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U.S. Senate Date: Wednesday, October 6, 2021
Committee on Environment
 and Public Works
Washington, D.C.

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THE U.S. ARMY CORPS OF ENGINEERS EMERGENCY RESPONSE TO HURRICANE
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Wednesday, October 6, 2021

United States Senate

Committee on Environment and Public Works

Washington, D.C.

The committee, met, pursuant to notice, at 10:07 a.m. in room 406, Dirksen Senate Office Building, the Honorable Thomas R. Carper [chairman of the committee] presiding.

Present: Senators Carper, Capito, Cardin, Whitehouse, Kelly, Inhofe, Boozman, Ernst.

STATEMENT OF THE HONORABLE THOMAS R. CARPER, A UNITED STATES
SENATOR FROM DELAWARE

Senator Carper. Good morning, everybody. I am pleased to join Senator Capito and our colleagues in calling this hearing to order. Welcome, everyone.

To our witnesses joining us today from the Army Corps of Engineers, Major General Butch Graham, how long have people been calling you Butch?

General Graham. Senator, since I was born. So, I am a junior, and my dad took Bill Graham, so they didn't call me Billy Graham.

[Laughter.]

Senator Carper. My mother wanted me to grow up and be Billy Graham. Down in Danville, Virginia, we spent a lot of time in a Baptist church, so you know what I mean.

Welcome, Butch Graham, and welcome to Brigadier General Tom Tickner, nice to see you again, and to Colonel Steve Murphy. We are glad that you could join us today. To the folks that are behind you and part of your supporting team, we welcome all of you.

Thank you for joining us for what, sadly, has become an all-too-frequent issue over that last couple of years, and that is providing emergency response in the aftermath of extreme weather.

Each of our witnesses comes from a different position within the Corps, and actually from different parts of the Country, that we were just talking about. They all are going to be able to share with us their points of view on the Corps' response to Hurricane Ida, as well as their thoughts on investing in more resilient water resources infrastructure or building back better, as our president likes to say.

As we all know, since 1980, North Atlantic hurricanes have become more intense and, unfortunately, more frequent. This trend is projected to continue in the years ahead as our planet continues to warm. Accordingly, the importance of the Corps' emergency response services will grow, as well.

That is why we must ensure that all parts of our government, that includes Federal, local, and State, are all working together in lockstep to improve the resiliency of our infrastructure so it can withstand these extreme storms.

In New Orleans, the \$14.6 billion flood-protection system built after Hurricane Katrina is a good example, really, a great example of a smart, all-of-government approach to resilience, one where the Federal Government funded the total cost of the project and the State of Louisiana has now begun to pay back its share.

They have, actually, a similar arrangement on a highway in Delaware, Route 301. If you get to drive out of here and go

east from D.C. and go through Maryland and finally get into Delaware, 301, the Federal Government upfronted the money, and the State of Delaware is paying it back with tolls, a similar kind of approach.

When Hurricane Ida made landfall exactly 16 years after Katrina, this new system was put to its first test. Fortunately, it held strong and prevented the catastrophic flooding in New Orleans that we saw in 2005. This is where we can see that federal investment in resiliency pays real dividends, but challenges still remain.

One of the biggest obstacles with projects like the one in Louisiana, as well as the Indian River Inlet in Delaware, is that States and localities often rely on reimbursements from the Corps to cover the costs of operating and maintaining these projects after they are constructed. But the Corps, constrained by politics and budget shortfalls, can't always recover all of these costs, leaving States and communities to foot the bills.

The result is that areas strapped for resources are unable to make the investments in resilience that they desperately need, and we know that the need is real. The stakes could not be higher, including our economy, our homes, and people's very lives and livelihoods are at stake.

Just look at how Louisiana fared during Ida. While sophisticated water infrastructure in New Orleans protected much

of the city from flooding, other communities in the State were devastated. We might have a photo of that. Yes, there we go.

In my home State of Delaware, which found itself in the path of Ida's remnants as the storm turned North, we experienced severe beach erosion; we experienced flooding and wind gusts of up to 60 miles per hour. I think we have a shot of Smith Bridge Road that we saw. New Jersey faced similar shoreline erosion, and many of us saw the videos of water rushing through and flooding New York City's subway systems. While the final number of deaths attributed to Hurricane Ida is not yet in, so far we know 29 confirmed deaths in Louisiana and more than 40 in New York and New Jersey, with deaths reported in at least seven additional States.

In addition to its tragic human toll, experts project Ida's economic impact at over \$90 billion, making it the seventh costliest hurricane to hit the United States since the year 2000. Just this about that: seven hurricanes, each responsible for more than \$90 billion in economic impact, all within 20 years, seven within 20 years.

Like all major storms, Ida is teaching us a lot, including about what works and what does not work. While we can all be thankful for the feat of human engineering that protected New Orleans, one of the Nation's most vital port systems, from Ida's destruction, we must also recognize that, until we address the

root causes of climate change, the U.S. will continue to face natural disasters of increasing severity and intensity with even more devastating impacts. That is why we need to rapidly and dramatically reduce our greenhouse gas emissions, while we increase investments in resilience and create a lot of jobs while doing so.

Benjamin Franklin once said that an ounce of prevention is worth a pound of cure, and his words still ring true today.

The Corps of Engineers Civil Works Program provides tremendous value to our Nation as the primary provider of water resources infrastructure. With more extreme weather events caused by a changing climate, it has never been more important that our infrastructure stands up to the growing challenge and protects the people that we all represent.

We look forward to hearing each of your testimonies today, but first, I want to turn to Shelley Capito, we call each other wingman and wing woman, but we are partners in crime here, but hopefully partners for doing a lot of good. I want to turn to her for her opening statement.

We all have competing hearings that are going on right now. I have a business meeting going on in the Homeland Security and Government Affairs Committee, for which I used to chair. It is a business meeting where they need me to come and be there for a quorum and to do votes. We are going to do that at the

beginning, and then you are in charge and will start our witnesses' testimonies, and I will come back as fast as I can. Thank you, Senator Capito.

[The prepared statement of Senator Carper follows:]

STATEMENT OF THE HONORABLE SHELLEY MOORE CAPITO, A UNITED STATES
SENATOR FROM WEST VIRGINIA

Senator Capito. Thank you, and good morning to everybody. It is good to see a familiar face here in Major General Graham, who served as Commander of the Pittsburgh District. When I was in Congress, you were my Corps leader, which covers a significant portion of my State of West Virginia.

Colonel Murphy, thank you for being here today and for the warm hospitality extended by you and your team to the committee staff during their visit to Corps facilities in Louisiana earlier this year. I want to thank you also, General Tickner, for being here with us today.

Thank you for your service. I know some of it has not been domestic; some of it has been international, and I thank you for that.

