AGENDA: CSO PHASE III STAKEHOLDERS MEETING

NARRAGANSETT BAY COMMISSION

DATE: May 22, 2014
TIME: 9:00 A.M.
PLACE: Narragansett Bay Commission
Corporate Office Building
One Service Road
Providence, RI 02905

PRESENTERS:

TOM BRUECKNER
MICHAEL WAGNER
RICHARD RAICHE
SCOTT LINDGREN
NICK ANDERSON

STAKEHOLDERS PANEL:

JAN REITSMA
CAROLINE KARP
JAMES TOOMEY
AMES COLT
DORIS ASCHMAN
DAVID TURIN
MICHAEL WAGNER
SHEILA DORMODY
LANCE HILL
MEG KERR
PHIL HOLMES
STEVE COUTO

BRIAN BISHOP
JOHN HART
JARED RHODES
MICHAEL GAGNON
AL MANCINI
HAROLD GADON
TOM BORDEN
GREG GERRITT
MICHAEL WALKER
RACHEL CALABRO

OTHER ATTENDEES:

ELIZABETH SCOTT
JOE HABERAK
ALAN NATHAN
GEORG PALMISCIANO
LAURIE HORRIDGE
TIM THEIS
PAM REITSMA
STEVE LALLO
CATHERINE OLIVER
CHRISTINE COMEAU
ROBERT OTOSKI
KEITH GARDNER
JOANNE MACERONI
RICHARD BERNIER
RAY MARSHALL
JAMIE SAMONS
RICHARD SALIT
AMBAR ESPINOZA
JENNIFER HARRINGTON
MEG GOULET
RACHEL GAUDIO

(MEETING COMMENCED AT 9:10 A.M.)

MR. DOMENICA: Good morning, for Phase III of the CSO program. The goal is to understand the current program, look at the options, see if it needs to be modified, how it needs to be modified, what are the criteria. And today's focus in the workshop will be, as it says on the agenda, primarily Items B and C: EPA affordability issues and green infrastructure alternatives. And the consultant, Montgomery Watson Harza, and Pare will take us through Item C, affordability issues. We're waiting for EPA to arrive, but that's a full agenda.

Also, Tom Brueckner is going to make some introductory comments, as well as cover really three issues; parking lot issues, that there's a summary of from the last meeting, some questions that have been submitted since the last meeting, and respond to those, and also a summary of the minutes. The minutes are on-line, the drafts have been on-line on the website. There are still some corrections that need to be made to it. I'm not going to take any more time here except to say it's very, very

important for the stenographer, minute keeper that we speak into the microphones just as I'm not doing right now. Make sure that you speak loudly and clearly, your name and affiliation. If there are any nominated stakeholders in the back, please come up to the table.

Every stakeholder, association, affiliation should have one person at the table. We're trying to limit it to one. Others are certainly welcome in the gallery, but please sit at the table. It facilitates the discussion and understanding of who's saying what. And with that, I'm going to give it to Tom. We have a tight schedule, and Tom's got a number of things to cover here.

MR. BRUECKNER: For the record, that was Mike Domenica.

MR. DOMENICA: Mike Domenica, Water Resources Association.

MR. BRUECKNER: The only other thing I wanted to check on, Jamie, on the minutes, what we typically do is we get minutes, they're in a draft format. We go through them and make corrections, which the stenographer

then makes. When we put them on the website,

that is usually the corrected minutes, correct?

MS. SAMONS: Yes.

MR. BRUECKNER: So if the corrected minutes are on the website, but I won't guarantee that there are no mistakes in them. There may be a few here and there, but we tried to go through them to make sure they were accurate.

What I'd like to do this morning is go through two things: The first is parking lot issues. We had mentioned that issues that come up during meetings, we would put in a parking lot to be carried through and addressed as they come up in the presentations, and so I want to summarize where we are with parking lot issues as of right now.

