



**US Army Corps
of Engineers®**

Charleston District

**CHARLESTON PENINSULA, SOUTH CAROLINA,
A COASTAL FLOOD RISK MANAGEMENT STUDY**

Charleston, South Carolina

**THE USACE PLAN AND DUTCH DIALOGUES RECOMMENDATIONS
APPENDIX - G**

SEPTEMBER 2021

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How Does the USACE Plan Compare with Recommendations in the Dutch Dialogues Report?

The Dutch Dialogues (DD) Charleston Report recommendations provide a framework for addressing several sources of flooding across a large area. Successful implementation of such a large, complex undertaking requires that it be divided into manageable parts and that those parts be continuously coordinated. Implementation of the DD recommendations will require many plans focused on different facets of the overall framework, with multiple proponents working in parallel at various scales ranging from single plots of land to the entire region.

Within the framework of the DD Report, the USACE Plan could be called the “Peninsula Perimeter Protection” sub-plan. It is focused on addressing one primary source of flooding – storm surge – in one geographic area – the Peninsula. In the DD Report, Steven Slabbers, Bosch Slabbers Landscape Architects, wrote, “...we see the Peninsula eventually becoming a polder, providing perimeter protection against the outside water. There is no alternative over the long term.” One of the key recommendations of the DD Report is “Work Towards a No-Regrets Polder Approach,” which states: “An integrated water system with perimeter protection that allows the peninsula to be operated as a polder, or low-lying hydrologic unit, is the recommended long-term strategy.” The long term need for perimeter protection cannot be eliminated by the other recommendations in the DD Report.

The USACE Plan is focused on perimeter protection against storm surge because Federal laws and policies are generally structured to recognize the local responsibility for stormwater management and tidal or rainfall flooding, and the authority and funding for this study preclude the investigation of measures to address these aspects of flood risk management, except where related to the impact of perimeter protection. Consequently, the USACE Plan cannot implement many of the other DD recommendations. However, if the USACE Plan provides the majority of funding for perimeter protection, which is one of the most expensive facets of the DD recommendations, that may allow more local resources to be directed toward implementing other DD recommendations to complete the overall framework.

Although the USACE Plan cannot directly implement all facets of the DD recommendations, it must be coordinated with the overall framework because all sources of flooding are interconnected. The following table shows the relationship between the USACE Plan and specific DD Report recommendations.

	Dutch Dialogues Report	USACE Plan	Discussion
Scope (geographic):	<ul style="list-style-type: none"> • The Charleston Peninsula: <ul style="list-style-type: none"> ▪ Lockwood Corridor/Medical District (west side) ▪ New Market & Vardell’s Creek Area (east side) • Johns Island • Church Creek & West Ashley 	<ul style="list-style-type: none"> • The Charleston Peninsula 	The Charleston Peninsula was identified as the USACE study area due to the focus on coastal areas in the study authority; the City of Charleston’s request for a flood risk management study of the Charleston Peninsula in a letter dated March 7, 2018; and the peninsula’s significant vulnerability to storm surge inundation.
Scope (flood hazards):	<ul style="list-style-type: none"> • Storm surge • Rainfall/storm water • High tide nuisance flooding • Groundwater 	<ul style="list-style-type: none"> • Storm surge 	<p>The USACE study authority is focused on hurricane (or storm) protection and related purposes.</p> <p>USACE regulation and policy recognize that effective flood risk management is a shared responsibility and that the construction of storm water and groundwater management infrastructure are local responsibilities.</p> <p>High tide nuisance flooding does not result in enough damages to warrant federal participation.</p>
Coastal Zone Recommendations	<i>Region-wide Engineered Hurricane Protection System: A coastal surge risk reduction system consisting of man-made surge barriers across major regional watersheds is not feasible at this time.</i>	The Charleston Harbor Storm Surge Barrier System was screened from consideration due to the cost and complexity of such a system.	Both efforts advise against a regional surge barrier system.