We all intently watched the impacts and aftermaths of Hurricane Ida, both in Louisiana, but also in the Northeast. Tragically, an estimated 82 people lost their lives and billions of dollars in damages. Those of us from States and communities that have recently experienced terrible natural disasters feel greatly for our fellow Americans impacted by this hurricane.

As both Ranking Member of this committee and also of the Homeland Security Appropriations Subcommittee, my staff and I have stayed abreast of FEMA's response to this disaster and the

efforts of other agencies providing support, such as the Corps. How important that has been.

By the most recent count, the Corps has more than 710 personnel deployed and received 24 mission assignments, totaling \$223.4 million in response to Hurricane Ida. The Corps has also issued \$2.5 million in Flood Control and Coastal Emergency funds under Public Law 84-99. This funding went towards the protection and repair of critical infrastructure, as well as the provision of equipment and facilities to fight floods and maintain essential services.

Again, I want to reiterate my gratitude to the men and women of the Corps for performing these critical functions. I am also eager to hear from you on how we can support the Corps' efforts to help the Nation respond and recover from these types of disasters in the future.

By all accounts, and our Chair talked about this, the Hurricane Storm Damage Risk Reduction System, known as HSDRRS, for New Orleans authorized by Congress and constructed by the Corps after the catastrophe of Hurricane Katrina performed as intended. The system prevented a more significant loss of life and severe damage to the city.

Not all areas were covered by the system, however, and that is where we saw the devastation in those unprotected communities in Louisiana and replicated in the Northeastern States.

It is important that local, State, and federal partners continue to work together to identify and address existing gaps in flood risk management and coastal storm damage reduction.

The \$5.7 billion in supplemental funding provided by the Congress to the Corps just last week will support these efforts. Solutions will take time, however, which is why it is also important that the Corps continues to work with communities to identify and mitigate risks through its Silver Jackets Program, Planning Assistance to States, and other authorities.

Challenges with and suggested improvements to existing technical assistance programs are something that I am keen on hearing from all of you. I am also eager to hear about how we can support the Corps' efforts to help the Nation respond and recover from these disasters in the future.

This committee will do its part in this process by authorizing individual projects and studies and providing programmatic direction to the Corps through biennial Water Resources Development Act legislation, which we are actively engaged in right now.

In closing, let me reiterate our gratitude, and again, I want to thank Chairman Carper for having this hearing.

[The prepared statement of Senator Capito follows:]

Senator Capito. [Presiding.] I would like to introduce our witnesses in the absence of our Chair.

First, Major General William "Butch" Graham is the current Deputy Commanding General for Civil and Emergency Operations at Headquarters, U.S. Army Corps of Engineers, where he oversees all the Corps Civil Works activities, a \$7 billion annual program, and responses to storms and other natural disasters. His previous Corps assignments include Commander of North Atlantic Division and the Pittsburgh District, from which he hails.

Our second witness is Brigadier General Tom Tickner, the current Commander of the North Atlantic Division. He oversees all aspects of a \$5 billion annual program that covers six districts, including activities in more than a dozen States, Africa, and Europe. His previous Corps command assignments include Pacific Ocean Division, Savannah Division, and Philadelphia District.

Our third witness is Colonel Steve Murphy. He is the current Commander of the New Orleans District, where he oversees all Corps activities in Southern Louisiana, so you are a busy man. He previously commanded the Nashville District of the Corps of Engineers.

I want to welcome each of you to the committee today. We appreciate your service to the Country and look forward to your

statements.

General Graham, we will start with you.

STATEMENT OF MAJOR GENERAL WILLIAM GRAHAM, DEPUTY COMMANDING
GENERAL FOR CIVIL AND EMERGENCY OPERATIONS, U.S. ARMY CORPS OF
ENGINEERS

General Graham. Ranking Member Capito and distinguished members of the committee, thank you for the opportunity to testify today to discuss the U.S. Army Corps of Engineers emergency response to Hurricane Ida.

Again, I am Major General Butch Graham, the Deputy Commanding General for Civil and Emergency Operations here at headquarters.

I would like to start by extending our sincere condolences to the families who lost loved ones during Hurricane Ida. Our thoughts and prayers are with those who have been impacted by this storm.

As was mentioned, Hurricane Ida made landfall on August 29th as a category four storm and immediately began to draw comparisons to Hurricane Katrina. As was mentioned, following Hurricane Katrina and the devastating flooding in the city of New Orleans, \$14.5 billion Hurricane and Storm Damage Risk Reduction System was built. As its name implies, it was built to reduce the risk of flooding caused by storms to the city. During Hurricane Ida, this system performed exactly as designed.

The projects the Corps build help the reduce the flood risk of vulnerable communities. We must also be prepared to respond

when some of those flood risks are actually realized. This aspect of resiliency is achieved through our emergency response partnerships with FEMA, State and local governments, and our key contracting partners.

In response to Hurricane Ida, as many as 760 Corps personnel have been deployed, so we snuck an extra 50 in on you.

The Corps has indeed done 24 FEMA Mission Assignments, totaling almost a quarter billion dollars. As was mentioned, under our Public Law 84-99 authorities, the Corps has issued \$2.5 million of Flood Control and Coastal Emergency funds.

As part of this massive response, with the team I am immensely proud of, I would like to highlight one of our missions: temporary roofing. Operation Blue Roof is managed by the Corps on behalf of FEMA. The goal of the program is to provide homeowners in disaster areas with industrial-strength sheeting to protect storm-damaged roofs. This allows residents to return to their homes, restarting local communities and local economies.

Since September 1st, the Corps has received over 34,000 valid requests. As of this morning, we have completed over half: 17,000 roofs have been installed to date.

To put this in context, last year for the two hurricanes that hit the Gulf Coast, Laura and Delta, the Corps installed 13 thousand. So, 13,000 last year, and we are up to 34,000 we need

to install this year, and we have completed 17,000 to date. This three-fold increase provides a perspective of just how damaging Ida was.

After any event, working with FEMA, we critically evaluate ourselves to see where we can improve. For the temporary roofing mission, even though we are installing roofs at almost twice the rate as our previous efforts, we are looking for ways to get started sooner by speeding up how we get work orders to our contractors and by bringing in, potentially, our contractors early, pre-landfall.

Looking more broadly, we continue to see record-setting severe weather events across the Nation. Last year alone, we responded to 28 different disasters, including ten hurricanes, nine major floods, and three major wildfires.

One of the ways we are responding to this challenge in the future is by incorporating climate change resiliency into our planning process, giving the scale of climate change a broader, more regional approach to planning for future events as required. Recently, the Chief of Engineers made a recommendation for the authorization of a \$29 billion system-wide risk management strategy for the coastline of Texas.

