



US Army Corps
of Engineers
Mississippi Valley Division



Corps Hurricane Response

Task Force Hope Status Report Newsletter

July 7, 2011

Next step for HSDRRS: ARMORING

Armoring enhances
resiliency and reduces
risk of failure
even from a storm
greater than 100-year level

As the U.S. Army Corps of Engineers completes the Hurricane and Storm Damage Risk Reduction System for the Greater New Orleans area, they are preparing for the final step: **Armoring**.

“For the past five years we have conducted extensive research and testing to come up with the best armoring solutions for the HSDRRS,” said Mike Park, Chief of Task Force Hope. “We hosted workshops and seminars, we employed subject matter experts, we listened to vendors, and we opened our meetings to our sponsors and stakeholders and invited them to offer their ideas for armoring the system.”

What is Armoring?

Armoring is a natural or artificial material placed on earthen levees and hardened structures, on protected



Crews install Turf Reinforcement Mats on a levee. The TRM will further strengthen the levee in the event of overtopping.

sides of levees, and on floodwalls or other structures to reduce the risk of breaching as a result of an overtopping wave attack associated with a greater than 100-year storm surge.

Armoring of levees adds a level of risk reduction known as *resiliency*. Resiliency allows a structure to weather forces greater than the 100-year storm. In the case of the HSDRRS, that could mean a 500-year event.

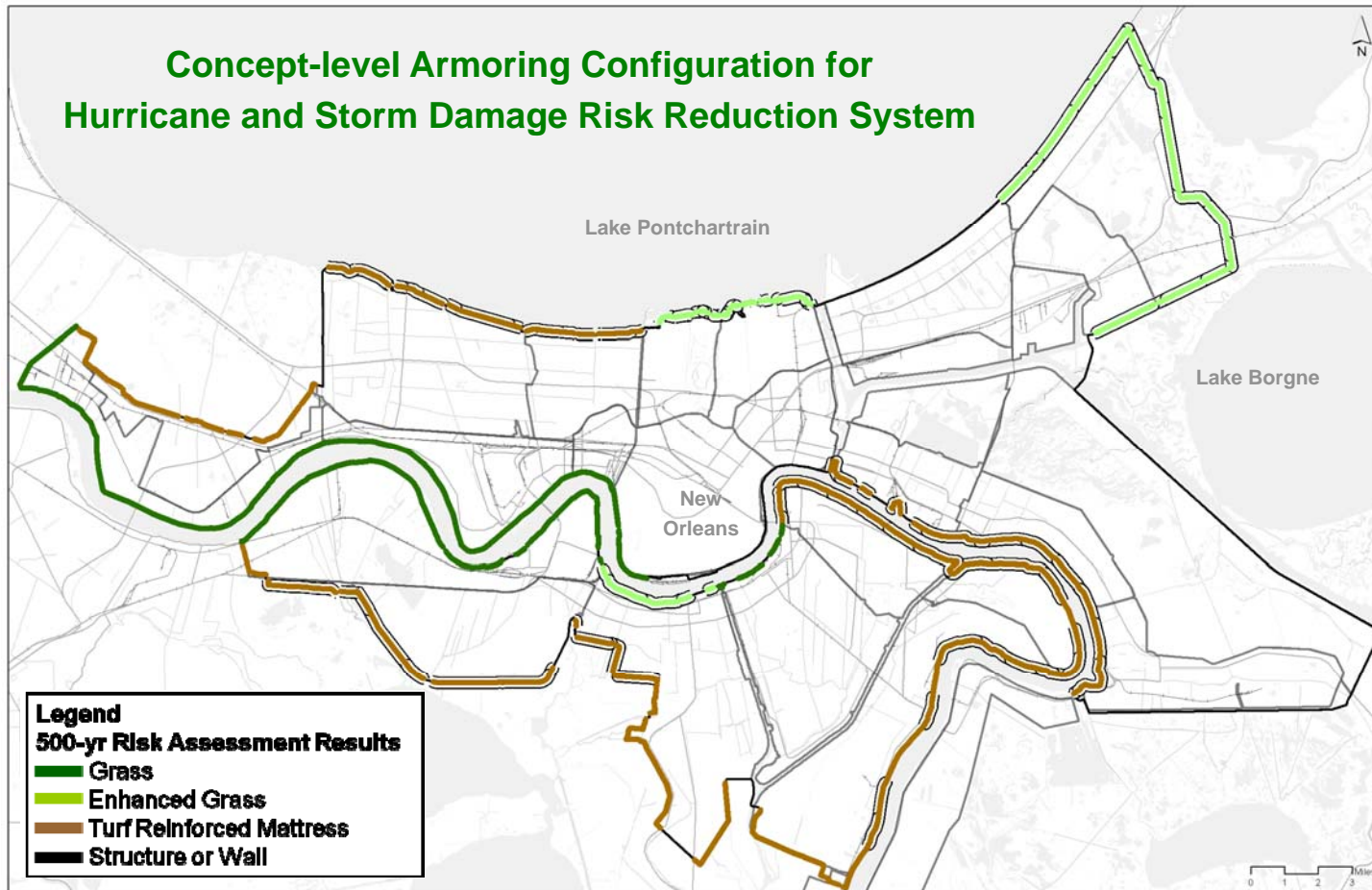
The Corps received Congressional authorization and funding for armoring through the 4th and 6th Emergency Supplemental Appropriations Acts. Armoring will be constructed on the HSDRRS with 100% Federal funding.

