STATE OF NEW JERSEY

NEW JERSEY CLEAN WATER COUNCIL

In the matter of:

GREENING NEW JERSEY'S WATER INFRASTRUCTURE:

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KHRIS DODSON, Associate Director, Syracuse University
JEREMIAH BERGSTROM, LLA, Rutgers Cooperative Extension Water Program
MARK ANDERSON, LLA, New Jersey Chapter of American Society of Landscape Architects

A G E N D A

MS. GOODWIN: Good morning and thank you so much for your patience. My name is Pamela Goodwin. I chair the Clean Water Council, and first of all, thank you so much for coming out on this cold and soon to be blustery day. By way of introduction, let me say that if this were a miniseries, we would call it Infrastructure Musical Part 4. The Clean Water Council started down this path really not knowing that we would still be talking about these issues four years ago when we decided we would do a public hearing on the issue of climate change and its impacts on water.

And I laughed to myself because at that particular hearing, Commissioner, part of the debate was whether or not we were really experiencing climate change or just unusual weather circumstances, and I think that today, certainly after our experience with Sandy, we have all the knowledge that we are experiencing both, and what's fascinating to me about that is that conversation led us the next year into a discussion, in a very general sense, about our water infrastructure resources in the state of New Jersey and what we needed to do to start

bolstering them which led the next year to a hearing on how could we finance these efforts.

And last year when we thought we would finally be talking about green infrastructure which would segue between our discussion on climate change and what we had learned about infrastructure, Hurricane Sandy beset the state of New Jersey and Commissioner Martin specifically asked us if we couldn't focus our efforts on storm recovery issues, so in the spring of this past year we did in fact hold such a hearing and yet again we heard more and more about what we need to do to not only develop our infrastructure but to anticipate the fact that our infrastructure needs to be more resilient than it has ever been in the past, and that then brings us to today's hearing.

We come back to the topic at hand, green infrastructure, and we have asked our panelists to focus not simply on the topic of green infrastructure but to try to integrate all of the things that we've been focused on which includes how do you finance it, how do you adapt it in a way that makes it economically feasible, and finally, with regard to the issues at hand

following the storm, how do you make green infrastructure valuable given the fact that we anticipate unfortunately that the storm that we experienced last year may not be the last storm of its nature and that the impacts given the way in which we're experiencing rising seas may likewise may not be the only time that we experience such a devastating impact.

And with that, let me introduce our keynote speaker, Commissioner Martin. Commissioner Martin has been one of this council's biggest fans. He is somebody who gets infrastructures, gets the importance of infrastructure because it's something that he's not only done in this life, but in his past life, and I'm hoping he'll be able to reveal to you some of the things that the department has learned from Sandy and just the whole notion of reconstituting our water infrastructure. With that, Commissioner Martin.

MR. MARTIN: Thank you very much Pamela. Thank you to all the other members of the panel. We have a great group of people to go through and some of the best experts that will talk about a lot of the key critical things we've

talked about in infrastructure these days. Again, on behalf of the Governor, I'm very proud to be here. Clean Water Council is one of those council's who, again, I spend a lot of time with. There is only a few councils or commissions that I spend significant time with, and I say that because of the fact that we've got a lot of work going on at DEP.

We're still focusing very heavily on Sandy, but there are very key councils and commissions that play an absolute critical role in our thinking, in our policy setting that shape a lot of the input that I need and that this Department needs and this administration needs to be able to go forward, especially when you start talking about water and clean water overall, so I'm very proud to be here today, and I thank the Council for their work which continues to be high quality work and provides incredible insights to the future for infrastructure in the state.

In post Sandy, as you talked about before, the amount of infrastructure that was damaged in what we saw the vulnerabilities of the infrastructure in the state was significant. We had over 70 water supply systems that were

damaged or on emergency power or some combination of both. We saw about 100 waste water treatment plants that had significant problems and some of those went completely under water. You look at PBSC, you look at NCUA's Sayerville plant, those plants went completely under water, and it showed the vulnerabilities of the state that we need to address this and look at it in the future and look at it a different way.

Overall we have about 2.6 billion dollars that we know of that was caused by Superstorm Sandy to the infrastructure of the state to the water infrastructure of the state. It's a big number. That's not counting the billions of dollars necessary to bring a lot of our infrastructure up to a certain level and a level that we believe is necessary. As you know, a lot of it is old and failing and we need to focus on that long term, and again, you've heard me talk about that a lot in the past and I'll continue to talk about that. Obviously as I mentioned the vulnerabilities that we had, Superstorm Sandy got this on the radar screen for us as a building to start looking at this in the future and a different way.

The vulnerabilities are there and we need to start addressing the vulnerabilities. As I mention, a lot of it is old and failing infrastructure. There's been a lack of funding primarily on the federal level on this and again from the state resources to be able to fund that, it becomes difficult. Though we've been finding a lot of good ways through EIT and other mechanisms to get money out on the street for that infrastructure, but it's got to be some long term planning that ties back to that overall. Sandy has created some opportunities for us on infrastructure which is the good part of that.

In that, we've been able to increase both federal and state funding for rebuilding for more resiliency. We've increased the focus on the criticality of that infrastructure that is necessary to maintain that long term. We also put in our minds that there's no such thing as a quick fix on infrastructure. It's not like let's go fix it all tomorrow and it will be done, put some basic small fixes in place. There are a lot of small fixes that had to be made to make systems operational, but the bottom line is that we've recognized now this is not a let's go sort

it out in a year or two. It will all be done. It will all be fine.

These are long term challenges that we need to work on. They require long term investments and a long term mind set. It's not a quick fix. So there are four key areas that I want to talk about this morning. First, I want to talk about long term resiliency. In conjunction with that I want to talk about asset management. Thirdly, I want to talk about long term capital investments and infrastructure, and lastly, I want to talk about green infrastructure, so let me start off with long term resiliency. Again, what we looked at for resiliency, we looked at three major components or four major components.

Asset management being the fourth one, but post Sandy we recognize that we need to lay out from the DEP side from the state. We need to start talking about what are the best management practices out there and where do we need to amend the rules on infrastructure in the state to make sure that we created long term resiliency. The first area we want to talk about is power resiliency. Both water supply and water

quality have existing regulations on the books already for back up power, but we recognize after the storm we needed to clarify the minimum requirements for back up power.

We need a presence of sufficient and onsite generators. We need to have extended fuel capabilities for these generators long term. We need the storage. We need to create the storage for back up sources in flood proof buildings and alternative fuel supplies. We also need to include the storage of fuel for trucks, fleets and for workers vehicles to insure that they are able to get to work. Those operations are able to work overall. We're also evaluating the merit of prestaging bulk fuel around the state.

We haven't decided how we're going to do that yet, but we've had several options, but again, do we start using DOT storage facilities around the state as possibilities so we have more fuel available for these kind of instances. The second major area on resiliency overall is flood proofing. Again, what we recognize that while we have a lot of standards in place, we need more specific on setting those standards or be clearer on what those standards

are. We want to improve the construction standards and we're considering looking at the elevation of pump stations and or the electric systems associated with waste water collection, treatment or water supply wells.

We're flood proofing systems and pump stations. We're talking about using the use of water tight manhole covers for collection systems within flood prone areas, and lastly, looking to expand the existence of capacity of water, sewer or stormwater lines when they're replaced. The third major area we're talking about is emergency preparedness, and again we're trying to lay this out overall within a broader plan. Our regulations require emergency response plans that need to be in place.

We've decided we need to clarify what those plans are better, more specific around those plans and make sure the communities and utilities have those plans in place and ready to move for storms such as Superstorm Sandy. The fourth major area, and it's part of the broader discussion that I laid out over the last four years is asset management. Again, the key component, you can talk about this as the key

component as water infrastructure in the state since I've taken this job. Asset management is the management of the fiscal components of drinking water and waste water systems overall.

A key component of asset management is looking at and managing the whole life cycle of assets, and there are five main components of that, performing an inventory in addition to the assets in someone's system, defining the level of service goals, identifying critical assets, establishing life cycle costs and developing a long term funding strategy. Asset management is absolutely critical. Large utilities around the country, primarily more private utilities and public utilities run that way.

We've got to look at it that way for municipal utilities, both water supply, waste water, and even in some towns we need to be looking at it from a stormwater point of view. What are we doing for the long term asset management point of view on it. Next major area I want to talk about is long term capital investments. Again, to be able to make this work long term we can't talk about investments and infrastructure on just an annual basis. We've

got to look out 10, 20, 30 years. Investments needs to be made over the long haul.

We recognize the financial pressures of trying to lay out a plan where we're going out and try to make large investments in a very short period of time. That's not the way it works. Long term capital investments means laying aside capital dollars on an annual basis and continue having a plan of how those assets are built up over a period of time. That's the way it gets done. It's not spend money when repairs are needed. You may need to do that, but we don't want to jump from repair to repair project overall. We want to invest long term over capital investments.

From the state's point of view, in the short run from Superstorm Sandy and our work with EIT, we've expanded our financial assistance programs to provide over 800 million dollars or money repairs for infrastructure for the state for water infrastructure of the state. We've also set up in a very short term 65 million dollars into what we're calling a statewide assistance infrastructure loan program or sale program. That allows us to get money out on the

street immediately for a lot of smaller projects that need to get started right away while a lot of the larger projects will work their way through both the process we have set up with DEP, EPA and EIT.