When looking at any future project, we understand that we need to comprehensively evaluate and analyze all project benefits. The Water Resources Development Act of 2020 created

flexibility for the Army Corps to address the needs of economically disadvantaged communities, minority communities, and rural communities. The Act promotes an approach that analyzes multiple benefits for project justification: social benefits, economic benefits, and environmental benefits.

The authorities in this Act encourage the use of natural and nature-based features, seek alternatives to accommodate for sea level rise, and inspire innovative ways to expand beneficial reuse of dredged material. We are working hard to put these new authorities to work for the American people.

Thank you again for the opportunity to speak today. I look forward to answering any questions.

[The prepared statement of General Graham follows:]

Senator Capito. Thank you.

General Tickner?

STATEMENT OF BRIGADIER GENERAL THOMAS TICKNER, COMMANDER, NORTH ATLANTIC DIVISION, U.S. ARMY CORPS OF ENGINEERS

General Tickner. Ranking Member Capito, distinguished members of the committee, I am Brigadier General Tom Tickner, Commander of the Corps' North Atlantic Division. Thank you for the opportunity to provide some context to the Corps' response to Hurricane Ida in the Northeast region.

As storm risk management is a shared responsibility, one executed best in a whole-of-community approach, the Corps partners with federal agencies and non-federal stakeholders. This collective skillset, combined with the capability, enhanced our effectiveness in preparing for, responding to, and recovering from storm events.

In my role, I am responsible for federal engineering work in all parts of the 14 Northeastern States, from Virginia to Maine.

Before the storm hit our region, my districts were able to obtain reliable advance information concerning potential Ida impacts from the National Hurricane Center, the U.S. Geological Survey, the National Weather Service River Forecast Centers, and other meteorological data. This data, obtained through Public Law 84-99 authority, assisted in the accurate prediction of potential consequences Ida could bring, and we were able to communicate this risk to FEMA and the States through the Corps'

mapping systems.

To manage risk to Corps-owned and operated projects, USACE conducted predictive analysis based on weather forecasts, and the division lowered its Corps' dam reservoir elevations before the rain arrived to retain the maximum amount of flood storage available to reduce potential impacts downstream.

We provided early support to our State and local partners by contacting them to determine their needs. Several of our district emergency operation centers activated to provide technical assistance under PL 84-99. Flood-fighting materials, such as sandbags, plastic sheeting, and alternate flood-fighting materials were placed on standby, prepositioned, and ultimately released as needed.

When the remnants of Hurricane Ida arrived, we were impacted mostly by significant fluvial events where rainfall overwhelmed stormwater systems and inundated local streams, leading to flash flood events and isolated tornadoes.

As part of our post-emergency assessments, I was able to conduct site surveys of locations within the storm's impact area. These locations included areas where the Corps has conducted studies, as in the Passaic River Basin, New Jersey, Manville, New Jersey, and in Merrimac, New York.

I also surveyed sites where the Corps has active projects, like the Indian Rock Dam in York, Pennsylvania and the Raritan

River in Bound Brook, New Jersey, and I am happy to report our projects performed as designed.

Finally, I observed areas where there was significant impact, but no current Corps projects or studies, like the Brandywine and Schuylkill Rivers areas of Philadelphia.

We also provided technical expertise to the States, including a Corps liaison officer to both Pennsylvania and New Jersey State Emergency Operation Centers. A subject matter expert on watering and debris removal to New Jersey EOC and on watering information for the Pennsylvania Department of Transportation. Both FEMA Regions 2 and 3, along with the States they supported, Pennsylvania and New Jersey and New York, were satisfied with our proactive approach to this event.

In the aftermath of Superstorm Sandy, Congress asked USACE to prepare a performance report analyzing how our completed projects performed. That report and other work following Sandy has heightened our intent to build resilience into our coastal storm risk management and flood risk management projects.

Together with our federal and non-federal partners, we are currently completing post-storm evaluations to determine impacts and develop deficiency reports for these projects. An initial assessment showed damages incurred to some of our flood risk management project elements, which will require an investment in repairs.

In addition to the repairs and maintenance we conducted on these projects, in some cases, the Corps recommends a comprehensive assessment of their status to include a review of performance criteria and recommendations for updating based on current science, recent storm events, and factors such as climate change.

In common with much of the Nation's infrastructure, many of our projects require continuing investment and operation and maintenance to ensure their effectiveness. The Corps' team is committed to working together with our federal interagency, State, and local partners to provide best engineering solutions for the tough challenges facing our communities.

Thank you again for inviting us to speak today. I look forward to your questions.

[The prepared statement of General Tickner follows:]

Senator Capito. Thank you.

Next, we will have Colonel Murphy. Thank you.

STATEMENT OF COLONEL STEPHEN MURPHY, COMMANDER, NEW ORLEANS
DISTRICT, U.S. ARMY CORPS OF ENGINEERS

Colonel Murphy. Good morning, Ranking Member Capito and distinguished members of the committee. I am Colonel Steve Murphy. I am the Commander of the Army Corps of Engineers, New Orleans District. On behalf of my team and I, thank you for the opportunity to meet with you today and discuss the Corps' response to Hurricane Ida in my district area of operation.

My area of operation encompasses all South Louisiana, from Texas in the west to Mississippi in the east. Day in and day out, I focus in large part on coastal and climate change issues.

The Louisiana coast is a working coast, as the State calls it, due to the significance of its activities and waterways and their benefits to the national economy. These include five of the Nation's top busiest ports, the Mississippi River, which is the busiest waterway in the Nation, and our economic artery, as well as the Gulf Intercoastal Waterway, which is the Nation's third-busiest waterway, all of which have been and continue to be impacted by gulf storms.

The majority of the State's population also lives in the southern half of the State near the coast.

Coastal Louisiana sits at the epicenter of climate change. Sea level rise and subsidence co-exist as threats that are major concerns for both the Corps and the State. Consequently, my

major missions are navigation, coastal and environmental restoration, coastal storm risk management, and flood risk management. Flooding of any kind, whether from rainfall, storm surge, or riverine flooding, or what has been occurring on a more frequent basis, the occurrence of all three at the same time, is a major concern for the State and for my district.

The men and women of my district are residents of South Louisiana. During a storm, they endure the same impacts as their neighbors. For them, working with our partners to ensure a promising future in coastal Louisiana is not just a professional responsibility. It is a personal commitment.

During Ida, almost a third of my 1,100-person workforce evacuated out of State, to include my wife and children. Almost all of us lost power, and almost half saw some form of damage to their homes, with 37 of us experiencing so much damage from Ida that their homes are now unlivable.

While we couldn't be more proud of the performance of the greater New Orleans area's Hurricane Storm Damage Risk Reduction System, and how it validated the massive national investment of \$14.5 billion that you have heard about already, other parts of the State were not as fortunate.

Where there was federal investment and levees and flood walls, though, the systems performed as designed. Hurricane Ida has validated and reinforced many of the lessons we have learned

over the last 16 years since Hurricane Katrina made landfall.