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	<p><i>Nature-Based Adaptation Strategies:</i> The City and County should identify and allocate municipal, county, state, federal and private or non-profit resources to natural and nature-based projects in the City / County / region that restore and improve the natural protective and adaptive processes of sand dunes, barrier islands, coastal marshes, wetlands, and intertidal ecosystems that reduce storm surge impacts and allow for long-term sea-level rise adaptation.</p>	<p>Construction of oyster reef-based living shorelines are proposed seaward of the perimeter wall where natural shorelines are at risk.</p>	<p>Living shorelines are proposed in combination with other measures to reduce wave attack and coastal erosion of existing wetland marsh, while reducing scour at the proposed storm surge wall. The living shorelines would also provide other environmental benefits.</p> <p>Other nature-based strategies were considered but did not meet USACE’s threshold for substantially reducing major storm surge damages if considered alone, while others addressed local flooding issues which are generally a local responsibility, not Federal; however, USACE encourages local implementation of such strategies through municipal, county, state, private, or non-profit support as suggested in the Dutch Dialog Report.</p> <p>Some of the natural features recommended for the Coastal Zone in the Dutch Dialogues Report do not occur in the study area (e.g., sand dunes and barrier islands). USACE already has other projects underway in the Coastal Zone such as the Folly Beach Coastal Storm Risk Management Project.</p>

	Dutch Dialogues Report	USACE Plan	Discussion
Peninsula Recommendations	<p><i>Work Towards a No-Regrets Polder Approach:</i> An integrated water system with perimeter protection that allows the peninsula to be operated as a polder, or low-lying hydrologic unit, is the recommended long-term strategy.</p>	<p>A storm surge wall would be constructed along the perimeter of the peninsula to reduce damages from storm surge inundation.</p>	<p>The storm surge wall in the USACE Plan would effectively create an urban polder.</p> <p>The USACE Plan provides for interior drainage components to the extent that they are to manage storm water flows that would be restricted by the wall.</p>
	<p><i>Perimeter Protection Must Be Multifunctional and Beautiful:</i></p> <ul style="list-style-type: none"> • The importance of the Perimeter Protection Study cannot be overstated, and any perimeter protection alignment must be logical, practical, and forward-looking. • Ensure that perimeter protection intersects in a logical, sensitive way with the Historic District. • Certain alignments will create important storm water storage opportunities and help manage groundwater. • All alignments should take a multiple benefit approach. 	<p>USACE commits to mitigating adverse effects to significant aesthetic resources. A Visual Resource Assessment Procedure was performed to inform conceptual mitigation measures and will be further developed during the project design phase.</p> <p>USACE commits to mitigating adverse effects to historic properties as outlined in a Programmatic Agreement among the USACE, State Historic Preservation Officer, the National Park Service, the Advisory Council on Historic Preservation, and the City of Charleston. Consultation with these agencies and other interested parties is ongoing.</p> <p>Marshes and other low areas within the wall alignment would temporary store storm water for interior drainage when gates are closed.</p>	<p>USACE will cost share in the implementation of visual and cultural mitigation measures that will help to blend the storm surge wall with the city’s visual character. The City of Charleston can opt to pay for additional betterments that would help achieve desired aesthetic standards.</p>