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Concept-level Armoring Configuration for Hurricane and Storm Damage Risk Reduction System



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HSDRRS Alternative Evaluation Process

The Corps uses a multi-criteria decision analysis process which weighs the merits of alternative engineering solutions against an array of evaluation criteria which generally includes risk and reliability, i.e. expectation of the successful performance of the various alternatives under consideration; operations and maintenance which measures the relative operability and maintainability of the alternatives under consideration; cost, schedule, and environmental impacts.

Weights are applied to each criteria where risk and reliability (i.e. performance) is weighted highest. The other criteria are weighted as appro-

priate to the engineering solutions under consideration.

A team comprised of Project Delivery Team members and subject matter experts convene to conduct the alternative evaluation process in which relative scores are attributed to each alternative under consideration for each of the weighted rating criteria. A designee of the non-Federal sponsor's choosing, usually the Project Manager, is assigned to communicate the non-Federal sponsor's concerns and preferences to the Alternative Evaluation Process Team for their consideration. The outcome of the AEP is a compilation of scores which results in a ranking of the respective alternatives. In cases where there is not a clear distinction in rankings, often a sensitivity analysis wherein the rating criteria weights

are adjusted, is used to better distinguish the optimum alternative. These alternative evaluation process meetings are often daylong undertakings as the teams go through the deliberative process, usually assisted by an experienced facilitator.

How was this applied to Armoring?

In advance of the Armoring Alternative Evaluation Process, the Corps undertook extensive research to test the performance of an array of armoring materials and applications. The Corps commissioned Colorado State University to erect the world's largest wave overtopping simulator and to conduct full scale flume testing of materials, including common species of grass, grass reinforce-

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Enhanced Grass on a Levee

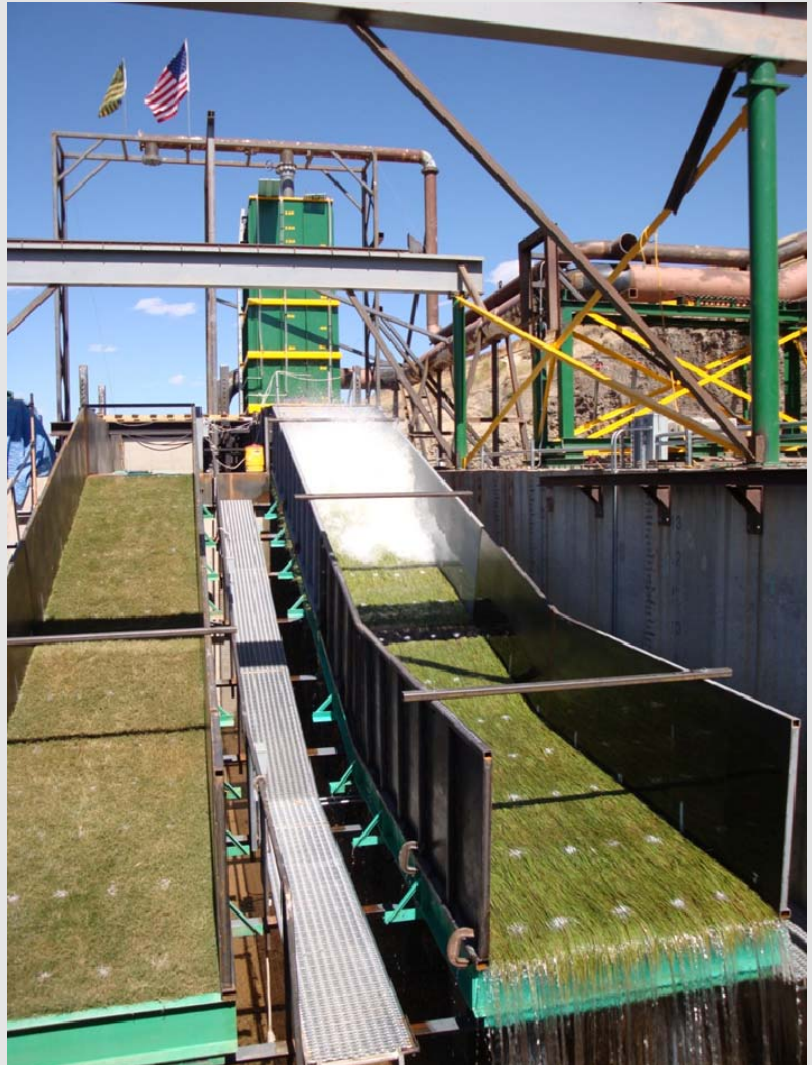
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ment mattresses, articulated concrete block, compacted clay, lime-stabilized clay, distressed grass, and turf reinforced mats with distressed grass.