For Sandy financing programs, 350 million dollars for clean water and drinking water has been set aside. 190 million for clean water, 38 million for drinking water. Again, the key component to that money will be principal forgiveness. About 20 percent of that money will be principal forgiveness coming from the SRF funding. Finally, the last area I want to talk about, I know that it's a big focus that we continue to talk about in this group is the green infrastructure. Green infrastructure is still new to many municipalities.

Again, we see blending both the gray infrastructure of building along with green infrastructure. Those two components have to go together long term. For fiscal year '14 and '15, EIT has reserved 32 million dollars to support implementation of green infrastructure for providing principal forgiveness loans up to 50 percent of allowable projects both in Barnegat

Bay communities of combined sanitary and stormwater systems. We're requiring the asset management of green infrastructure as part of a long term control plan for CSO communities.

We see this as absolutely critical component for CSOs long term. Obviously these have done it. We see what New York has laid out for their plan and we recognize that green infrastructure can play a key role in addressing some of the very larger issues especially CSOs long term. Again, what we are putting out there is updating our best management practices and regulations around green infrastructure. We want to promote better understanding and a use of green infrastructure. We want to update low impact design and general design maintenance. We want to provide training to other state agencies to promote and permit for stormwater and allow for maintenance and using new technologies.

Again, we also see the developing using both monies that we have from SRF funding to play a key role in leveraging long term funding within green infrastructure overall. We're very committed to green infrastructure. We see it as a key component of how we're going to

make investments in the future. We also see it in a lot of ways as both a way in a lot of cases a lower cost way of addressing a lot of the stormwater issues that we have to address within the state of New Jersey.

In closing, I want to recognize that we have long term plans in place in the state of New Jersey for infrastructure. We're going to continue to come out with -- continue laying out those long term plans. We're also going to be talking about both best practices and new regulations as necessary to address infrastructure of the state. We believe it's necessary in its post Sandy era to lay out a long term game plan of how we're going to continue to rebuild the infrastructure of the state of New Jersey.

I want to thank the Clean Water Council for your work and your continued commitment to getting things done and focus on the efforts that we have on clean water. It's absolutely necessary. I need your input. I appreciate your guidance and direction overall and I appreciate the hearing today so we can get some additional input from some of the top

experts in the field. Thank you all very much.

MS. GOODWIN: Commissioner Martin, thank you so much for your time, and for those members of the public here, please understand that while the commissioner goes off to his other responsibilities, he has staff members here, including Michelle Putnam, who will hear everything that you have to say as well as our speakers have to say and we will distill into a report for the Department and the Commissioner as a result of this hearing.

Before I begin, I would be remiss in not introducing the members of the Council and thanking them for their great efforts in bringing us to this hearing, in particular, my co-chairs, Jim Cosgrove and Dan Van Abs for whom this absolutely would not be possible. So thank you so much to the two gentlemen sitting in the front row, and I'd ask everybody else to stand. I'm going to read the names of all the council members, although not everybody could be here today. Stan Cach who is in the back of the room. Stan is our department liaison. Ferdows Ali from the Department of Agriculture. George Bakun. He is a representative from the NJ AFLCIO. Jim,

I've introduced. Jim is a representative from the public?

MR. COSGROVE: New Jersey Board of Professional Educators.

MS. GOODWIN: Ok. Thank you. Russ Furnari. Russ, you're a public representative, are you not?

MR. FURNARI: State chambers.

MS. GOODWIN: Oh. It's good to know peoples affiliations. Tony McCracken.

MR. MCCRACKEN: Public.

MS. GOODWIN: James Requa. And you are with the?

MR. REQUA: DCA.

MS. GOODWIN: Jessica Sanchez is with the DRBC. Chris Sturm is with New Jersey Future, but are you a public representative?

MS. STURM: Public.

MS. GOODWIN: Thank you. Tony Valente from the NJ Department of Labor, and Dan, who I've introduced. Dan is a public member. He is a professor at Rutgers University. And Ray Zabihach. He is likewise a member of the public, and Lou Neely just joined us. Lou represents the League of Municipalities. Anybody else? Please

introduce yourself and your affiliation.

MS. GOLDSMITH: Amy Goldsmith, New Jersey Environmental Federation.

MS. GOODWIN: Are you a public member, Amy?

MS. GOLDSMITH: Public.

MS. GOODWIN: Thank you. With that, let me introduce our speakers today and explain to you the format. We'll have a panel. Each panelist will speak for about 15 minutes and then we're going to open it up to questioning the panelists. We'll then take a break. As Commissioner Martin mentioned, the council as well as the department has been very interested in green infrastructure and we looked to see how different enterprises, including the city of Philadelphia, New York, and in this particular instance, Syracuse, the county and the university have begun to engage with regard to identifying appropriate mechanisms for green infrastructure, and among the various models that we have heard, we thought that the Syracuse model made perhaps the best sense for the state of New Jersey given the way in which we are configured.

So I hope that you'll enjoy Khris'

remarks as much as we did when we had the opportunity to meet with he and some of his other colleagues. Khris Dodson is from the University of Syracuse. He focuses on smart growth, water, waste water planning and financing infrastructure for local communities, has a Master's in environmental communications from the State University of New York in environmental studies and forestry, and without further ado, Khris, please share your remarks. Thank you.

MR. DODSON: So first of all, I was confused about the amount of time, so I have more slides than I probably have time for so I apologize in advance if someone drags me off with a shepard's hook and I'll go willingly. I'd also like to second everything that the commissioner said. His four points are really the four things that I work on, on a daily basis when I'm not working for Onondaga Save the Rain Program, so that's what I'm here to talk about today is Onondaga County's Green Infrastructure Program. We are a partner.

We do a lot of technical assistance, design public education and outreach for Onondaga County's Save the Rain Program. So anyway, I

call green infrastructure truly a public utility. Why? Because we don't all volunteer afternoons and evenings and Saturday mornings at the sewage treatment plant. We don't go and put chemicals into the water to disinfect it. We're not allowed to for good reason, but we can build rain gardens, we can use rain barrels. We can put green roofs on our commercial buildings, and doing so helps the public utility. We've become part of the public utility.

We're serving the public good by doing those things to help the community that we live in, the community that we pay rates and taxes in, manage stormwater. This isn't your grandmother's rain barrel. This isn't the rain barrel you use to water the kitchen garden. We're talking about millions of gallons of stormwater annually in cities the size of Syracuse. 147,000 people live in Syracuse. We're a midsize city but mid smallish and we have to capture 250 million gallons annually of stormwater a year by 2018.

Why? In the last 50 years, 60 years since the advent and reliance on the automobile, we pave everything. If you look out these

windows and see rooftops that are impermeable, sidewalks, roads, impermeable space. When rain hits this, it doesn't absorb. I think we know that. It runs off somewhere into pipes that were built 100 years ago for the amount of stormwater we were capturing 100 years ago and it travels to the same pipe that our sanitary sewer travels through which is a euphemism really for everything we flush down the toilet, and when there is no more space in that pipe because if we paved everything, that water overflows and ends up in our local waterways becoming an environmental and public health hazard.

So what is the trouble with run off? Really, other than the fact that it combines with sanitary sewer and sometimes overflows into our local waterways, it's that one drip of oil or that windshield washer fluid or that dog poop on the corner. It's that cigarette butt. It's that french fry bag. It's that water bottle, that piece of plastic, that piece of gum wrapper foil. All of these things seem innocuous when you do it. It's all right for you to toss something out the window or for your dog because you forgot your pooper scooper, to leave that there on the

corner.

But when you multiply that by every single person in your community that has that one drip a day or that one thing they drop on the ground by accident and decide not to pick up or that one pile of dog crap on the corner, it's accumulative and effective all of those things washing off of our landscapes with fertilizers and everything else that we apply to our landscape into our waterways that is really kind of disgusting and then you add sanitary to it and it becomes even more gross and I know I'm preaching to the choir here for some of you.

So I'm moving kind of quickly, so if you're unfamiliar with what a CSO is, combined sewer overflow which, by the way, there are 770 communities in the United States that are CSO communities. This is kind of a graphic of a CSO. During dry weather, all the rain from your roof, sidewalk, driveway goes down the storm drain into our sewer system. It will go to the treatment facility and it combines with anything that comes from your house, from the dishwasher, from the toilet, from the shower.

But then when we have a wet weather

event, snow melt, rain, that stormwater and that brown water from your home, from your business, et cetera combined reaches the capacity of the system and overflow a dam into a nearby lake, stream, creek, et cetera, depending on how your system is constructed and what your nearby water bodies might be, but if we put in a vegetated swale to capture that water from your sidewalk, from your roof leaders, down spouts and from your driveways before it even hits the road.

If we put in porous roadway or porous parking lots, porous sidewalks, let that water go into the ground and recharge the ground water. We're reducing the reliance on that sewer system effectively increasing the capacity of it to carry the sanitary sewer that most needs treating. So you'll see here that much of the stormwater doesn't even reach the system. So types of green infrastructure, for those of you who may be unaware. We have bioswales. Essentially think about roadside ditches that are meant to be vegetated, not meant to be dug out every year by the town backhoe causing erosion, causing high speed water and sediment rushing down the sides of roads.

But then to slow that water, allow it to soak up, feed the plants, infiltrate into the ground. Rain gardens, same thing, except for it's more of a static space where you put water toward, maybe from a down spout, allow that water to recharge the ground, feed the garden instead of running down your sidewalk, down your driveway into the street. Rain barrels of course, green roofs. These are great things for areas where maybe a large building such as this one is built from lot line to lot line. It can't do anything else other than putting a green roof on top to manage the stormwater that falls on that lot. Porous pavement is great.