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	<p><i>Decouple High and Low Ground Water Systems:</i></p> <ul style="list-style-type: none"> Managing storm water at the top of the watershed will alleviate pressures for immediate drainage on low ground. A peninsula-wide groundwater management assessment is needed. 	<p>No recommendation regarding storm water or groundwater management.</p>	<p>Effective storm water management would complement the USACE plan in a storm surge situation. Storm water and groundwater management are local responsibilities.</p>
	<p><i>Work at All Scales – from Dips to Deep Tunnels:</i></p> <ul style="list-style-type: none"> Decouple deep-tunnel system from shallow drainage systems. Dips and swales in streets should be strategically eliminated. 	<p>No recommendations regarding storm water management.</p>	<p>Locally implemented measures to reduce or slow runoff would complement the USACE Plan by reducing the need for pumping. Storm water management is a local responsibility.</p>
	<p><i>Emphasize Historical Connections:</i> The historical street grid, in which the City connected high-ground to low-ground and to the rivers with its transparency, order, and canopy of trees, should be reinforced.</p>	<p>USACE will ensure that historical values are protected to the extent possible through the application of the Secretary of the Interior’s Standards for the Rehabilitation of Historic Buildings.</p> <p>Adverse visual effects on historic properties will be avoided or minimized through design of the wall or other treatments. Mitigation of those effects that cannot be avoided will include such things as documentation, interpretive signage, educational programs, informative web sites, donation of preservation easements, contributions to preservation funds, or other measures.</p>	<p>Adverse effects to historic properties are analyzed and addressed through consultation with the State Historic Preservation Officer and other consulting parties as required by the National Historic Preservation Act. The Programmatic Agreement among the USACE, State Historic Preservation Officer, the National Park Service, the Advisory Council on Historic Preservation, and the City of Charleston ensures the USACE has taken into account the effect of the plan on historic properties in compliance with the National Historic Preservation Act.</p>

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	<i>Flood Adaptations for Historic Structures:</i> Accommodate the elevation of historic buildings where warranted in order to improve resiliency for our historic district and ensure their very survival.	Nonstructural measures such as elevations and floodproofing are recommended in areas where construction of the wall would be impractical due to the topography of the peninsula or other constraints.	Some of the structures identified for nonstructural treatments in the USACE Plan are historic, therefore Design Guidelines developed by the Charleston Board of Architectural Review would be consulted.
Peninsula Eastside Recommendations	<i>Expose & Celebrate Waterways:</i> Daylighting Newmarket Creek watershed near the Lowline should be studied.	No recommendation. The study considered measures that would restore historical creeks, but they were screened because they did not reduce storm surge risk.	Restoration of historical creeks would be a good option for the city to improve storm water drainage issues, which is a local responsibility, as well as habitat.
	<i>Prioritize High Ground:</i> Any new public housing in this zone must be built on high ground.	No recommendation regarding public housing.	Land use, building codes, zoning and other regulatory policies are the responsibility of local government.
	<i>Add Water to Public Spaces:</i> All public spaces in Eastside should be assessed for water storage and infiltration opportunities.	No recommendation. The study considered measures that would use public spaces for water storage opportunities, but they were screened because they are not effective in addressing storm surge inundation.	Storm water management is a local responsibility.
	<i>Development Guidelines:</i> Limit development in the lowest portions of the Cooper Redevelopment Zone.	USACE will require the City to prepare or maintain a floodplain management plan as a local cooperation requirement for the project.	Land use, building codes, zoning and other regulatory policies are the responsibility of local government. As part of the National Flood Insurance Program, the City is required to regulate development in flood zones. USACE encourages the city to implement low-impact development to complement the USACE Plan.

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	<p><i>Coordinate Drainage and Perimeter Protection:</i> The City should ensure robust storm water runoff management is created and drainage to the river/outfall is ensured, probably via pumps and collecting basins.</p>	USACE analyses consider the capacity of the city’s existing drainage system and proposed drainage improvements. To date, five permanent and five temporary interior drainage pump stations are included in the USACE Plan.	Both efforts recommend an interior drainage system to complement the storm surge wall. USACE efforts are focused on ameliorating any adverse affect of the wall on interior drainage.
	<p><i>Pilots, Projects, Programs, and Partnerships:</i> The City should pilot water storage and street retrofits. Rainproof-type pilots should be encouraged or mandated. Curriculum in city schools could be oriented to development of water literacy.</p>	No recommendation regarding these local actions.	The recommended smaller-scale local actions would complement the USACE Plan.
Charleston Medical District (CMD)	<p><i>Establish a Flood Resilience Coordinating Committee:</i> CMD should establish an inter-institution CMD Flood Resilience Coordinating Committee.</p>	No recommendation regarding this local action.	The recommended local action would complement the USACE Plan.
	<p><i>Understand the Cost of Doing Nothing:</i> CMD institutions should perform an investment value analysis to assess current risks and recent loss and impact patterns.</p>	The No Action Alternative / Future Without Project scenario describes future conditions if no action is taken by USACE to address coastal storm surge risks on the Charleston Peninsula.	Storm frequency and storm damage modeling in the USACE report could be used to inform the Medical District’s risk analysis.
	<p><i>Develop Real-Time Forecasting Capability:</i> CMD and/or the City should develop or improve real-time flood forecasting tools for CMD emergency vehicles, employees, patients and the public.</p>	No recommendation regarding CMD forecasting capability.	USACE encourages the development and implementation of Emergency Response Plans and Flood Warning Systems, which are responsibilities of local governments.
	<p><i>Advocate for Multiple-Benefit Perimeter Protection:</i> Alignment of perimeter protection should enable additional storm water storage and groundwater management.</p>	The USACE Plan will include interior drainage (storage /pumping) components limited to managing storm water flows that would be blocked by the wall.	Wall alignment will consider interior drainage requirements, costs, and environmental effects.