The systems that the Federal Government invested in, and especially the HSDRRS, have reinforced the value of the Corps' system-wide approach and demonstrated the importance of sustainability and resilience that the Corps has incorporated since then into its designs. We have projects currently underway that are now incorporating these principles outside of the greater New Orleans area.

We are now in day 40 of recovery from Hurricane Ida. I will close by saying there could not be a better team to handle natural disasters and climate change than the team that has gathered, federal, State, and local in Louisiana. Everyone here knows disaster response is truly a team sport. I do not think we could be working more closely or more cooperatively with the State of Louisiana than we are right now.

After personally experiencing two of the longest Lower Mississippi River flood fights in our district's history, the most active Atlantic hurricane season in history last year, the COVID pandemic, and now Hurricane Ida, I can definitively say that this is a highly functional and collaborative team that has made the USACE response in support of this State and these disasters, and especially Ida, successful.

That same team spirit and cooperation also drives the Corps investigation and implementation of natural and nature-based

solutions that are in sync with the State's 50-year, \$50 billion coastal master plan. These include measures ranging from beneficial use of dredged material to coastal restoration to environmental mitigation to the consideration through my regulatory program of large-scale diversions in the Lower Mississippi River aimed at restoring the coast and making it more resilient.

I could go on, but out of respect for your time and to allow for questions, I will close there. Thank you again for the opportunity to be here.

[The prepared statement of Colonel Murphy follows:]

Senator Capito. Thank you, Colonel.

We will go to questions, and a belated happy birthday to my colleague from Maryland, Senator Cardin.

Senator Cardin. Well, Senator Capito, thank you very much. I only have 364 days remaining until my birthday, so thank you. I appreciate that.

First of all, thank you all very much for your service. We really do appreciate the leadership of the Army Corps. It is critically important in Maryland; it is critically important to all of our States.

I was in Louisiana, New Orleans, after Katrina. Our committee went down there to inspect firsthand the damage that was done, and it was shocking to see the amount of loss of life and of property. So, the \$14.5 billion investment is one that we all supported, and it worked, as you all have said. We are proud of what we were able to do to mitigate Hurricane Ida.

We also recognize that these storms are becoming more frequent and more severe and that we have a responsibility to deal with the realities of climate change, both in mitigating future pollutants that are emitting greenhouse gases, as well as adapt to the realities. Your responsibilities on adapting to the realities, I want to just touch on briefly.

Many years ago, we made a decision in Maryland to invest in beach renourishment, because the Northeasters were becoming more

and more severe. We invested millions of dollars. The result has been billions of dollars of savings, and savings of life.

These types of investments really pay off dramatically, but there is also a change in the risk factors that I am seeing in our communities. We saw it during Ida. We have had flooding before, because of a long sequence of rain, causing banks to rise beyond what they can handle, and you have dealt with that issue through your flood management programs.

But in recent years, we have found something different occurring, and that is the large volume in a short period of time of rainfall. That was true during Ida. So, it wasn't really the integrity of the flood system. It was more the extreme amount of rain in a very short period of time.

I mention that because in Ellicott City, Maryland, as you all know, we experienced in a 20-month period two 100-year floods. But what was really unique about these floods that we had never experienced this type of flooding before. Ellicott City is on the banks of rivers. We have seen the rivers rise and cause flooding into Ellicott City. We had never seen the large volume of rain occur in such a short period of time that couldn't possibly be managed by the current system.

So, my question to you is, as we look at these new risk factors, more violent storms, not necessarily hurricanes, just a large volume of rain coming down in a very short period of time

that are flooding communities, how do we prepare for this?

Now, I appreciate, Colonel, your mentioning the beneficial use of dredged material. We are doing that in replenishing wetlands. That is part of our strategy, because wetlands not only manage the flooding situation, but it also manages the pollutants going into from runoff, so it is an important part of our strategy.

I am interested as to what your recommendations are to us to manage the realities of the current risk factors on violent storms occurring with a large amount of rain in a short period of time, which is not the way we have traditionally been dealing with infrastructure to prevent flooding.

General Graham. Senator, thank you for that question, and let me address that. We have put together, the Administration has directed it, a climate action plan. It is right up with CEQ right now, and we expect that to be released soon.

It has five major components to it. I think those address your concerns, and those five major components are: we have to modernize our approach, and that is our programs and our policies, to deal with a different future. We have to manage better the facilities we do operate, like the dams around Philadelphia that General Tickner mentioned. We have got to enable, as Colonel Murphy spoke to, our partners, and a lot of that is with sharing our science with them.

I know some of the committee staff members went down to Duck, North Carolina and saw some of that science being created. We have got to share that information with our local partners, and that includes this actionable data that can stand up to scrutiny, so folks, local communities, States, realize the challenges that they are under.

Then finally, Senator, we have got to plan and put into operation those futures, and this authorizing committee plays a key role in that. Thank you.

Senator Cardin. I think my time has run out. I just would urge us to think about how we can work in partnership to deal with these extreme raining events that are causing communities to be extremely vulnerable. It is hard to plan for every part of our community getting an extreme weather event, but we have to have a game plan for our communities, because it is occurring. We saw it during Ida; we have seen it several times in Maryland.

It is unprecedented, the type of flood risks that we currently have, so we are going to be looking to you and this report to give us a game plan on how we can protect communities the best that we can from the realities of these storms.

Thank you, Madam Chair.

Senator Capito. Yes.

Senator Inhofe?

Senator Inhofe. Thank you, Madam Chair.

I know this hearing is on Ida, but all three of the individuals as witnesses here were participants in a real tragedy that we faced in 2019, a flooding case in Oklahoma, where we had levees that were 75 years old and well, well past their normal historic lifetime, and they held up. I can remember actually being up to my waist in water during that time, and so it was something that we were very fortunate.

Since that time, we have been on pins and needles what might happen if we should get another flood. But nonetheless, everyone performed very well, and the WRDA language that we put into the 2020 WRDA system performed very well.

General Graham, as the Corps plans budgets for future projects, do you believe it is important to take into account safety of life benefits like you did in the Tulsa Levees Chief's Report?

General Graham. Senator, absolutely.

Senator Inhofe. Well, I have to say that we really did a good job in terms of the private sector. We had to make some changes in our current statutes to accommodate that at the time, and things did work, and worked out really well. Now, we don't have many hurricanes that hit Oklahoma, but what it is important to remember is that Oklahoma is as connected as Arkansas is to the Mississippi River through the MKARNS. A lot of people have

a hard time understanding that we in Oklahoma are navigable.

I have probably said this three or four hundred times in the last few years to let people know that we need to be a part of a system and participating in that system and have actually done really good work in terms of working with the private sector.