We have a demonstration in Lake Placid in the Adirondacks where we actually put in porous asphalt on a high speed roadway to see if we can actually start building porous high speed traffic lanes. Up until this point, porous pavement is really used for parking stalls, sidewalks, driveways, places where you don't have that force of speed, so we'll see how that turns out and if that's positive. It can really make the way we manage stormwater and our transportation infrastructure. So Onondaga

County in Syracuse, a case study. This is us.

This is our infamous Onondaga Lake. At one time known as the most polluted lake. I'm not sure if there's any real data to say that, but it's a sense of sick pride in Syracuse, so let them have it, but this is the city of Syracuse essentially. Each one of these colors is a different sewer shed, so we've mapped all of our outflows. We've mapped all of our sump sewer sheds, which sump sewers they travel through, where this ultimately ends up, what's the service, what's the capacity and we've named them all so it's like a water shed.

We've looked at our built infrastructure in that same way to identify target areas where we need to do really robust green infrastructure projects such as the downtown area. Here this is very, very impervious. This area is more residential. Here, we need big projects. Here, let's give away a few rain barrels, so this is where we are right in the middle of New York and I was telling the panelists earlier, I travel a lot of work. End to end, nine hours, and so if I get to drive an hour, hour and-a-half in a day for a meeting,

that's awesome.

And so here is another graphic, so we've numbered each one of our CSOs, combined sewer overflows. We have 49 active CSOs right now. Several years ago, I think we had more like 70, so we're shutting them down pretty quickly. So we got started really there are a lot of community members in Syracuse who are really excited about green infrastructure, underground storage of stormwater and other things instead of building regional treatment facilities which are expensive, which the OMM, Operations and Maintenance costs never go down.

They always go up and we're looking at alternatives. And we'll use this report from the energy sea rooftops and rivers in 2006 as an example of what we can do in Syracuse. They convinced the leadership that green infrastructure is the way to go in part because we did end up building one of those regional treatment facilities. This one, the midland data RTF cost 120 million dollars. That's the whom price tag of our green infrastructure program. One treatment plant.

We needed to build four more to

reach our goals. In a city the size of Syracuse, it wasn't financially sustainable, and it wasn't socially and culturally sustainable either. Nobody wants to go to high school across from a sewage treatment plant. Nobody wants to go to our one thriving night district next to a sewage treatment plant, and this is where they had designed to put in a couple of these plants.

The community was also not interested any longer in living across the street from 12 foot wide trenches where we were building conveyance pipes and having all of these big things sit in front of their house for months on end while they spent millions of their dollars putting in conveyance to treatment facilities such as this one, which essentially chlorinates the water, removes the floatables, chlorinates the water, dechlorinates the water and dumps it right back into the creek, so it's not necessarily, it's patching the problem. It's not making it any healthier for any kind of living thing in this creek which travels the whole length of our city. Just a couple pictures.

This is a disturbance in anybodys neighborhood. In a belt community, a post

industrial community, whatever you want to call Syracuse which is not similar from Trenton, Camden, Newark or any other city in New Jersey, do we need to give people another reason to leave the city? So building five sewage treatment plants and doing this across the street might be the straw that broke the camel's back for some folks. Having overflows and sewage separations which are expensive, ugly and public health issues, more reasons to consider the alternative.

Having an upset constituency, leaving toilet paper in your trees in your front yard and leaving toilets in your front yard and walking down main street, another reason to think maybe something should change, and finally we had a new county executive, Joanie Mahoney, someone who was from the city and sat on the city council for quite some time before she became county executive, decided she had four days to enter into contract to build those other four treatment plants and she decided against it. She decided let's do green infrastructure instead. Let's get green infrastructure into our consent judgment and let's move forward on this quickly and we have, and that was 2008.

So some highlights. I'll go through very quickly. We've captured 100 million gallons so far. We're monitoring so we can demonstrate we're actually doing that. We're using the EPA swim model to kind of model how much we're capturing. We're also ground treating that through the partnership with us and Syracuse University. We built 100 projects in two and-a-half years and they're pretty big projects, and I'll show you a few now. We have to capture a total of 250 million gallons of stormwater a year by 2018. We have to do public education and outreach and we have to do monitoring and reporting as part of our agreement with the federal court.

We also have milestones here to reach and we're on target to reach this one by the end of this year which is essentially now. That 250 million gallons though is only six percent of our total CSO volume. It's astounding how much water comes out of our buildings and off of our landscape. This is kind of how we project we're going to get to that capture every year, 35 million gallons this year, 36, 37 and then kind of hitting toward the end of 22 building projects

that will manage that amount of water every year. We're mapping this.

You can find this on our web site, savetherain.us, and you can click on any one of those balloons and find more information about the project that is there, but this shows you the density of the projects that we have in the city. There's several things we're doing, no matter who you are, if you're a resident, a business owner, someone who works for a nonprofit, another governmental entity in town, there's a way for you to get involved in save the rain. We're placing 8500 street trees by 2018.

We walk around and knock door to door in residential areas. Would you like a few tree, we'll plant it for you, and you even get to pick the species. Only 25 percent of people actually say yes to that, but we do offer it. Trees drink water and unimproved streets with no curbs, that really provides a benefit. It improves streets that do have curbs. We're starting to put in curb cuts to allow that water into the right of way so trees soak it up. The green improvement fund has been super popular. We've never even advertised it.

Since March of 2010, we've offered money, reimbursement money to businesses and nonprofits. You have a broken up parking lot, you have a leaky roof. You want to put some street trees in or redo your sidewalk, we will help you pay for that improvement if you do it in a way that manages all the stormwater. So we've got 120 applications. 36 of those projects have been completed. 54 are going in the ground in early 2014, are contracted for construction in 2013 and the remainder will be going in, in 2014.

So that's a huge number of projects and a huge public investment in the private sector and it really beautifies the community when some of these businesses have all of a sudden nice new parking lots to help with pot holes or they put green roofs on their buildings or they plant trees and put in bioswales and rain gardens. For a community, again, that's post industrial decay, this is really revitalizing it in more ways than just water management. The aesthetic value alone is pretty powerful.

So here is a couple of pictures of some of those things. A parking lot that's been redone. This is porous concrete in the middle.

This is asphalt on either side and we've shimmed the traditional asphalt so the water will sheet flow into that porous area. We don't need to do the whole parking lot in porous. Porous is more expensive and it's unnecessary to do the whole parking lot in porous to manage just that parking lot. You can do strips and get the same bank for your buck.

There's a green roof on this architecture firm, and those are also solar panels. They paid for that themselves. Another green roof on this building and then they did porous pavers which are very expensive, but they paid the difference in that cost. Porous pavers in their parking lot and driveway in this lead platinum hotel in Syracuse, so these are some examples of the green improvement program. We have the diversity of unique projects in Save the Rain. It's not just doing the parking lots and parking lots and a few green roofs here and some rain gardens and bioswales.

We've done some pretty cool stuff and I'm going to go through some of them now. Jim Bayheim who is the basketball coach for Syracuse University. If you live in Syracuse,

the Syracuse area, you're required to know that, so I'm sharing that with you. He has the Bayheim Foundation where he builds courts, it's called Courts for Kids Program, where he builds basketball courts for inner city children so we've convinced him, and it didn't take much convincing, to build four of those in the city of Syracuse and if he paid for the cost of the traditional basketball court, we would may the difference if we could use porous pavement so it could manage the stormwater of those basketball courts.

Cool anecdotal information, because of the void space here, the neighbors say that the bounce is less noisy. Maybe because the void space treats the noise, so the neighbors are happier and the kids and the parents are happier too because after it rains there's no puddles. They can go right out, and play and also in a city like Syracuse where we're struggling to reinvest in our parks, having some new park infrastructure is certainly nice. The connective corridor is great.

This is a street right adjacent to Syracuse University that Syracuse University, the

City of Syracuse and Onondaga County Save the Rain Program all jointly paid for, the construction of. This green space is a bike lane which is really cool because it's separate and distinct from the vehicle traffic lane, so bikes feel very protected. We have sidewalk, porous pavers, the bike lane, the bioswale and then all of the water from lot line to lot line for this mile and-a-half strip is captured. We're capturing five million gallons of stormwater, and not only does it look much cooler and it provides alternative transportation modes for folks.

This is East Water Street. This is the oldest lock station on the Erie Canal right there. It's now a museum. This is our city hall which looks like a castle. This is the before picture of East Water Street and this is the after, so when you come to downtown Syracuse instead of being like, oh, yep, another northeastern city that's struggling because industry has left. Oh, isn't this charming, and so we capture again from lot line to lot line all the stormwater, porous pavers for the parking lane so that when people come in here, they're like, this is grey, this is asphalt, there's

something different here.

Oh, right it's the parking lane. It becomes an visual signifier that this is a place to park, not here. And people do try that. I'm sure they try to do it here too. They park wherever is convenient for them. We've also narrowed the crosswalk across from the museum, ADA accessibility. A narrower crosswalk means ease in crossing the street when you have the opportunity for folks who have mobility issues and it's much more attractive with the bioswales and trees. We're, as far as I know, the first and only so far professional hockey team in the country to skate on rain water so this is the Syracuse Crunch.