Additional testing was carried out at Texas A&M University, LSU, the Corps' Engineer Research and Development Center. Subject matter experts on wave simulation, armor-ing applications and erosion from the Netherlands were commissioned to design the wave modeling apparatus and testing methodology, and to establish performance ranges for various armor-ing materials.

A Risk Analysis Team comprised of former members of the Interagency Performance Evaluation Task Force modeled consequences of storm surge impacts within the HSDRRS perimeter that could be expected with the alternative armor-ing solutions in place under a range of storm intensities.

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Wave overtopping testing at Colorado State University



Installing Turf Reinforcement Mat on a levee

“Virtually, every point around the perimeter system will be armored in some fashion.”

- Mike Park, Chief Task Force Hope



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The compilation of all of this research and expertise was available to the Armoring Alternative Evaluation Process Team to assist them in evaluating the various alternatives. Seven alternative configurations of armoring were evaluated by the team.

Conclusion

The selected armoring alternative consists of a combination of enhanced turf cover and Turf Reinforced Mattresses to make the system uniformly resilient for a 500-year event with enhanced levels of resiliency on segments of the system

where breaches could result in catastrophic losses (see map).

“Virtually, every point around the perimeter system will be armored in some fashion,” said Park.





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The *Status Report Newsletter* supports the information program for Task Force Hope and its stakeholders.

It also serves as the primary tool for accurately transmitting the Corps' hurricane risk reduction efforts to stakeholders.

This is an online publication that is open to public distribution.

This issue and past issues can be found at: <http://www.mvn.usace.army.mil/hps>

Comments and questions may be sent to the Status Report Newsletter editor at: b2fwdpao@usace.army.mil

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★ A Message from our Commanding General ★

Congratulations to the Hurricane Protection Office team for successfully completing your mission of providing 100-year level risk reduction by 1 June! Although some finish-up work still remains, your achievements to date are simply incredible and historic.

We will hold the HPO Relinquishment of Command Ceremony on 21 July 2011, at 1:00 p.m., at the National WWII Museum at which time the HPO team will be deliberately transitioned into the New Orleans District. I hope everyone who has played a part in the success of HPO and the Regional and National delivery of those Hurricane and Storm Damage Risk Reduction System projects will join me in attending this special ceremony.

The HPO mission has truly been a Regional team effort over the

last five years; everyone involved can be proud of the tremendous job that we are bringing across the finish line.

I recently hosted the visit of several high-level Army officials, and we flew over many of the perimeter projects. Secretary of the Army John McHugh, Army Chief of Staff Gen. Martin Dempsey, and Assistant Secretary of the Army Jo Ellen Darcy were all extremely impressed with what they saw. I felt a deep sense of pride in all of your incredible achievements.

Thank you for all you have done to reduce risk for the people of the Greater New Orleans area. You have made history here.

Michael Walsh

Major General Michael Walsh, Commander
Mississippi Valley Division