Colonel Murphy, I would have to say this, I am sure, Senator Boozman and I have spent a lot of time working on the impact of the navigation way. Colonel Murphy, is it true that getting our navigable waterways open to commerce is key to a successful recovery effort, and how does the Corps prioritize dredging efforts following flooding in storm surge events?

Colonel Murphy. Senator, thank you for the question. I would say, absolutely. That is one of the first things we are looking to do as soon as we can get boats on the road and in the water. I have survey boats going out on all the federal waterways that I am responsible for to get surveys in conjunction with the Coast Guard to clear them.

Senator Inhofe. I appreciate that. The 2019 flooding was a shock and exposed a lot of gaps in our system, but we are lucky in Oklahoma to have numerous private sector entities that we had to bend the law a little bit to make it happen.

So what I would like to ask you to do is to, for the panel, for the future, look at the authorities. What authorities does

the Corps need to enable them to respond as capably as they did respond in this case, and this might be something that you can do for the record. Get your ideas together as to how can we work more efficiently with the private sector, such as we did in the State of Oklahoma.

Okay? Very good, thank you.

Senator Capito. Thank you.

Senator Whitehouse?

Senator Whitehouse. Thank you, Senator. Welcome, all of you. I am glad to have you here. I represent Rhode Island in the Senate. Up in New England, the most extreme climate-related shift that we have seen has been in the form of extreme rainfall. It is kind of off the charts.

In terms of a persistent underlying shift related to climate, what we see coming is sea level rise. In fact, we are going to have to redraw the map of Rhode Island to accommodate the loss of seashore and what is now land turning into an archipelago of flooded islands.

Against that backdrop, we experienced dramatic failure of FEMA mapping. I have read press reports that, in Texas, FEMA mapping was off by as much as 50 percent when floods hit the Houston area.

As a result, Rhode Island has had to do its own mapping, going back to the original data and bringing in our own

scientists. As a result, we have got a very, I believe, accurate and successful mapping tool called STORMTOOLS that has been run by our CRMC agency, the Rhode Island Coastal Resources Management Council. It is annoying as hell to fund FEMA and also have the State of Rhode Island have to pay for its own mapping because FEMA mapping isn't accurate.

I know FEMA ducked because a lot of the reason for the inaccuracy was that they would have to bake in climate change, and there are very powerful forces that want to punish anybody who talks about climate change. So FEMA took a dive on this one, in my view. But the result is one that you all have to live with all the time, which is bad maps.

What are you doing to try to make sure that you are operating off of good flood maps, and when you have to come in with your emergency response, people aren't being clobbered by the fact that they didn't know they were in a flood zone, so they didn't have proper insurance, so now they are really stuck? You are in the middle of all that. What is the view from the front?

General Graham. Senator, thank you for that question. In any project that the Corps does, there are two imperatives, Senator. We want to make sure that we get the engineering right, and that we want to make sure that we are in control of the projects and are good stewards of the taxpayer's money. So

to your comments, to make sure that we understand the topography and the hydrology, that is, we agree with you that it is absolutely essential, and that is the bedrock that all that engineering is founded upon.

Senator, I will go back and relook based on the information you provided to make sure we are, indeed, using the best science available.

Senator Whitehouse. I think, often, predictions related to climate change are simply zero-factored out, which is just simply bad prediction when we know perfectly well what is going on here. You see it change, and then you act as if it is just going to go straight from here on over, rather than continue its trajectory, when there is zero science to support that proposition that it is going to go level-state. So please take a look at that.

The other thing I want to just flag for this hearing and for my colleagues, which I always do, is that, we are talking about Ida. Ida hit as a coastal flood. The Army Corps of Engineers has something called the Flood and Coastal Storm Damage Reduction Program. In the last decade, it has run between favoring inland over coastal flooding by 19 to 1. That was our best year, to be at the tail end of a 19 to 1 losing battle, 120 to 1, \$1 for coasts for every \$120 for inland. And the Fiscal Year 2022 budget has it at 45 to 1, somewhere in the

middle, \$1 for coastal for every \$45 for inland. I want to thank the Corps for agreeing to take a good, hard look at this and try to understand exactly what the heck is going on.

But when you look at sea level rise, when you look at offshore storms, when you look at Ida coming ashore as a coastal storm, the idea that you guys have set up your inland, your Flood and Coastal Storm Damage Reduction Program in a way that so inexplicably favors inland flooding over coastal flooding is a matter of real concern to those of us who represent coastal States and have huge flooding issues, like what STORMTOOLS reveals about Rhode Island.

We are working on that through another lane, but I just didn't want to let this opportunity to go by without raising that astounding discrepancy and what it means for my State.

Thank you, my time is up.

Senator Capito. Senator Boozman?

Senator Boozman. Thank you very much and thank you all for being here. We really do appreciate your service to our Country in this capacity, but you have all had outstanding careers and have just served in so many different ways.

I want to associate myself with Senator Inhofe's words regarding the MKARNS, the importance of getting back on track, the benefit to the economy, all of those kinds of things. He truly has been a great champion and great leader in that for

many, many years, and it really is important, not only to our States, but to the economy of the entire Country, and really, the world.

Major General Graham, media reports indicate that the cost of damage from Hurricane Ida could be as high as \$95 billion. This compares to \$170 billion resulting from Katrina, \$131 billion from Harvey, and \$74 billion from Sandy, according to estimates by the National Oceanic and Atmospheric Administration.

In your testimony, you discussed how our Country invested \$14.5 billion to reduce flood risk in New Orleans. I like how you used the term "invested" instead of "appropriated" or "obligated," because infrastructure projects truly are an investment, especially ones such as the Hurricane Storm Damage Risk Reduction System that did protect New Orleans, which saves this Country money and, more importantly, saves lives.

I guess the question is, do you believe the American people received a good return on their \$14.5 billion investment? If so, why?

General Graham. Senator, thank you for that question. I think, certainly, it was a great investment. I was able to go visit Colonel Murphy about a week after the storm hit, and I was expecting to have to stay out in Mobile or maybe up in Baton Rouge. But a week after the storm hit, the amazing city of New

Orleans was back on its feet, and it would not have been back on its feet if it wasn't for that \$14.5 billion investment.

Senator Boozman. Very good. Colonel Murphy, in your opening statement, you talked about the team effort between the federal, State, and local government, tribal and levee boards, to address the issues caused by Hurricane Ida. In your opinion, how much does it help the Corps when they are able to lean on their non-federal sponsors, and what are the benefits of having local side-by-side with the Federal Government when addressing the aftermath of extreme weather events, and I would say, even, not only aftermath, but the precursor?

Colonel Murphy. Senator, I say in short, having a single non-federal sponsor through the State has been invaluable. Just during the storm, I was talking to the governor directly via phone call and text; I was talking to Chairman Kline with the State's Coastal Protection and Restoration Authority, and I push out what we call LGLs, Local Government Liaisons, put Corps employees directly to the parish and levee district emergency operation centers.