I don't know much about hockey. I guess they're NHL or AHL. You don't have to know about Syracuse Crunch. You do have to know about Syracuse basketball. There is our logo, always have to be marketing ourselves, but we capture all the rain water off the roof of this building and use that to make the ice to skate on. It makes sense. Why do we spend money to clean water to a drinking level standard only to have a bunch of guys in helmets and uniforms beat each

other up on it. It seems like a waste of money to skate on drinking water in my mind.

A couple other anecdotal pieces for this is that it actually for some reason freezes faster so we use a little bit less energy to freeze this rain water than we do potable water and the skaters actually like it. They say it freezes a little bit harder too. Anywhere you go in the northeast, parking lots look like this. If you start to manage stormwater, they can look like that so we capture all the water off this parking lot, infiltrate it into the ground using these bioswales that are in between the parking lanes, so what you see here is a very thin four foot strip maybe of garden, sunken garden.

What you don't see is the huge gravel beds that underlay almost the entire parking lot and those gravel beds are really used for the storage as the water slowly infiltrates into the ground. Another parking lot we have here, we've managed the whole parking lot by just doing porous around the edges, and while we were digging that parking lot up we thought ahead. People are starting to use more electric cars. We're not going to redo this parking lot again in

another five or 10 years. Let's put in some car charging stations, so we did.

Let's also, while we take down a lamp, put up new ones so the new lamps are LED, super energy efficient. A lot of our streets, we're starting to make more attractive. The before is gray and winter. The after of course is sunny and summer. It's like the acne commercials you see where the color of the photo is always off, so the after always looks much better so we've done the same thing here but we have curb cuts on this road to allow all the water off the road to go into the bioswale, run off the sidewalk into the bioswale.

This is an aerial just to show you the density of this one part of Syracuse of green infrastructure. This is a green roof. It's brown here because we just planted it then. This is an acre and-a-half green roof. It captures a million gallons. This is the War Memorial where the ice rink is, so we capture all the water there for the ice. This is that parking lot we managed around the edge. This is the other parking lot. We put in the median along this road, and this whole parking garage, all the rain

that falls on the roof of it is managed by a huge rain garden along the side of it so just that one area in Syracuse is capturing a lot of stormwater.

So education and outreach is where I'm focused, but it means telling a great story and getting people engaged, and we have great projects to tell that great story with, and so we do. And we also have projects that are accessible to folks that they can walk on and walk by. We have interpretive science to let them know what they're seeing, why this space is different, and again, the before is gray and winter. The after is summer and sunny, but you see we put in rain gardens, flexy pave, porous asphalt.

People are getting to see, walk on, touch, feel and live near this green infrastructure and understand what we're doing in the city and how it makes improvements. We're using our own facilities like the zoo in the city that is a park owned space and saying, hey, tens of thousands of people locally come to this zoo every year, why can't be telling them about Save the Rain while we're also telling them about the

animals that live here. We put in a lot of projects, rain gardens near the entrance and a lot of things within the visiting area where people can understand what a rain barrel is, what a rain garden is, how porous pavement works.

We put on green roof on the elephant barn and we tell people about that. We've done a lot of work there at the zoo for folks. If you went to our zoo and you didn't see anything Save the Rain, then you were walking around with your eyes closed. We're out there all the time doing public events. We have this great house which is really a shed on a truck bed with a green roof on it, porous pavement, sidewalk, little rain barrels that we use when we go out for events in the parade and we also do tabling and things like that.

It really means being enthusiastic and it means being targeted and strategic. Having a message, having a way for different people to get engaged based on who they are and where they're coming from. We do workshops for all types of folks. We tell Realtors why Save the Rain is a valuable thing, why they should be pitching this to people who are interested in

buying in our community. We employ youth to do demonstration projects. We train professionals like landscape architects and engineers. If you're part of our community, help us help you with Save the Rain.

If you're an engineer and you want to get engaged, let us train you on how to get engaged in this program. We have a rain barrel program. We've given away about 1200 rain barrels so far in three years for free to city Syracuse residents, and when the time is right, we let them paint the rain barrels. It's part of on art festival. We hire an artist to come in and help them. They make creative designs if they like, and then we also do demonstration projects, let people know what it can look like.

So this is a residence across the street from a park diagonal from an elementary school, high visibility, high traffic, put in a rain garden, porous pavement, roof leaders over here, rain barrels on the other side and signage so people know what changed here, what's different and why we did it. Some other demonstration projects we did at a community center. Someone's driveway, porous concrete. It

really means working with everyone. So we have the youth group that I didn't talk too much about, but they're young kids from a socioeconomically challenged community in Syracuse.

We pay them fair wage, I think 12 or 15 dollars to build green infrastructure and to teach their peers about green infrastructure. Not only do they learn the soft skills of getting up and going to work at 9 o'clock and working until five without texting, but they learn marketable skills to go out and work for a landscape architect or a landscaping company. Here we have the city of Syracuse mayor, the Onondaga County executive and the EPA Region 2 administrator, Judith Enck, at a meeting we had a couple years ago and then researchers at Syracuse University, again, monitoring demonstrating.

We are capturing what we model that we capture. It really brings people together, get people outside learning, feeling better about their community, making the community more attractive together, and the last couple sides are some pictures of some of the pieces that

we've created as part of our public education and outreach for this program. In two languages, English and Spanish. We have crossword puzzles and mazes for the adults and other information for everybody else. We have E news here, 2,000 subscribers, Facebook, blah, blah, blah, all that social media crap.

We're really doing great with it. It's my job. I shouldn't be so deprecating, but social media tires me and then we're getting a good recognition, both locally and also nationally, so Governing Magazine, which I'm sure you all read, named Joanie Mahoney the eco adversary public official of the year in 2011. This really gets her kudos at home. The cover of Municipal Sewer and Water, I'm sure you all subscribe. She was on the cover last year. This gets her kudos at home. It makes it easier for her to keep moving forward with this program.

And now rooftops to rivers 2 which was our original kind of inspiration. Now, we're in it this past year so that makes us feel kind of proud. Last few things. The other day we won the New York State DEC which is like the DEP, Water and Quality Excellence Award. We are

capturing all of the water off of the Carrier Dome where the basketball team plays. Capturing that water to flush the toilets during games. Again, why do we use drinking water? Why do we pay to clean water to drinking level just to flush it down the toilet? Why can't we use what falls from the sky for free?

We are advising the White House Council on Environmental Quality. We won the U.S. Water prize, and just last month in Newark, the city of Newark and the city of Camden both came to the first annual national GI Summit held in Syracuse this October with more than 30 other communities around the country including LA, Portland, Denver, Chicago, DC, Boston, New York City, Syracuse obviously, to talk about green infrastructure and how we can make this kind of a force in all of our communities and really get out there and hit the ground running.

I apologize I did in fact take more time than was allotted to me. I'm happy to take any questions when the Q and A time comes. Here is my contact information and I yield the floor.

MS. GOODWIN: So I doubt that anybody here has any question why we wanted you

to hear that. That was fabulous and inspirational so we look forward to your questions and comments and a perfect segue into Jeremiah Bergstrom who is also here with Mark Anderson I might add, and Mark will be available for comment, but he will not be speaking. Both of them are licensed landscape architects in the state of New Jersey and Jeremiah works for the Rutgers Cooperative Extension Water Resources Program and represents NJASLA and has served on NJDEP Strong Water Advisory Committee, but in particular I want him to talk to you about, or ask him to talk to you about what kinds of programs similar to the ones that you've seen here or initiatives I should say are working, can work, should be working here in New Jersey. Thank you.

MR. BERGSTROM: Welcome everyone, and we want to thank you for being part of this discussion here and thank the Clean Water Council for this opportunity and I look forward to sharing with you our thoughts, our ideas, our projects, our programs that we've piloting throughout the state and also hearing from you about New Jersey's Water Infrastructure. Where

do we begin? I'd like to begin with this. New Jersey needs a community based approach to designing and building infrastructure that leverages the resources of our landscape and environment.

These green systems can provide communities with real savings, strengthen local economies, make communities more resilient and create healthier more livable communities while protecting critical water resources. Just a quick introduction for those of you who do not know who I am. I work for Rutgers Cooperative Extension, the outreach arm of Rutgers, the State University of New Jersey. I've been working for four years there. More specifically, I work for the Water Resources Program, a speciality program of RCE focused on addressing New Jersey's water resources issues.

The Water Resources Program is led by Dr. Christopher Obropta and we have been partnering with communities and organizations throughout New Jersey for more than 12 years. Our mission is to identify and address community water resources issues using sustainable and practical science based solutions. I am also a

licensed landscape architect and Mark Anderson has joined me here today to represent NJ ASLA, the New Jersey Chapter of the American Society of Landscape Architects. We and our colleagues in are committed to balancing the needs of the environment and the human community in our design projects throughout the state of New Jersey.

Together, Rutgers Cooperative Extension and NJASLA are excited to help lead the discussion of green infrastructure for New Jersey. Rutgers Water Resources Program has been actively engaged in partnerships throughout New Jersey for the past four years promoting and building green infrastructure. In communities across the state from Camden County to Hudson County, from Bergen County to Sussex County and many, many more. We are working to educate as well as build awareness about the need to look at infrastructure differently and we hope that our experience and expertise can assist you, the Clean Water Council and New Jersey as we chart a path for greening New Jersey's water infrastructure.