And the second thing I want to go over is there have been two requests; one, if you read the minutes by Ames Colt that we summarize the minutes of the meeting because they're so lengthy, sometimes it's hard for people to understand exactly what went on, or they're looking for a condensed version of them. So I'm going to try and summarize briefly what

was discussed at the last meeting, and issues

that came up and resolutions for those issues, if there were any, and also parking lot issues that came up from the last meeting. So I'll do that now.

Parking lot issues from before, previous meetings: The main one, obviously, is the EPA guidance on affordability. We pointed out that it was more flexible in terms of cost that can be considered, and as we had said, we're trying to drill down to census tract MHI to determine affordability when we're doing our affordability analysis.

And the second issue with regard to affordability related to water quality standards is we have stated that you would build what you can afford now, and if water quality standards are not met, determine what else needs to be done to meet the standards, and then you would again spend to the limit of affordability.

EPA had some slight objection to that, and Dave Turin said we should be looking at the water quality objectives first instead of the money. So I think just a little different

nuance on that issue. So to address those two issues, we've asked EPA to speak today, and

that's the next item on the agenda. And that would be on the affordability issues and meeting water quality standards. Another parking lot issue that was raised, does MWH know of any models to access rates in the most impacted neighborhoods?

Right now -- EPA on the affordability criteria with the thought that if the poorest census tracts are used for the affordability analysis, that that may not be an issue. Another concern that was raised at previous meetings was that Phase III is preordained.

Now, while we have a proposed Phase III approach, which basically consists of a tunnel and sewer separation, the intent of this reevaluation program is to determine if Phase III is needed at all, and can it be modified. And part of that is it needed at all relates to water quality standards. And then again, the affordability of meeting water quality standards. And as I mentioned at the last meeting, a question was raised asking if we

could provide a summary of the minutes of the previous meeting, which I'll do now. So,

basically, the last meeting was a presentation by MWH on grey infrastructure alternatives, which are the alternatives that we were proposing for Phase III, the way the program is set up now, and has to do primarily with building structures and facilities, tunnels.

And the other approach that we'll be talking about today is green infrastructure, which is less concrete oriented, if you will, probably a softer approach to dealing with stormwater issues and CSOs. So I'll just briefly go through what the technologies were that were presented, kind of talk about the pluses and minuses, and some of the discussion that came up. And then after I finish with this, I know that Ames had a few questions related to the alternatives that were talked about, and then we'll go through those.

And if other people have some specific questions, we can deal with those, as well. So the first grey infrastructure alternative that was talked about was sewer

separation. And by the way, I want to mention that for me, someone who has dealt with this for years and years, this seems so simple for me to

understand because I'm so familiar with it, but I can appreciate someone who has never dealt with these issues before, the technology, being somewhat unable to differentiate between alternatives or understand really what the point is.

So I'm going to try and make this fairly simple straightforward, and just touching on the highlights so that it provides a background for you. So when we get to the next meeting, which is going to be evaluation of the alternatives, you'll just have some basic understanding that you would need in order to go through that process.

So the first grey infrastructure alternative is sewer separation. So in this alternative we separate the storm flow from the combined sewer, usually by putting in a new pipe in the street, a new storm pipe. And then we have to connect all the catch basins and the downspouts from houses into that new pipe.

We talked about the minuses of that

approach, that alternative. First of all, it creates a stormwater discharge that will need treatment, and with the combined sewer overflow

system as it is now, some treatment occurs before the overflow occurs because that first flush is basically taken into the interceptor off to the treatment plant.

The second minus for storm sewer separation is that it's disruptive to homeowners, businesses and neighborhoods because the amount of construction we have to do in every street. You have to tear up every road to put in a new pipe. And then the third item we had mentioned was that maintenance is required for the catch basins long-term usually by the communities which is pretty much beyond their ability to do.