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	<p><i>Anticipate Changing Conditions:</i> CMD flood risk reduction strategies must incorporate projected climate changes and their impacts upon access and operations.</p>	<p>The USACE report includes an analysis of an intermediate sea level rise (SLR) scenario and its effect on the study area with and without the proposed USACE project. The final report will also include analyses of low and high SLR scenarios.</p> <p>Most sections of the proposed storm surge wall can be adapted (made taller) if deemed necessary in the future.</p>	<p>The USACE planning process requires forecasting conditions over a 50-year planning horizon, including relative sea level rise, hydrology, and environmental trends.</p> <p>In addition to requirements to evaluate impacts from SLR, USACE must evaluate climate change impacts to rainfall intensity.</p>
	<p><i>Create Resilient Connections:</i> The report includes recommendations regarding the CMD Greenway, additional access to/through CMD, connectivity between neighborhoods, Gadsden Creek, and a Westside planning framework.</p>	<p>Connections to the Battery Promenade and future pedestrian bridge along the Ashley River Bridge are important considerations in determining the specific wall alignment.</p>	<p>Land use, building codes, zoning and similar regulatory policies are the responsibility of local government. Increasing resilience is part of a USACE study objective. Perimeter protection would render the CMD more resilient to storm surge impacts.</p>
Johns Island Recommendations	<ul style="list-style-type: none"> • <i>Do No Harm</i> • <i>Conserve & Protect Natural and Cultural Assets</i> • <i>Respect Elevation</i> • <i>Update Johns Island Plan with a Regional Perspective</i> • <i>Maintain and Improve Overland Drainage</i> • <i>Use Market-Based Tools</i> 	<p>No recommendations for Johns Island.</p>	<p>Johns Island is not included in the USACE study area.</p>
Church Creek Recommendations	<ul style="list-style-type: none"> • <i>Judo, not Boxing</i> • <i>Develop Watershed-Based Plans</i> • <i>Protect & Sustain Intertidal Zones</i> • <i>Detain & Infiltrate</i> • <i>Integrate Parks, Water Storage & Historical Landscapes</i> 	<p>No recommendations for Church Creek.</p>	<p>Church Creek is not included in the USACE study area.</p>

	Dutch Dialogues Report	USACE Plan	Discussion
People	<ul style="list-style-type: none"> • Waggoner & Ball • Kingdom of the Netherlands • The City of Charleston • USACE • Historic Charleston Foundation • Medical University of South Carolina • The Nature Conservancy • The Water Institute of the Gulf • American Flood Coalition • Charleston Water System • Clemson Design Center Charleston 	<ul style="list-style-type: none"> • The City of Charleston • USACE • Historic Charleston Foundation • Medical University of South Carolina • The Nature Conservancy • College of Charleston • AECOM • Davis & Floyd, Inc. • Charleston County • State Historic Preservation Office • Advisory Council on Historic Preservation • National Park Service • South Carolina Department of Transportation • U.S. Coast Guard • Multiple state and federal natural and cultural resource agencies 	Several representatives of various agencies and organizations participated in both efforts.