New Jersey communities are struggling, struggling with a range of water

resource and water infrastructure issues. From residents in urban and environmental justice communities living with polluted waterways and combined sewers backing up into parks, streets and basements every time it rains, to suburban townships experiencing frequent nuisance flooding while struggling to manage and maintain hundreds of stormwater management basins, clean tens of thousands of inlets and outlets along with hundreds of miles of storm sewer pipes, to our shore communities looking to rebuild and find ways to minimize damage from future storms.

These are the issues New Jersey is facing every day and hopefully we can help lay the foundation for creative, innovative and cost effective strategies for New Jersey communities as we all invest in infrastructure for the future. How did we get here? As we've seen already, we begin to build our great cities and towns, we needed to get water away from our homes, schools, roads and businesses. We designed and constructed an incredible network of infrastructure to do just that. Now that network of treatment facilities, pipes, inlets, outlets and basins carries nearly every drop of water

from our rooftops, our driveways, our parking lots, sidewalks and roadways directly to our rivers, lakes and streams.

The result of this work has left New Jersey with a host of issues including limited resources for maintaining our existing infrastructure, impaired water quality as a result of nonpoint source pollution and degraded quality of life for many residents in flood prone and urban environmental justice neighborhoods. Our gray infrastructure network of pipes, pumps, basins and treatment plants needs to be reinforced. We need to stop, look around and leverage the landscape and the resources available to us in the environment as we plan infrastructure for the future.

By managing stormwater where it falls, near its source, through healthy landscapes, soils and innovative structural measures, we can begin to reduce the burden on our existing infrastructure systems and improve and protect water quality. Integrating green strategies into the next phase of infrastructure upgrades and improvements throughout New Jersey will help to maximize the impacts of our limited

resources by not only improving water management, but enhancing the quality of life in our communities and protecting the environment.

Where are we now? Communities are struggling with water infrastructure in a variety of ways and are looking for cost effective innovative solutions. Over the past several years we have met with community leaders in the City of Camden, Hamilton Township in Mercer County, the City of Hoboken, the City of Newark, Patterson, Little Falls, Montclair, West Orange, Saddle Brook in Bergen County and Bayonne in Hudson County. These communities are ready and willing to consider green infrastructure tools like green roofs, tree plantings, bioretention, permeable paving and water harvesting. And use these tools in their community to better manage stormwater, address flooding and protect water resources.

Green can work. Many communities throughout the country are figuring out how to make it work. We can look to these communities for guidance and direction. But New Jersey does not have the same level of financial resources available and we have to do things a little bit

differently. New Jersey needs to start by taking a community based approach. We need to invest in identifying the specific needs of New Jersey's communities and the opportunities for maximizing water management. These communities can then develop individual programs to address these needs building grass roots support and a sustainable, resilient future for our State's infrastructure.

This unique approach will provide New Jersey with a plan for infrastructure that we can sustain. Green infrastructure will look different for each community. In suburban townships, the infrastructure may include a municipal led program to naturalize and modify existing stormwater basins to promote infiltration and groundwater recharge as well. The green infrastructure also may include residential rain barrel and rain garden programs for homeowners or it may include repaving parking lots and fire lanes with pervious paving solutions.

In our urban core, it may include converting brownfields to greenfields to capture and manage stormwater runoff reducing pressures

on the combined sewer system. It may include renovating vacant lots to serve as community gardens and harvesting rainwater or creating pocket parks with rain gardens and pervious concrete sidewalks. These and other green infrastructure projects have been successfully demonstrated in communities throughout New Jersey. This is not infrastructure as we have known it. Leveraging is key.

New Jersey needs to leverage the landscape as well as leverage available intellectual, human and financial resources to better manage stormwater and to make green infrastructure accessible to all communities. This will require change. Planning, design, engineering and construction of green infrastructure in New Jersey will require a paradigm shift in the way we think about our communities in our infrastructure. Hamilton Township in Mercer County has begun investing in this new approach.

Over the past three years, the township in partnership with Rutgers Cooperative Extension has assessed current water resources issues, evaluated existing infrastructure and

charted a course for improving stormwater management that includes all community stakeholders and available resources in the solution. As we move forward, we need to keep in mind that an effective way to implement green infrastructure in New Jersey is through this community based process. Successful green infrastructure programs rely on support from a range of stakeholders and constituents.

The projects we have shown were the result of partnerships between design professionals, community leaders, nonprofit organizations and local residents. Nowhere has this been more successful in New Jersey than in Camden. The Camden SMART, Stormwater Management and Resource Training, initiative has been paving the way for green infrastructure in Camden for nearly four years. This unique partnership has been able to leverage Federal Resources through USEPA, State Resources through NJDEP, intellectual resources, through Rutgers Cooperative Extension, resources from the city, nonprofit organizations including Cooper's Ferry partnership and New Jersey Tree Foundation as well as other local resources through numerous

community development and civic organizations.

We all rely on infrastructure. A community driven approach ensures a sustained commitment to constructing and maintaining green infrastructure now and in the future. New Jersey communities need to work with multiple professionals and multiple organizations to effectively and successfully build green infrastructure that protects and enhances the quality of our environment as well as the quality of life for our citizens. Where do we go from here? Some of these may be a little redundant. We've already heard today. Hopefully if all three of us say the same thing, maybe it will stick.

How can we leverage the landscape and have green infrastructure for everyone in New Jersey? These seven actions are what we want to share that will help promote green infrastructure throughout New Jersey. First, commit to maintaining New Jersey's existing infrastructure while investing in new gray and green facilities. We have not invested enough in maintaining our existing infrastructure and are now facing the consequences. In many communities we need to get

existing infrastructure operating effectively to clearly understand what the opportunities and needs are for green infrastructure.

Whether maintenance includes repair and replacement of concrete structures in hundreds of stormwater basins that are 25 to 30 years old or including replacing outdated pumps with new technology that can minimize combined sewer overflows or if it is simply cleaning sediment and leaves from inlets and pipes, it must be done. We need to invest in and commit to maintaining the existing infrastructure we have as well as the new infrastructure we build. Through a coordinated and consistent program of investment in stormwater infrastructure, New Jersey can keep costs down and make green infrastructure a cost effective component of our future.

We need to demonstrate the value of green through consistent statewide policies, plans, regulations, permits and enforcement. New Jersey must continue to be vigilant and explore innovative ways to better protect our water resources. We need a consistent message woven into and through our policies, regulations, state

planning efforts, permits and enforcement actions that recognizes green infrastructure as a viable component of our state's future water infrastructure network. New Jersey needs to recognize the value of its trees, its landscapes, its natural areas and soils in protecting our waters, our economy and our communities.

While a number of environmental partners including the Riverkeeper and Baykeeper continue to elevate our awareness of these issues, we all need to engage in better protecting and preserving our valuable natural resources. We need to develop community informed green infrastructure plans and programs for each unique municipality in New Jersey. Whether your community has a separate storm sewer system and is struggling to address nuisance flooding, inflow and infiltration or your community has a combined sewer system with overflows discharging untreated waste into waterways, streets and backing up into homes.

Every New Jersey community needs to identify what green infrastructure will look like for the individual community. One size does not fit all. Passaic Valley Sewerage Commission has

recognized this need. PVSC in partnering with Rutgers Cooperative Extension is leading an initiative to inform the 48 communities it serves about the opportunities for green infrastructure and is providing resources necessary to develop individual plans for the 48 communities served. These communities will be provided with this assistance to commit to taking the first steps in implementing green infrastructure projects and programs.

We need to make available funding accessible to communities and leverage funds wherever possible. Funding needs to be made accessible for those communities prepared to embrace green infrastructure. While funding may be available to cover the costs of new infrastructure, these dollars are not always readily available to communities. Securing public monies can be a heavy lift and communities looking to take the first step with green infrastructure will need an incentive and assistance to move ideas and plans into action. We need this funding to enable local communities to take action.

We need to make green infrastructure

an effective part of every tax payer funded capital infrastructure project. Green infrastructure needs to be a part of every tax payer funded capital infrastructure project. What funding we do have dedicated to green infrastructure should be leveraged wherever possible. When we are building publicly funded schools, roads, treatment plants and parks, green needs to be part of the equation, part of the discussion.

It's frustrating to go to a public meeting or a town meeting or a partner meeting and hear about new schools being built in the community, public dollars, and green is not part of that equation. We need to overcome these hurdles and include green infrastructure and innovative infrastructure for upgrades in all our publically funded projects. We've recently partnered with local entities to help leverage limited available grant dollars to successfully install rain gardens in the public right of way in Haddonfield or Camden County and also a pervious asphalt parking lot in the community of Clark, Union County.

Base funding for the planned capital

improvements was provided by the local municipality while additional green measures were funded with available grants. Significant cost savings for green infrastructure can be realized when projects are planned and constructed through a cooperative partnership including both gray and green. In these cases, without this partnership, these two efforts would not have been able to be completed with available grant dollars. We need to provide incentives for homeowners and businesses to adopt green infrastructure. These incentives will encourage individual property owners and businesses to adopt green infrastructure strategies.

To see impacts and improvements in water resources, we need widespread adoption of green infrastructure by more than just government entities. This will require innovative ideas and programs. Programs like the New Jersey Water Supply Authority rain garden rebate program for homeowners. New Jersey Water Supply recently piloted this program in partnership with Rutgers Cooperative Extension providing technical assistance to homeowners willing to install rain gardens. Homeowners worked with professionals to

develop a rain garden design specifically for their home.