That communication that that has facilitated really has created a, we like to say, a one door to the Corps approach, whereby questions, concerns, friction is immediately identified, and we can solve problems. So it helps quicken our response, and I would attribute, really, a lot of the communication that

exists right now to why we have been successful to date.

Senator Boozman. Colonel, what other Corps-constructed Flood and Storm Damage Reduction projects within the New Orleans District, apart from Hurricane and Storm Damage Risk Reduction System, were impacted by Hurricane Ida, and what is your assessment of their performance? I had the opportunity to be down there in Congressman Kalish's district, which butts up to New Orleans, and after Katrina, and I know that there was tremendous impact there, sometimes we leave those areas out because of the focus, you know, on the bigger centers, but tell us what else was impacted.

Colonel Murphy. Thank you, Senator.

Senator Boozman. Assessment of their performance.

Colonel Murphy. Like I said during my opening remarks, any federal system perform as designed. We didn't see any major overtopping, and certainly not on the hurricane storm damage. Outside of that, though, we have over \$1 billion in DB 18 supplemental projects that we didn't see any major impacts on.

Sadly enough for the West Shore Lake Pontchartrain Project, unfortunately, that was not in place. The good news is, we are actually moving forward. We have let contracts; we just let the first contract on that. That will reduce risk to La Place, which was one of the most heavily impacted areas to the storm, and with those contracts in place, really, the majority of them

this coming year and 2022, we will be well on our way to completing that project.

Senator Boozman. Very good. You have got a good story to tell. That is great, thank you.

Senator Carper. [Presiding.] Senator Capito?

Senator Capito. Thank you, and thank you all for being here.

After I question, and the Chairman has given me this time, I have to go to another 11 o'clock meeting, so I want to thank you. So, I am going to start with you, Colonel Murphy, on a quiz. You said, navigation routes, the busiest is the Mississippi, the third is the inland waterway. What is the one in the middle?

Colonel Murphy. Senator, it is the Ohio River.

Senator Capito. I was hoping you would say that.

[Laughter.]

Senator Capito. It just happens to run right along the western border of my State. Major General Graham, thank you. This is the second time we have gotten to work together, so this is great. I am going to say something that we talked about, pre-disaster mitigation and how important that is. It is interesting to hear my colleagues talk about these flash rains that just sort of sit, and that was our last flood in 2016, was very devastating, as you know.

But what we hear from our local partners sometimes, and even FEMA in some sense, and I am not laying blame here, is that sometimes, the processes to get help are so doggone complicated. So you have got an opportunity through the climate program that you said you wrote that has five different aspects to it to, I think, really streamline some of these.

If I look at my cities and towns and counties, they don't have flood disaster experts. They have somebody that is tasked with that, but they are also tasked with traffic or some other, trash pickup, or some other functions, because they are spread pretty thin. You all have all that expertise, and I think, as much as you can streamline those processes in working with your local partners, certainly in New Orleans, they have a lot of experience with it.

But what we found was it was just chaos, but managed chaos. But I think we could have done better with it and recovered quicker, had we had a little bit more hand-holding and simplistic way to react to some of those.

I want to ask you, just put that on your radar screen, we have just appropriated \$5.7 billion in supplemental appropriations in the continuing resolution. I was wondering, your process and timeline for expending these funds, if you have any ideas on that? Also, will you make sure that that information regarding this funding, when we make requests for

information, that that comes in a timely fashion?

General Graham. Ranking Member Capito, in terms of transparency with to respond to the committee's request, absolutely. We will be absolutely committed to being responsive on those.

To the timeline on getting those \$5.71 billion that we just received at work for the American people, we are working on that right now. We are looking at the investigation projects, the construction projects, certainly we are looking at the Mississippi River projects, and the O&M work that we have got. Our goal is to, as with any of the disaster supplementals, is to get that work delivered as fast as we possibly can.

Senator Capito. What is the timeline stretch on that, on those dollars? Do you know?

General Graham. Ma'am, I don't know. I will get that answer back to your team.

Senator Capito. Okay, thank you.

General Tickner, I think we were all astounded when we saw the video of the post of, well, it wasn't the post, it was Hurricane Ida flooding the subways in New York City. I think it was something we hadn't ever really anticipated.

What do you attribute that to? Was there something, again, here that pre-disaster could have been better performed to be able to mitigate that? Because we saw, obviously, as the

Colonel said, the pre-disaster that we did in response to Katrina actually prevented a lot more damage in Ida. So, what do you see in the Northeast in terms of very unlikely places to see pictures like that?

General Tickner. Ranking Member Capito, I appreciate that question. As an engineer, we all watched what happened in New York City. We don't really have a project there that takes care of that. But what happened was a large amount of rain fell in a very short period of time, record levels, and their stormwater system, the drains, couldn't handle it. So the roads turned into rivers, and water went to the lowest point, many of which was a basement.

There were a lot of rescues that happened in the basements. Then there were also folks trying to drive through those, that stormwater, which, once you get out of your vehicle, you are now fighting the water, and the power of the water, it will overtake anybody. So, regretfully, New York City had 18 deaths. New Jersey had even more with 30, I believe.

So, from talking to my counterparts at the State level, from the pure flash flood, when we are not putting in a project, it is about education and letting people know that this risk is out there. Don't go into the water. Regretfully, some people lived in the basements, and hopefully, that problem is being corrected, where they have a way out.

Senator Capito. Well, I would say that the bill that we passed, the Safe Drinking Water and Wastewater, and then as was incorporated into the BIF, in terms of trying to manage or trying to modernize some of these old storm systems, I don't know how old New York's storm system is, but I would imagine it is in excess, probably, of 100 years. Certainly, we have systems that old in our State, and then to try to manage that.

So, this is where I think if we do on the front end, what we know to have fallacies of the back end, we are going to end up saving money, saving lives, saving property. But we have to make these processes for communities and States to access these dollars so they actually feel like they can work with you and work with other local partners, FEMA and whoever, to be able to get these projects up and running.

So thank you all very much, and I appreciate all of your good hard work. Thank you.

Senator Carper. Senator Capito, thanks so much, and thanks for keeping the trains on time while I was trying to wear two hats at once. No, the Army is always on time. It is the Navy we worry about, right? I say that as a retired Navy captain. I like to say, different uniforms, same team. There we go, how is that?

Colonel Murphy, let me just say, this could be for anybody, but in terms of what we witnessed in greater New York, the

subways flooding and that sort of thing, my sense is that with climate change, we are seeing more intense rain. In some cases, we are seeing storms hunker down and sit on an area for a while, and just create a lot of flooding. Is that a fair characterization or not, anybody?

