniquely positioned to support the Army and Department of Defense using a large Multiple Award Task Order Contract to execute ESPC projects that is valued at \$900 million. Their product delivery

team approach incorporates multiple disciplines that are co-located to facilitate an effective, efficient and quicker award process. In recent years, the center has reduced the ESPC award cycle time from 24 months to a range between 12 and 15 months, eliminating delays that result in loss of savings that average about \$3,000 per day, while striving to obtain the competitive pricing and appropriate life cycle cost effectiveness needed to ensure best value to the Army. These efforts have resulted in annual cost avoidance of \$6,700,000 and savings of 385,800 million BTUs of energy per year.

Presidio of Monterey

By manually reading the advanced electrical and natural gas meters installed in each of the energy intensive barracks buildings through the Army Meter Program, the Presidio of Monterey Directorate of Public Works (DPW) was able to develop an accurate energy distribution profile that revealed energy conservation opportunities. At low cost, over-illuminated corridors were partially de-lamped, twist timers for day room thermostats were installed, 80 percent of laundry machines were limited to cold water use, and signage was posted in barracks living quarters instructing occupants on how and when to operate their heating systems. DPW also installed dryer exhaust fan controls so fans could only operate when the dryers were running, and optimized boiler systems to use incrementally lower water temperatures during hot weather. These low cost actions, coupled with emphasis and coordination by garrison leadership, enabled the three worst performing barracks to become energy conservation standouts without negatively impacting occupants. Total cost of all energy conservation measures was \$348,871 and resulted in an annual cost avoidance of \$94,000 and savings of 6,450 million BTUs per year.

Fort Stewart

Fort Stewart undertook several energy conservation measures during the past two years to replace deteriorating and inefficient infrastructure, reduce energy consumption and improve the quality of life for Soldiers, their Family members and the Fort Stewart community. Inefficient oil fired boilers were replaced with natural gas fired condensing boilers and hot water heaters to replace a failing high temperature water distribution system; advanced street lighting controls were installed with intelligent photo control sensors to control lighting fixtures; and inefficient HVAC pumps,

chillers and cooling towers were replaced with variable frequency drive equipped systems. Much of the actual work on these projects was performed by DPW in-house personnel, which significantly improved the cost effectiveness and return on investment. These efforts resulted in an annual cost avoidance of \$242,325 and energy savings of 12,000 million BTUs per year.

Fort Carson

Fort Carson used a \$2 million ESPC to fund water fixture replacement projects and reduce water consumption. Water conservation efforts were undertaken to meet Net Zero reduction goals, mandated water reductions and comply with local restrictions. The reduced water consumption significantly reduced natural gas consumption due to less hot water passing through shower heads and sinks. Retrofitting included changing 2,292 toilets from 1.6 or greater to 1.28 gallons per flush, upgrading 3,971 aerators from 1.5 or greater to 0.5 gallons per minute, replacing 2,088 shower heads from 2.0 or greater to 1.0 gallons per minute, and replacing 145 urinals from 1.0 or greater to 0.125 gallons per flush. These actions allowed Fort Carson to reduce water consumption by about 54 million gallons of water within one year and achieve a 41 percent water reduction for fiscal year 2013 compared to the fiscal year 2007 baseline, far exceeding the established fiscal year 2013 goal of 26 percent. This resulted in annual cost avoidance of \$285,000 and saving of 7,800 million BTUs of energy per year.

Individual Award

While serving as Energy Manager for the Fort Hunter Liggett and Parks Reserve Forces Training Area (RFTA), Todd Dirmeyer developed a robust program of energy, water and waste technologies to meet energy and water conservation mandates, policies and strategies. A major accomplishment was the implementation of a long term renewable energy project with an online dashboard for the Fort Hunter Liggett solar array. The project was phased throughout several years, with the first 1.1 megawatt of solar power coming on line in April 2012, the second in August 2013, and the third in July 2014, along with complementing onsite grid energy storage. He also was instrumental in planning a similar solar project at Parks RFTA which is currently in design and intended to achieve complete independence from the local electrical grid. His effort resulted in an annual cost avoidance of \$1,686,261 and savings of 37.7 billion BTUs of energy per year.