Once the homeowners complete installation of the rain garden, they can submit for a rebate to offset costs of the project. Ideas like Assembly Bill A4003 introduced this past April sponsored by Assemblyman Eustice, Wilberly, Gusciora and Barnes. This Bill poses to establish a capture, control and conserve reward rebate program for the state to encourage property owners to implement certain techniques to conserve water or control stormwater runoff. Both of these approaches are ways New Jersey can provide incentives for the private sector to invest in Green Infrastructure practices. Everyone needs to be involved as part of the solution.

And finally, as Commissioner Martin indicated, New Jersey needs to identify long term strategies to provide consistent and reliable funding for construction and maintenance of both gray and future green stormwater infrastructure. To protect our investment in green infrastructure, New Jersey needs to identify long term funding strategies that will provide

consistent and reliable funding to continue development of new infrastructure as well as maintenance of existing infrastructure.

The City of Hoboken has been very active in developing plans for green infrastructure as it looks to address impacts of its combined sewer system on the quality of life of its residents. Through a number of grant funded efforts, Hoboken has been able to prepare community informed plans for green infrastructure, designs for demonstration green infrastructure projects and outline green strategies to be incorporated into its Master Plan. We see these as the first steps New Jersey can take to help communities across the State move forward with greening our water infrastructure.

In closing, we hope that the ideas and examples we shared here today help to elevate the discussion and generate innovative strategies to move us forward. Rutgers Cooperative Extension and the NJ Chapter of the American Society of Landscape Architects appreciate this opportunity to participate in this very important discussion and we look forward to being part of

the solution. Please let us know how we can best use the experience and expertise we bring to the table to help New Jersey.

We look forward to hearing all of our ideas today and continuing the dialogue forging ahead in greening our water infrastructure. I would like to end where I began. New Jersey needs a community based approach to designing and building infrastructure that leverages the resources of our landscape and environment. These green systems can provide communities with real savings, strengthen local economies, make communities more resilient and create healthy, more livable communities while protecting critical water resources. Thank you.

MS. GOODWIN: Thank you very much, Jeremiah. Let me now open it up from questions from the audience. Chris.

MS. STURM: It seems like one of the biggest to giving green infrastructure is money. I'm curious what's motivated the huge investments that Syracuse has been able to make if it's the EPA kind of consent decree and recognition that the county has to do something and it's just a matter of how. New Jersey cities in general have

not faced that kind of regulatory stick.

MR. DODSON: We did have the regulatory stick and it was a matter of how we needed to go. Do we need to continue to build these regional treatment facilities at a cost that is excessive for a community of our size or did we want to try to find a sustainable approach, and when I say sustainable, I don't mean the green idea of sustainability. I mean the economic long term, the longevity of the fiscal longevity of being able to afford this infrastructure 20 or 30 years from now. I think we decided the green infrastructure, and don't get me wrong, we do have a combination of green and gray in Syracuse, but adding the green in a significant way would really improve our fiscal stability in the long term.

MS. STURM: And you had to increase rates or bonds to pay for both the green and the gray?

MR. DODSON: No. We have increased rates but it hasn't been, we haven't bonded but it wasn't because of the green infrastructure. It was because rates had not been increased in some time to support, so a good example of

Onondaga County. We are 450,000 strong. In 1960, we were 450,000 strong, but we take up three times the amount of land space today than we did in 1960, so the rates haven't increased to support the infrastructure that is now beginning to age to the point where it needs substantial reinvestment.

So the rates are being increased because of that, the size of our infrastructure, not because of the green infrastructure. The money that we're using for green infrastructure is actually money saved for those regional treatment facilities that we were going to build and never did.

MS. GOODWIN: Other questions? Dan.

MR. VAN ABS: Everything I heard today was awesome. I have a question with regard to I heard on the last presentation there was an effort on the state level for homeowners to get some kind of rebate on infrastructure improvements. I was wondering on a federal level is there a push to offer cap incentives or rebates for those type of improvements as well.

MR. BERGSTROM: I can't really speak to the federal push right now. I am not aware of

anything. The most recent documentation that's out about green infrastructure initiatives and the push from USDPA is available. They have a recent document on there for the strategies for the coming year that was issued for October. Funding is an issue and how that's going to move forward is going to be, it's up to debate, but I haven't seen a push directly for property owners and home owners incentives at the federal level at this point.

MR. DODSON: There is nothing that's coming down the pipe line that I'm aware of in the near future though I was at a meeting in DC yesterday at the Environmental Finance Advisory Board, and they developed a report which should be available on-line on the EPA's website. I forget the name of what it's called, but essentially, the 32nd summary of that 46 page report is let's make SRF money truly available, let's make an allocation of SRF money specifically available for green infrastructure for stormwater. New York is already doing that with some of its discretionary money for green infrastructure. We have the green innovation grant program which is really cool. It will be

great to see other states have the same money.

PUBLIC QUESTION: I was mainly wondering what hurdles you had to overcome with regard to green roofs, structural standards and where I can get more information on how you help folks design for green roofs because we currently don't have the resources for that.

MR. DODSON: Our deputy county executive for physical services, Matt Molay, was insistent that we share everything, full transparency, so when we have engineers design a project, we ask them to put their DWG files on their websites which is essentially the raw design file which any engineer could then manipulate so you could find the design specifications, the construction bid documents and all those things for all of our projects at our web site savetherain.us.

If you go to the top you'll find green projects and just click on that and click on a project that looks good to you and then all those documents are available for download. There is probably more information than you want, and if you want to contact me for more questions or anything else, let me know. We have about 18

dozen green roofs on the web site right now so you can look at different sizes and shapes and formats.

PUBLIC QUESTION: Syracuse gets a lots of snow. How does that impact those parking lots and those green aspects and particularly the Carrier Dome that collects that water that's a big roof, how do you deal with that snow in the gray time of the year?

MR. DODSON: What snow? We have a really, a nice little unknown gem in Syracuse. It's the State University of New York College of Environmental Science and Forestry. They are a wonderful asset. I work for Syracuse University, but I'm an alum of student ESF, and I think ESF is more of an asset to us, Save the Rain than Syracuse University is when it comes to helping us design things for our cold climate, so first of all, there is the New Hampshire Stormwater Research Center at the University of New Hampshire.

They are 25 years of data, millions of data points on porous pavement technologies, 28 different kind of variables of porous pavement technologies demonstrating that this stuff really

does work in cold climates and this is how you should treat it and maintain it. My point of bringing up ESF is they have great botanists there who can identify just the right kind of trees, shrubs and forbes and grasses and perennials that are not only native but salt resistant, so when we can, which is more often than not, we plant native salt resistant plants in areas.

The good news though is that porous pavement, at least in Syracuse, it is gray a lot. We'll get dumped on with like three feet of snow, wake up in the morning, they plow it, the sun comes out for a hot second just enough to melt it. It drains through and then we don't get that black ice problem later in the day and the next day when they need to come out and salt and resalt and resalt, plow, salt, melt, drain, done, so the city is using much less salt on these porous pavement applications as well so it does in fact also then benefit the core plants.

MS. GOODWIN: I have a question with respect to maintenance both with regard to the porous pavement and roof gardens because the complaint that I have heard is regard with to

porous pavement there is additional maintenance, leaves, whatnot. Dirt, otherwise it loses its effectiveness and then with regard to roof gardens, there is a weaning issue that at some point it becomes, I was told they are difficult to manage and I know several people who have removed their roof gardens, so how do you address those two things?

MR. DODSON: First of all, there is maintenance. We have to maintain anything that we own, so it's a different kind of maintenance. I'm not going to lie. It was a very steep learning curve for some of the DPW guys on how to plow, when to plow, please don't plow, don't push all the snow into that corner because that's a rain garden now. We have to move the snow somewhere, and if you want us to plow it, we have to put it somewhere, and they're coming up with a new strategy for where to put that snow. In some instances we put it in a truck and drive it away and dump it somewhere else now.

Because of the compaction of that snow damages the rain gardens. We do rent two times a year, the county, when I say we, I really mean the county. We rent two times a year a

vacuum truck that we go around and vacuum all of the parking lots. Once in the spring after all the sediment and stuff has been pushed by the plow and remaining leaves and trash kind of gets stuck onto the parking lot. We vacuum that up, and once again in the fall when the leaves fall.

We also then loan that out to the private parking lot so they can do the same so we can insure that what they've built is the structure that we've funded continues to work for all of us, and then there's one small analogy. What if this corner of this parking lot gets clogged and it no longer allows water because we do have this consistent dumping of leaves or sediment or leaves or whatever, but the rest of it drains fine so maybe we have this one clogged part, but the rest of its working and it's maybe it's not that big a deal.

And then finally the green roofs, we have a 17,000 square foot green roof on our building that I work in. We have a tree, an aspen growing on it and it is a transitional species and we went out and kind of took a trowel, very careful so you don't damage the root and pull it out, but the weeding is certainly a

problem, but two times a year we pull out the crown vetch, the other kind of weedy species and the occasional tree that grows, but the benefit of that we have a landscaping crew that goes out and does that. There are OSHA specifications that do make it difficult with some green infrastructure designs.

These guys have to be harnessed so they don't fall off of the roof, so when you build a green roof, you have to also build a fence, but after a couple of years, once that sedum really takes hold, usually people grow sedum on green roofs, it's a very thick ground cover that makes it hard for a lot of other things to take root, so each year the grounds crew has to visit fewer and fewer times and fewer and fewer hours each time.