General Graham. Chairman, I believe it is, that that is a fair characterization, and in that massive rainfall events that we weren't expecting is, I think, what caught a lot of people by surprise. We saw the tragedies in Western Tennessee with some of the mountain flooding, and the valleys, where we tragically lost some lives this year. If you would ask somebody in New York City, do you think that could happen here? I am going to guess that they probably said it couldn't.

So I think education on this coming out of this is probably our best defense.

Senator Carper. Yes. General, anyone else want to comment? I know that you weren't trained, I wasn't either, in weather ology or meteorology.

General Tickner. I will just mention a little bit, maybe beyond New York City, where we have done, we have started to build over the last 100 years in the flood plains. That is something that I know our State partners are very concerned with because they don't want just to do projects; they would like to do natural and nature-based features and non-structural, which

could be moving people out of the floodplain that exists today.

Senator Carper. All right, thank you.

I want to put a human face on it, so when Hurricane Ida came up the East Coast, it spun some tornadoes. One of those tornadoes ripped through nearly just on the other side of the Delaware Memorial Bridge. It struck a family farm, a number of them, but also the family farm of Katie Grasso. We know her; she is my communications director in Delaware, lives in New Jersey. Her family farm, their family farm was destroyed, houses, buildings, equipment.

So, that is a human face. People that we know, and there are a lot of other folks that are suffering, were suffering, are suffering today, still, as a result of all of this, but Hurricane Ida was the first big test of the new Hurricane Storm Risk Reduction System.

By most accounts, maybe by all accounts, it was given an A. I didn't get a whole lot of As when I was in school, but that is very encouraging to hear. I got a few. This system, however, is only part of the picture. It doesn't function without tireless communication and collaboration with other critical players.

My question is for you, Colonel, please. Please tell us about the differences between the Corps' response to Hurricane Katrina and Rita and the response to Hurricane Ida. What were

the biggest changes and lessons learned from previous storms that you put into use in responding to Hurricane Ida?

Colonel Murphy. Thank you, Chairman. I could probably spend 30 minutes, but I won't.

I would tell you a big difference is the systems approach that the Corps now uses. Before Katrina, it was the Hurricane Protection System, and it was a system in name only. It allowed water into the city via canals, and it was incrementally funded. So I would say a huge change is the Corps approached it as a system, which I think has application to what this committee is interested in is, how do we get after coastal resilience, how do we get after flooding, is looking at things as a system.

So, that full federal funding, key lesson learned, allowed the Corps to move forward. All the talents and the technology that the Corps had, we see today in the system. It allows decisions to be made that are not funding-based, but they are risk-based, and you see that in what performed right during Ida.

I would say we had a willing federal partner, a single federal partner, that did not exist between Katrina. And now with the State, I work with the Coastal Protection and Restoration Agency, and they work with the levee districts. The communication is back and forth. But I have a single State sponsor who is responsible for working real estate issues, who I work with on payback, all the kinds of issues.

Then really third, I would say, another key enabler was the alternative environmental arrangements. There is no way to build the kind of infrastructure you need without having some kind of an environmental alternative arrangements to allow you to move quickly. Now, we still met those environmental requirements, but what really Congress allowed working with CEQ after Katrina, we were able to move forward very quickly.

Senator Carper. You didn't need the 30 minutes, but you have 27 more minutes. We will just put that in the bank, okay?

I am going to turn next to General Graham for a quick question pertaining to climate change and project design. As I mentioned earlier, the intensity, the frequency, the duration of storms has increased significantly, and as climate continues to warm, as our climate continues to warm, hurricane intensity and rainfall are only projected to increase as we continue to experience the impacts of climate change. The way in which we approach risk reduction must take these factors into account.

My question is, and I will ask you to be fairly brief on this because I want to recognize Senator Kelly shortly, but does the Corps currently account for climate change in its design process for flood risk management projects?

General Graham. Sir, it does, absolutely. I will give you a very quick example. We are working on a project. It is on Highway 1, which goes down to the Florida Keys in Monroe County,

the southern tip of Florida. We have formulated that project, we designed that project, for the high sea level curve, because one of the aspects is raising Highway 1, the only road in and out.

So, we went and had the authority to use the higher sea level curve, and that is what we are using for this project.

Senator Carper. All right, good.

I have a follow-up question for the entire panel. I am going to yield to Senator Kelly. He is a man on a mission, so he can ask his questions and head on to his next assignment.

Senator Kelly. Well, thank you, Mr. Chairman, and thank you for all the witnesses today for being here.

General Graham, this question is for you, on emergency preparedness in Arizona. You have spoken both in your testimony about the lessons that the Army Corps of Engineers learned from Hurricane Katrina and how those lessons informed the Corps' response to Hurricane Ida.

But of course, the goal of emergency preparedness should be to be ready to respond to any catastrophe the first time. With a changing climate affecting all aspects of the Country differently, preparing for the worst-case scenarios everywhere is even more important. That is why I was pleased to see that the Los Angeles District partnered with the Arizona Department of Emergency and Military Affairs in early September to host an

emergency exercise to plan for a scenario where above-average rainfall in Arizona causes the Corps' Painted Rock Dam near Gila Bend to fail and risk significant downstream flooding.

So, General, can you describe the value that tabletop exercises like the one hosted in Arizona can provide to the Corps as you prepare for the worst-case scenarios? What value do exercises like these provide for the Corps as you work to respond to the real-world damages, like those cause by Hurricane Ida?

General Graham. Senator Kelly, I certainly thank you for that question. We were all watching the monsoon season, very, very wet monsoon season down in New Mexico and Arizona closely. So, those exercises that our South Pacific Division did in the Albuquerque District were absolutely key to making sure that the partnership that Colonel Murphy spoke to that works so well within the State of Louisiana, that we build that connective tissue within our State partners in Arizona. It is the "make a friend before you need a friend," and it is really all about trust.

In the middle of a disaster, if you haven't established that trust beforehand, you have got a storm, Norm, and perform during the hurricane or the storm, and we don't want to do that. So it is absolutely key, those exercises are, to building trust in that whole of government team.

Senator Kelly. Yes, I mean, it just reminds me of not only flying the space shuttle simulator, but at times, we also do tabletop a lot of different scenarios that often are rather complex. In Arizona right now, as you know, we have had the worst drought in our Country's history, in Arizona's history. I have a subcommittee hearing on this specific issue later today to discuss what do we do here going forward to mitigate for this drought.

Because of climate issues we are facing, we have had one of our worst wildfire seasons. As you know, after the fire, if it rains, comes the flooding. We have been dealing with that, so I appreciate you doing this.

I have got another question about Corps benefit-cost ratio, General. As you know, the Corps makes most construction and investigation investments based on a project's benefit to cost ratio as a way to measure the value of the project, what value that project will provide to the surrounding community, including preventing a worst-case scenario during a disaster.