The pluses for the sewer separation are that one of the stakeholders mentioned that they hoped it would alleviate flooding problems, I believe that was Lance Hill, and it provides new utilities infrastructure, because when we go in we have to replace utilities in the street so you get new gas lines, waterlines, and we repave

the roads. So that's a benefit to doing the sewer separation. Sewer separation was, at the last meeting, it was mentioned that it was proposed for Overflows 35, 39, 56 and 206. 39

and 56 are on the West River, and 35 is on the Moshassuck, 206 is on the Blackstone River. There was some discussion of Overflow 35 that it's close to Overflow 37, a neighborhood which was recently impacted by the sewer separation and the concern was raised that if we go and start tearing up North Main Street in that area again, it's going to just be more burden to that same neighborhood.

The next grey infrastructure alternative that was discussed was tunnels, and corollary to the tunnels are the interceptors that bring flow to the tunnel. So basically the tunnel is an underground storage system that collects the CSOs which are pumped out after the storm to the treatment plant, and the secondary treatment is provided for the stored flows.

The current Phase III program proposed is the Pawtucket tunnel, which is 26 feet in diameter, 13,000 feet long, and two series of interceptors, and they flow to the

tunnel primarily from Central Falls.

Now, this tunnel would capture all the overflows along the Seekonk and Blackstone Rivers, especially large overflows such as 218,

205, and 220 on the Moshassuck. Now, 220 is right here, that's 220, 218 is over here, and 205 is up there. They're the biggest circles on he graphicd.

Now, some of the minuses for the tunnel are that there's some routing issues for the interceptors. We have to go under a railroad, and there's some bridge crossings, so there is somewhat difficult construction points for the interceptors. And the other is that it's a big project commitment, that can't be broken down into smaller contracts over time. So if you're going to do a tunnel, you're going to have to commit a lot of money for that one project.

You can't really break it up into a more affordable approach over time. And for tunnels to be cost effective, they need to capture a lot of volume, so that you're into the tunnels, or you're not going to do tunnels.

Now, the pluses for the tunnels are that there's limited surface disruption because almost all the work is deep underground. You get a high level of treatment because the flows stored in the tunnel are usually pumped out to

the plant for secondary treatment. There is very low maintenance, there's very few moving parts, it's easy to operate, and there's limited land acquisition siting issues, again, because there are so few points where we impact the surface.

One of the questions that came up with regard to the tunnels was how do we handle Overflow 220, which is that largest circle on the Moshassuck River. So there were two approaches, basically, that were looked at, or will be looked at. One is an adit, which is basically a small tunnel to connect it to the big tunnel, along the Pawtucket tunnel, and the other approach would be a force main and pump station force main, and a gravity sewer to get the flow over to the tunnel.

So those will be looked at when we're evaluating alternatives. The next grey infrastructure approach that was discussed was

near surface storage, and corollary to that is screening and disinfection. So basically a near surface storage tank is a tank built 15 to 30 feet underground, and basically it's just a big holding tank to hold the CSOs until after the

storm for treatment at the treatment plant. There are none currently proposed for Phase III, in the currently accepted program.

Now, the minuses for storage and screening and disinfection, we need odor control. The maintenance of the facilities require cleaning after each storm. We have a lot of moving parts. You've got screenings that you have to take out. With screening and disinfection you have chlorine on site.

You have to make sure that chlorine is active, that you don't overdose, that you don't put too much chlorine in the river and kill the fish that are in the river. So that's an issue. And the biggest problem probably is siting, and there were several situations where we looked at specific sites and we showed that really, there was no place to put these large facilities.

And as was mentioned, that was one of the reasons why we got away from in many of the areas, even in Phase I and II, near surface storage facilities, because there was no place to put them. The pluses for the near surface storage and screening and disinfection are that

it can be broken out as small contracts, probably that's the biggest plus. So you could do as a phased program, pick up, select overflows to the major ones, and deal with them on a cost-effective basis. You get a high level of treatment for the three-month storm if you're doing near surface storage because you're pumping it out to the treatment plant, and you get lesser treatment from all of the storm if you use the screening and disinfection approach because overflow gets passed through the facility for the duration of the storm because it's a lower level of treatment.