Alternatively, our green roofs slant in a way that down to the ground, so sometimes it's nice to come in, in the morning and find a raccoon sitting outside the window next to my desk and we do find that and it's kind of interesting. Problem, opportunity, joy, whatever you want to call it.

MR. BERGSTROM: Maintenance is the

second question I usually get asked. The first one is how are we going to pay for it. The second one is how are we going to maintain it. The bottom line is most communities, we have introduced green infrastructure into it, those communities have the resources available to do the maintenance, it's just a different kind of maintenance. Green infrastructure doesn't necessarily require, it doesn't need to require additional equipment or specialized work.

Most of it, and the majority of it is scheduling, planning and having one or two trained staff available that know how to evaluate what is needed and identify the right weeds or identify when we go out and clear out the sediment of the systems. And more importantly, most of the communities are struggling to maintain existing infrastructure as it is or not maintaining it the way we should and we need to reinvest in maintaining infrastructure and then plan for additional maintenance for new strategies.

MS. GOODWIN: Jeremiah, what if one of the state proposals which would incentive homeowners, how is the individual home owner

going to conduct this maintenance?

MR. BERGSTROM: Individual homeowners, for the most part, strategies of individual home owners are going to be responsible for rain barrels, rain gardens or strategies that they can very quickly, very easily provide.

MS. GOODWIN: What about roof tops and what about impervious driveways?

MR. BERGSTROM: Those are all strategies that they can deal with on their own. For the most part, maintenance for green roofs is minimal. I've seen very few residential infrastructure for that. For the most part, green roofs are commercial type systems for long term investment and for impervious driveways, impervious paving, they don't require a lot of maintenance. They don't require anything specific other than keeping it clean and making sure that we don't have leaves building up on it and then breaking out and moving any sediment that would flow onto it. It's not extensive and it can be done by an individual or a standard landscaped contractor with the specialized training, not requiring specialized equipment.

PUBLIC QUESTION: Are construction officials generally amendable to this installation, and are there standards that are in place that make it easy to put these things in?

MR. BERGSTROM: Here in New Jersey or Syracuse?

PUBLIC QUESTION: Both.

MR. DODSON: Quickly, you know, people are resistant to change, and frankly, guys who have been doing the same thing for 20 or 30 years don't want to change because they want their countdown to retirement calendar. So change is difficult. Usually when they do make that change, then they're amenable and they continue with that new direction. And then finally, to the design piece, New York RDEC, similar to the DEP created green infrastructure stormwater design manual which has been kind of held as the standard for green infrastructure EMG design in New York State. There is some alteration to it and I think the DEC is going to revise it, but they put that out in 2010 and that's really what most people use when they're designing green infrastructure.

MR. BERGSTROM: In New Jersey, no,

construction officials are not amenable to this for the most part. There is a lot of education that has to be done, and where we are effectively moving forward with green infrastructure, they have been engaged in the conversation, in the plan from the very beginning. They bring to the table what resources they have available and then we're able to create that plan for that community with strategies they are comfortable with or feel like they can maintain and move forward.

Not every town is going to want to put in green roofs and extensive impervious paving solutions. Maybe they don't need to. Maybe there are other strategies that their facility crews are available for maintaining and able to maintain so it needs to be tailored. Green infrastructure needs to be tailored to the individual community and the needs of the communities, and a lot of education has to be done from the local leadership down through the staff, officials and to the residents themselves.

PUBLIC QUESTION: In New Jersey is there a guidance that is available that supports green infrastructure and these officials?

MR. BERGSTROM: Not yet.

MR. DODSON: The New York manual is available on-line.

MR. VAN ABS: It seems if we're going to get beyond pilot projects and test cases that we need municipalities that have actual management objectives when they're tying to achieve a specific thing. In the case of Syracuse, that specific thing was getting EPA satisfied with the planning, and that's been true of Philadelphia, New York and other places. Are there places where municipalities have really ramped up on green infrastructure because of local driven objectives as opposed to regulatory objectives, where they have a very clear sense of what they're looking to achieve and not just to do a pilot project?

MR. BERGSTROM: The two communities in New Jersey that I would say are on the forefront of that could would be Camden, city of Camden and also the community of Cranford. We've been working with the city of Camden for four years. In the city of Camden, a combined sewer system discharges untreated affluent throughout city streets and parks on a frequent basis. As much of an inch of rain, they have overflows in

some areas of that city and they have seen this and the community has seen this issue as a threat to the health of the community and they are embracing green infrastructure citywide.

We have 20 to 30 projects already in place and we're trying to figure out how to move forward with another 20 or 40 or 50 projects that will begin to alleviate the pressures on the combined sewer system in the city of Camden. Community of Cranford recently adopted an ordnance, a very stringent stormwater ordinance. The recent there is they want to address the flooding issues, the results of Hurricane Irene. They adopted this ordinance, even discussed it with the mayor. Up there he's very eloquent on that. He spoke a little bit down in the municipalities at a presentation I attended.

They adopted an ordinance that says anyone who is adding an addition in the city or in the community of Cranford that would include 400 square feet of new impervious cover or more must manage all the stormwater run off generated from that 400 square feet of impervious cover onsite through green infrastructure strategies. You're not allowed to create or generate

additional stormwater runoff through the sewer system.

PUBLIC QUESTION: Jeremiah, just to address something you said. You said in New Jersey we currently have no guidance on green. I want to correct you. We do have the BMP that does include green infrastructure issues. Lisa Schaffer from my staff is currently revising that and we will be putting that out and get some feedback, but also right there on the screen the green infrastructure web page that we are using to promote and push green so that people can see it does work just like Khris had with the Syracuse model. If people can see it does work, we're hoping that they'll take the initiative to incorporate it.

MS. BERGSTROM: Got it.

MS. GOODWIN: We've got time for one more question, this woman right here.

PUBLIC QUESTION: I'd like to know a little bit about the interaction between the rate increases for the gray infrastructure and the green infrastructure program. Did instituting that program make the rate increases more palpable? Was there any kind of interaction

between those two?

MR. DODSON: It's kind of complicated. So we were going to build these several treatment facilities probably for hundreds of millions of dollars total. The green infrastructure program is probably a third of that so you could say we realized a total of two thirds savings by doing green instead of building those treatment facilities, but the rate increase is really because of deferred payment for the existing infrastructure. The issue really comes down to the fact that all of the green infrastructure would save two dozen token projects in the suburbs.

All of the green infrastructures happening within the city of Syracuse, though the whole sanitary sewer district which is all of our essentially the whole suburban and urban part of our county pay the same sewer rate. So there's this kind of tension between the city and the suburban caucus and the legislature. There's also this perception that the rate increase is in part due to the save the rain program, so it's part of this tension between what are we investing in and who is paying for it versus what

have we invested and not paid for in the past and are only now beginning to pay for, so I don't know if that answered your question but that's of kind of where we're at.

PUBLIC QUESTION: Doesn't the green infrastructure help everybody ultimately?

MR. DODSON: Yes, all county taxpayers, all county rate payers are paying for Save the Rain and realize the benefit of the savings of the program to this point.

MS. GOODWIN: Thank you so much. Stan, looks like you have something to say.

MR. CACH: My question goes to both to Khris, Jeremiah and Mark. In EPAs green infrastructure guidance, it speaks to capture (inaudible) up to 10 percent. I'm curious in your collective respective experiences, what have you experienced and can you talk a little bit about the cost of that type of project.

MR. DODSON: In Syracuse we capture 95 percent of our stormwater either through gray or green methods and so that's essentially and it depends on geography, so for us that is about the first stinch of every rain storm which that first stinch is 95 percent of all rain events in

Syracuse and we're pretty happy capturing that amount because that's a pretty robust amount of stormwater to capture, and then once you start looking at capturing the first inch and-a-half or two inches, there is an economic term for it but it starts to become prohibitively more expensive to get those incremental increases, so everything we design is at one inch if not more.

MR. BERGSTROM: Cost effectively, we're looking at the first inch and a quarter of rain that Water Quality defined for New Jersey. The VMP that Jim mentioned, that is the 90th percentile storm here in the state of New Jersey. We're capturing that much rain. We can do that cost effectively. Where possible, we are also looking at designing these systems and that's an inch and a quarter over two hours. We're also looking at with rain guards and bioretention systems, where we can capture a little bit more.

Looking at being able to capture up to the two year storm which is about three inches of rain over the course of 24 hours, by designing a little bit larger in a county for infiltration, some of these VMPs can actually make these systems a little more resilient as we will most

likely get more intense and more frequent storm events over the course of the year, but both of these we have been able to design cost effectively in New Jersey.

MS. GOODWIN: Thank you. We will now take a break and when we return, we'll open the floor to public testimony. Let me remind you, if you have not signed up to deliver testimony and you would like to do so, please leave your name at the desk up front. Thank you.

(Whereupon a break was taken.)

MS. GOODWIN: We have three people who have signed up to speak. I'll call them by name, and then if anyone else is in the room, wishes to give testimony, please let us know. Typically we allow five minutes. We'll be a little bit lenient here, but not much because everybody needs to keep moving. Likewise, if you have written testimony, you can leave it with us. If not, within the next two weeks, it will be incorporated into the record. We have from United Water, Elizabeth Watson and Chris Len, and I don't know if they intend to speak collectively or individually.

MS. WATSON: Good morning, everyone.

My name is Elizabeth Watson and this is George Lavatelli. We're from United Water. I'm managing manager and George is senior project manager. We have been working on a few hydro power projects for all types of renewal energy, but given that we're a water company, hydro definitely fits within the framework of our business. As such, we're been reviewing legislation for net metering in New Jersey and found that there's some opportunities to open up legislation to allow net metering for hydro power projects.