I, like many folks, Senators, on this committee, support efforts to ensure that a project's benefit to cost ratio reflects not just the monetary value of property damage, but the risks to life and health of those affected by a potential Corps project. So, General, when you look across the Country, do you believe the Corps does a good job at prioritizing investments in

the construction and investigation projects, which are most likely to prevent future disasters?

General Graham. Senator Kelly, thank you for that question. On anything we do, there is always room for improvement. For the benefits that you spoke of, we often evaluate a project primarily on its national economic development benefits. We are working now to incorporate three other benefits, and those are the regional economic benefits, the societal effect, and the environmental benefit, as well.

So, those include the life, health, safety that you just spoke to, so we are going to make sure that we are including all of those when we design our studies.

Senator Kelly. Well, thank you General Graham, and thank you to all of you for being here today. I yield back 18 seconds.

Senator Carper. We appreciate each one of those 18 seconds. Senator Kelly, thanks. I know you had a full plate this morning; thanks for making time to come by and participate.

Before I recognized Senator Kelly, I was talking to General Graham about climate change and project design, and I has asked, does the Corps currently account for climate change in its design process for flood risk management projects. You were good enough to answer that.

I want to do a follow-up to that question for the rest of

the panel, if I could. That would be, how does the Corps adapt its design processes with the rapid advances in science and our increased understanding of the interconnectivity of these systems, keeping in mind the increased frequency and intensity of climate-related impacts into our future?

Tom Tickner, would you like to take a shot at that, then Colonel, and then we will come back to General Graham?

General Tickner. Chairman Carper, thanks for the question. We have lots of projects on the Northeast that we are studying. We do take the current science, the existing engineering that is out there that is really not changing. But the science and the new data that is coming in with climate change is adjusting our projects. You see that on the coastal projects that we have in Delaware and New Jersey and Maryland with the dune systems that we have. But it also is going on to all our flood risk management projects as we look at the potential amount of water that has got to pass through safely, past urban areas, and to where we are going to let it expand or go out to sea.

Senator Carper. All right. Colonel Murphy, anything you want to add to this?

Colonel Murphy. I would say, down in the Mississippi, Chairman, I would say down in the Mississippi Valley Division, which is my higher headquarters, we have the Engineer Research and Development Center, which is Corps of Engineers, and for a

lot of our issues, we are working closely with them to get, they are our lead for science, technology. I can tell you, just on studies on the Lower Mississippi River, we are incorporating the best science and data that they have helped to provide us.

Senator Carper. All right, thank you. General Graham, anything else you want to add before we turn the page?

General Graham. Just to reemphasize that, the research and development aspects of this, which is, we know the world is changing, and to make sure that we are on a solid foundation of science is absolutely critical.

Senator Carper. All right, thank you. We will be guided by science, not blinded by science. That is good.

General Tickner, if I could, another question for you regarding flooding impacts in urban areas, not unlike what we saw in the Greater Wilmington, Delaware area when this hurricane came through. General Tickner, your command covers, as we know, the North Atlantic Region, which includes some of the most densely populated areas in our Nation. While Ida had significantly weakened by the time it made its way up the East Coast, it nevertheless produced devastating impacts throughout our region, including in my home State of Delaware.

Could you just describe for us briefly some of the specific challenges that the Corps faces in conducting flood response in urban environments, and how did you overcome them, and how might

we better overcome them in the future?

General Tickner. Chairman Carper, thank you for the question. It is a shared response. We are working very closely with all the State, definitely Delaware, but through all the States in the Northeast.

It is a combination of structural things that the Corps of Engineers would come up with, non-structural, moving folks out of the flood plain. It is allowing the water to expand into certain areas, like parks or other environmental habitats. It is other educational tools to allow people to know what could happen in their area, river gauges and installing more of them, which goes right to the early warning systems.

One of the successes that I have heard from the States was, they were able to warn their citizens through the automated systems that were out there. They knew flash flooding was happening because of the river gauges, and so it is a partnership and a shared responsibility.

Senator Carper. All right, thank you. General Graham, a different question, if I might, one that deals with environmental justice communities, there is a lot of them in my State and around the Country. General Graham, despite the recent supplemental bills that have provided a significant increase in federal investments for critical infrastructure, the impact of storms like Ida will always disproportionately affect

those who may not have the means to evacuate in a timely manner, especially those in economically disadvantaged communities with large environmental justice populations. Rather than mitigating the damage from these storms on the back end, it is imperative that we invest up front to protect those communities that need the most help.

My question would be, would you just discuss with us for a bit how the Corps is specifically helping these communities from future storms or natural disasters?

General Graham. Chairman Carper, thank you for that question. The guidance we received from President Biden is absolutely clear, to focus the federal investments on environmental justice.

One of the areas, and I will focus up in the Northeast, would be the back bays. We have put coastal storm risk management systems, the berm and dune systems that you are familiar with, on the parts of the coast facing the oceans. A lot of the flooding also happens around the back bays, and oftentimes, the folks that live back there aren't as well-off. There is a great deal of environmental justice concerns back there. So we are formulating a bunch of those projects.

Certainly, General Tickner is right now, and those will soon be, some of them have already been in front of this committee, and some of the larger ones will soon be there. I

think that is one aspect of how we are getting at that.

Senator Carper. All right, thank you. I have more questions I would like to ask, but I am needed back at the Homeland Security and Government Affairs markup business meetings, so they are saving you from any further damage I might inflict. Actually, I have not inflicted, and you have been very forthright and clear-minded in your responses.

I just want to give a brief closing statement here, and then you can look for a couple more questions for the questions that I would like to have asked, and you will receive those shortly.

Before we adjourn, a little bit of housekeeping. I would like to ask unanimous consent to submit for the record a variety of materials that include letters from stakeholders and other materials that relate to today's hearing, and asking unanimous consent while I am the only one in the room, that is a pretty easy thing to do, so no objection.

[The referenced information follows:]

Senator Carper. Additionally, Senators will be allowed to submit questions for the record through close of business of Wednesday, October 20th. We will compile those questions; we will send them to our witnesses. We ask that you provide a reply to us by Wednesday, November the 3rd.

In closing, I just want to thank our witnesses for your testimony today. I really want to thank you for your continued service to our Nation. As one who spent a few years in uniform myself, I have huge respect for the work that you and the men and women you lead do for our Nation.

I know of so many of your teams, both serving in the military work around the clock to help Americans who are suffering in the wake of these disasters. We are grateful for your work. I want to make sure the Corps is equipped with the resources it needs to carry out your missions and fortify communities amidst a worsening climate crisis.

I don't have any other unanimous consent requests, do I? No? With that, we are dismissed. Thank you again so much. Great to see you all.

[Whereupon, at 11:20 a.m., the hearing was adjourned.]