Now, proposed for evaluation in Phase III for near surface storage and screening disinfection. One of the things we talked about was changing from sewer separation for Overflows 39 and 56, which are along the West River, to a West River interceptor that would provide

storage and would also provide relief for the Branch Avenue interceptor which runs along the West River. And the reason for that relief is that Branch Avenue interceptor is surcharged now during storms, creating sanitary sewer overflows which are illegal, and this would also help to

alleviate those discharges. The other evaluation we're looking at is near surface storage or screening disinfection for Overflow 220 as an alternative to the adit, or to the interceptor for 220. And we provided looking at sites.

One of them mentioned was Morley Field which is a ball field right next to it, and that generated some discussion about could that tank be built somewhere else, which kind of got into the discussion of siting these facilities. It gives people a flavor for how difficult that might be. Parking lots to the north of that was suggested, but we pointed out that that parking lot was used on a continuous basis, and that wasn't an option.

The question was raised if it could be built to store bigger than a three-month

storm, and what is the cost effectiveness of designing for larger than a three-month storm at another location, Overflow 103, 104, which led to a discussion about overflow policy from EPA, do four overflows per year comply with EPA's policy. Do we need to do a three month storm or a bigger storm if we could? And it was stated

by Dave Turin that no, we don't for overflows per year really doesn't apply to us, because in New England there are numerous numeric criteria for quality standards which don't really allow for the four overflows per year presumptive approach.

So that may be something we can talk about further today. And then there was a discussion about possibly doing near surface storage, screening and disinfection for Overflows 104 and 105, which were up in Central Falls, which are the areas that would need the interceptor if the tunnel was built. If we didn't build a tunnel, could near surface storage work there. So those will be things we will be evaluating.

And then we talked about near surface storage for Overflow 205, which is an

extremely large overflow, and that would require 13 million gallons of storage, and it was proposed originally back in 1994 when we did the first evaluation to be two separate facilities; 13 million gallons would require two facilities, one of 6 million gallons and one of 7 million gallons. And that obviously wasn't selected for

the proposed approach because there was siting issues there, as well. And we talked about the near surface storage for Overflow 218, which is the largest overflow in Phase III. And the problem there was the size of the facility and siting it because right adjacent to it, the parcel that's now vacant is under development for a trucking facility, so that's probably not going to be available.

And the other thought was to convey the flow to the treatment plant directly and treating it at the plant, but we don't have capacity at the plant to treat that flow. That's sort of substantial. And right now our wet weather facilities are designed to take the flow from only the north diversion structure. That's basically the summary of the grey

infrastructure alternatives that we're going to be looking at and in the next meeting evaluating.

And then the parking lot issues for grey infrastructure alternatives, I only really came across one, and that was a concern that the life of system issues in terms of durability. In other words, how long would the facilities

last, and the level of control given that future weather patterns may change from what they are now, would they be designed adequately to accommodate future weather patterns, future rainfall events? So that's something that will also be looked at as we go through the evaluations. And then the last topic that was discussed was stormwater, and basically it was just a little kind of primer on what can be done for current stormwater facilities, really with regard to catch basins, some sort of treatment systems, catch basins to capture the grit and also to throttle the flow into the storm drains.

It's kind of a precursor to what we're going to be discussing today about green infrastructure. So that is the best summary I could come up with for the meeting. And again,

this was the last meeting, pretty technical stuff, but just understanding that there are these hard grey alternatives that are out there, and they're typically the ones that we look at, we will be looking at those, that's the alternative here, and the alternative is to look at green infrastructure, either as a supplement or an alternative to the grey infrastructure

alternative. Ames had some questions, he had some specific questions.

MR. DOMENICA: Before you go to those, Tom, are there any questions regarding the parking lot issues, or the summary of the minutes?

MR. REITSMA: Jan Reitsma from the Governor's Office. I want to thank you, Tom, this is extremely helpful. I'm one of those unfortunate souls who had a hard time following some of the technical discussion, and in particular, reconstructing it when I read the transcript.

So what I would suggest is that we actually pull out the summary and make it available in written form separate from the

transcript, and I think that might also be useful to people other than the ones who are serving on this body. I would like to be able to go back, because even now, and I'm on my fourth coffee and I still have a hard time with keeping up with all of it, but I want to thank you because that really helps to reconstruct things in my mind. I get the context. I just wanted to say that. Thank you.