So surprisingly New Jersey is one of only five states in the country that does not allow hydro power to be net metered. If you don't know what net metering is, it's basically producing power on a site and crediting it towards an electricity use at that site. It could be site specific or as the state of New York has done, it can be remote net meter, so hydro power on one site is produced and it's credited towards another site that is using power, that needs the power, and if you think about the way hydro systems are typically set up in the landscape, when we have an opportunity to

gain hydro power.

So for example, maybe in a distribution system where there is pipes going downhill, you can gather the hydro power from that or when it's dammed as part of a water reservoir or stormwater protection, you usually don't need the electricity on that site. If you're having water flow down hill, you don't need to pump it. The sites where you need the electricity are pumping. Pumping uses about 90 percent of the electricity used in a water distribution treatment system.

So we're proposing New Jersey considers opening up net metering for hydro, specifically allowing remote net metering, and it would be similar, we're hoping something similar to the New York legislation that was just passed, and what it would do, it would allow projects like George and I have been working on, reopening the Dundee Damn hydro project. There is also several other similar projects around the state that are not financially feasible because of this restriction on that metering.

So it really -- we're not even asking for a huge grant or anything like that.

It's really just bringing hydro to the same level as net metering as other renewal technologies. Any other comments that you have?

MR. LAVATELLI: I just wanted to say we're speaking on behalf of the Dundee Water Power and Land Company which is co-owned 50 50 by North Jersey District Water Supply Commission and United Water, and we got permission from them to come speak today.

MS. WATSON: Than you for your consideration. Any questions, comments, concerns?

MS. GOODWIN: Thank you. Chris, I apologize. Chris is with the Newark Baykeeper.

MR. LEN: I'm Chris Len. I'm the staff attorney for Hackensack Riverkeeper and New York New Jersey Baykeeper, and our job is to look after the biological ecological integrity so the discussions we're having today are very important to the kind of work that we do in our groups, so I'm pleased the Council is holding this hearing and taking comments from people like me and thinking about these issues very carefully.

It's nice to see green infrastructure becoming more and more important

in New Jersey. I feel like it's only been a couple years since the idea of green infrastructure was pretty novel to regulators who regulated in New Jersey, and now that we're considering it as a cost effective solution to a lot of our stormwater problems, I think that's a great advancement in the way that we look at these issues. Thinking about this, in particularly our groups have been involved in CSO work trying to get better permits, better control for sewer overflows.

It occurred to me that first of all, you have to start to do something before you can finish it and New Jersey has allowed itself the starting of these programs for far too long and to the extent that we're starting them now, I think that's great, but if you look at a town like Portland, Oregon or Providence, Rhode Island or Atlanta, Georgia where many years ago they started to address their CSO problems through gray and green infrastructure. Portland, I believe, has one or fewer CSOs anymore in a year and it rains a lot there.

I know, I went to law school there and it rained on me 200 days out of the year, so

their great advantage over us is simply that they started working on it 20 or so years ago and now that they've finished they have solved the problem and I'm encouraged now that it seems like we're starting to work on it as well. I was at the League of Municipalities and heard from the Camden Sewer District that they had a pipe that was made of wood and it was tongue and groove constructed and it was still holding up except that when you have tongue and groove construction to transport water, it all comes out of the pipe and they lost something like 20 percent of their flow just because of tongue and groove pipe construction.

And I think that's a great example of what has become of our infrastructure because if it's underground and there's not political regulatory pressure to change things, then it's easy to not change things. I've heard about wooden pipes in Newark, and it's up in our area as well and that's the sort of thing that we really need to address and why haven't we addressed it? Because we lack the incentive necessary to make these things happen, and I think there's four different incentives that

cause people who have to make these decisions to make better decisions. There's regulatory incentives. There's economic incentives. There's political incentives and environmental incentives.

As far as regulatory incentives go, I think it's a great sign that the Department of Environmental Protection is working on new and individual CSOs. Having read many of the eight that they've put out so far with what I would imagine something like 15 to 20 to go, they are a great improvement and they have requirements for green infrastructure that I think are going to move a lot of what we've been talking about forward if we get those drafts issued and that still remains an open question.

For economic incentives I would like to address express our service report for the stormwater utility bills that Senator Smith has put through. There's not going to be very much change about these things until it becomes more or less expensive to change than doing things the same way, and when we allow stormwater discharge into our rivers funded by taxpayer dollars and with the costs accrued to all of us who use our

public use land that divorces the economic incentive to the people who make decisions of stormwater infrastructure and put all the costs on the people in the state.

By having stormwater utility and allowing towns, if they choose to, to charge for stormwater contribution system, then that can both fund stormwater improvements and cause incentives for people to do common sense easily done things to keep water at storm infrastructure like simply grading your parking lot towards the field rather than the storm system. We also think that that should be applied to all municipalities and not just the CSO municipalities because the stormwater infrastructure problems in this state are not limited to CSO municipalities.

We have problems in Bergen County with flooding, and the reason that it floods well, first of all, it's because the climate is changing, but second of all it's because we paved so much of the state, and if we can have stormwater adjustments to our infrastructure to keep the water out of the rivers, maybe we can reduce the flooding and not just the CSO. For

political incentives, our organization, we find it very (inaudible) with their waterways and we find that when people are once again experiencing Meadowlands from the bay from baykeepers that they come to understand the value of the resource and can start managing changes.

And sometimes the regulators will respond more quickly to political incentives than regulatory ones, and so we think it's important that this council not support any further changes of the DEP makes that keep people away from their waterways. Our organizations about their public access rules in large part because the rules memorialize the inability for people in the northern state. We think the council should ask for more and greater access capabilities for people in New Jersey.

And finally, one thing it just makes the least amount of sense and I want to talk for a minute about New Jersey Oyster Restoration Research in area waters. After Sandy one of the bigger parts of Governor Cuomo's report on the storm was the necessity to reestablish oysters in New York waters. Oysters, first of all, they filter water. They are themselves green

infrastructure. One oyster can filter 50 gallons of water a day. They take in polluted water especially water filled with nutrient bearing pollutants and they turn it into oyster flesh and oyster shell and they build reaches. They have clean water come out the other size. They build structure.

The structure provides habitat for sea life commercially and environmentally important sea life, but at the same time, they create structures within the water that can be important for storm surge and Governor Cuomo saw the importance of this and how economical it could be to simply allow oysters to return to waters. Unfortunately in New Jersey what we have done is perpetuate bands by the DEP of oyster restoration research in most waters in New York Bay.

That just doesn't make sense, and at one point the department said there was poaching but the department has told us since that there are now patrols to meet FDA standards, and the idea that this important research continues to be band when it can be amongst the most cost effective ways to prevent future storm damage and

to clean waters is silly. And we hope that the council will support the overturning of this band and that the DEP should overturn it. Instead of working against us, work with us to restore oysters to area waters as quickly as possible. Thank you very much.

MR. SONKIN: Good morning. My name is Joel Sonkin. I'm the city chief of Energy and Environment. The city of Newark has been committed to green infrastructure. We see it as being a solution to a number of our problems. Specifically aging water infrastructure, urban key island air quality issues, flooding and just general. In the past year, we've passed a new stormwater ordinance and are in the process of passing a new Master Plan, both of which exclusively encourages green infrastructure as a solution. We're also undertaking a number of site specific green infrastructure interventions.

While we appreciate the site specific work, one of the things that we're really focusing on is trying to get more systemic green infrastructure work done. One of the things we're doing to accomplish that is our planning staff is currently working on developing

a standard manual for green infrastructure best practices. That is something where we've been developing a manual of plug in play green infrastructure interventions for both municipalities and private sector views that would document kind of the space required, stormwater treated, the amount of the water treated for square footing that we would be able to kind of use for ourselves and also give to prospective developers.

This is probably something that we probably cannot develop alone, so any sort of state assistance. My guess is this has some broad applicability to our cities that would like to do some green infrastructure that lack the technical expertise that would. One other area in which we feel that we would need state assistance to do more global green infrastructure work is kind of a much discussed our inability to charge storage water impact fees. I recognize that's not popular among a number of people, but our challenge is really absent being able to charge stormwater fees separate and apart from traditional water.

We are never going to be able to do

it on a broad scale, and particularly the challenge we have is the way that we currently manage stormwater is through traditional water and sewer or through the general fund. In both cases there is a significant amount of a lack of equity where basically small businesses and homeowners are being an asked to subsidize parking lots and passive storage that contributes a significant amount of stormwater to our system but pays nothing to the system we support so we urge the state to help with that. Thank you very much.

MS. GOODWIN: Thank you. That concludes today's hearing. By way of follow up, the council also prepares a report to the department and the commissioner. When that is available, it will be posted on our web site and again, I thank you.

MR. CACH: We'll accept comments until December 31st.

MS. GOODWIN: Written comments accepted until December 31st. Thank you so much. Be safe.

(Hearing concluded at 11:34 a.m.)

C E R T I F I C A T E

I, LAUREN BUTTERFIELD (License No. XIO2211), a Certified Court Reporter and Notary Public of the State of New Jersey, do hereby certify the foregoing to be a true and accurate transcript of my original stenographic notes taken at the time and place hereinbefore set forth.

Lauren M. Etier

LAUREN BUTTERFIELD-ETIER, CCR

Dated: January 8, 2014.

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