MR. BRUECKNER: So there are two things that I want to talk about. One is that the presentations are on the website, which probably the power points are a little more succinct than the minutes, and if you want you can go back and look at the power point presentations by MWH, which may answer some of your questions regarding the technical stuff.

And the other is with regard to the summary, my only concern about doing that is I'll probably do the summary and I'll summarize what I think is important. So there may be things that I leave out which someone else may have thought was important, but that's the risk we'll run for having me do a summary of it.

MR. REITSMA: At the same time you

provide the structure I think that is extremely important, at least to me, to put the different pieces of information.

MR. BISHOP: I have two kind of point of order questions that I'm assuming maybe some of the substantive issues over cost or the presentation you made aren't appropriate to this part of the discussion. One is I'm just trying to understand the distinction between the

sanitary sewer overflow discharge that you talked about in the interceptor that runs along the West River versus the CSO itself.

MR. BRUECKNER: SSO, sanitary sewer overflow occurs on a separated sewer system where there's supposedly only sanitary flow going into that sewer. But what actually happens is there are, we'll say, the illegal tie-ins of stormwater which inflow into the sanitary system so that when it rains it exceeds its capacity. Now in a CSO, the system is designed to take the stormwater, and it's relieved legally, well it's relieved at a point that is permitted, but now it has to be addressed.

MR. BISHOP: And I suppose it's moot since it happens, I mean, is a sanitary sewer overflow theoretically more illegal, is that double super secret probation, or what's going on here?

MR. BRUECKNER: Well, the CSOs are permitted, and there's a program in place to address that. The SSOs are not permitted, and I guess that's the distinction.

MR. BISHOP: Is there no relief

structure, or are we just talking it goes into people's basements?

MR. BRUECKNER: Or in the streets.

MR. LIBERTI: I just want to clarify that a CSO system is designed to take that flow where a sanitary system, the excess flow should not be in. It should have been designed to properly convey it, so it really is sort of more illegal because it was never designed to operate that way, where a combined system was designed from day one to have these relief points.

Now, you can have a combined sewer, it's possible that there's too much flow in that, and it shows up in the street, that's a

problem too, that it's not an authorized discharge point. So what the other communities do is sometimes they get penalties for those sanitary overflows. They have programs that go out and find them and correct them.

MR. DOMENICA: Caroline, go ahead.

MS. KARP: I have a question about overflow 220, and I've gone back to the power point. I guess I want to ask if you showed that slide again with all the major overflows, what

is the best plan for 220 that's separate from 205 and 218, really big CSOs in East Providence?

MR. BRUECKNER: You mean that's not going to be tied into the tunnel?

MS. KARP: Yes.

MR. BRUECKNER: Well, there's possibly green infrastructure which we haven't looked at at all previously, but will be in this evaluation. The other alternative would be a near surface storage facility which would be at Morley Field which is right next to it, which will be a big holding tank to capture the storm. And then the other would be a variation of near surface storage which is screening and

disinfection, which is a flow-through facility and the discharge occurs at the time the storm is treated.

MS. KARP: The reason why I ask you, I'd kind of like to flag 220 as being kind of a separate issue geographically, and then I'm going to flag this, and I bet it's going to be part of the parking lot issue, and it goes to the base of this program. We're managing based on fecal coliform bacteria, fecal bacteria, whatever they are. So we're basically managing

this entire system based on what comes out of sanitary waste and the risk of sanitary waste going into receiving waters, so I would ask DEM and the EPA that's not our only problem for the bay, so we really have major problems for the bay and emerging problems like the nano particle, nano scale, triclosan, for example, is a problem or there may be a problem.

And they're spending a lot of money on this project. So I would just want to make sure that as we look at this, we also at some point have a conversation about what the big problems are for Narraganset Bay and the extent which CSOs address those problems.

Because we manage around bacteria and the water will be somewhat clean sometimes, but we may not have anything living in the bay. We somehow have to get to the underlying questions, why are we doing this and are we regulating on the right pollutants.

MR. BRUECKNER: Which would be part of the evaluation for the alternatives for that, which would be more effective in controlling those pollutants of concern.

MR. GADON: I thought you said one

of the objectives was to decide whether or not Phase III was needed. I thought that had already been decided because Phase I and II did not do the trick.

MR. BRUECKNER: So, I mean, I don't want to make that statement that we right now absolutely have to do Phase III, but it's likely we have to do something. I don't think it's going to be we don't have to do anything. Affordability does come into the issue of what we have to do, so we'll be evaluating that. And then the other part is when we do water quality evaluation, do we have to do the extensive

program we had proposed originally?

MR. DOMENICA: I think we'd probably better move on here, Tom. Ames, you had some questions.

MR. COLT: Ames Colt, Rhode Island Bays, Rivers and Watersheds Coordination Team. I sent these to Tom saying he could address them offline, but he wanted to get some today, so I'll try to be quick. They're kind of specific. In terms of treatment processes, I was curious as to whether we could expect localized or satellite screening disinfection plants to

provide treatment equivalent to wet weather treatment processes at Field's Point or Bucklin Point?

MR. BRUECKNER: So the answer for the near surface storage is yes. For the satellite treatment facility it would be screening disinfection, probably not quite the level of treatment, but more primary treatment than secondary treatment, which would be screening disinfection.

MR. COLT: It seems that at least we're discussing options for Outflow 220, which is a key piece of this, I totally agree. You

said you could either have storage or screening disinfection, you can't do a combination. So I was wondering, other than the required pumping system to remove water that's been stored and put into an interceptor or a bedrock tunnel, is there any other operational need for those storage facilities?

MR. BRUECKNER: Okay, under the 220 alternatives there are two. One is put it in for the tunnel and associated with getting to the tunnel is either an adit or a pumping station to pump it to the tunnel. So that's one

alternative. Then the other alternative that would be looked at would be, as I mentioned to Carolyn, a near surface storage tank or screening disinfection, and you can do either one, and they each would work to a certain degree, and probably would meet our requirements. I'm not sure if that answered your question.

MR. COLT: It's a small point, but if you have a local storage only, and you're basically only having to load up to that storage and then pump it out after the rainfall, is

there anything else you have to do operationally at that site other than maintain the pump systems?

MR. BRUECKNER: Yes, for the storage you have to clean the tank afterwards, and you have to make sure that the facilities, they're working, the pumps, and whatnot, are working.

MR. COLT: And then Outfall 220, you talked in detail about either the Pawtucket Avenue interceptor or a subtunnel. Overall, can we expect the interceptor along Pawtucket Avenue, and so forth, to be cheaper to construct

than the subtunnel?

MR. BRUECKNER: I think that's something we can evaluate.

MR. COLT: Would the Pawtucket Avenue interceptor be very disruptive to the Pawtucket Avenue corridor neighborhoods, or is that all pipe jacking and microtunneling?

MR. BRUECKNER: Let's put it this way, to go to the adit is least disruptive, as it's completely underground. The pipe jacking is less disruptive than cut and cover, but is still fairly disruptive at the points where

you're doing the jacking pits. And locating those is not easy either because it's very densely developed, so it's an issue.

MR. COLT: But at least you're not tearing up a street right down in the middle of Pawtucket?

MR. BRUECKNER: No.

MR. COLT: Would a pump station required for the Pawtucket Avenue interceptor in the long run make it more expensive than a subtunnel?

MR. BRUECKNER: Say that again?

MR. COLT: Well, if you have the

interceptor you've got to push that water up to the boundary of the watershed. In the long run is operating that pump station going to mean that the total cost of the system is going to be higher than a subtunnel?

MR. BRUECKNER: Again, that would be evaluated in the cost.

MR. COLT: So it's possibly a close call?

MR. BRUECKNER: I'm not sure.

MR. COLT: Okay. And then to

Outfalls 39 and 56 on the West End, another really interesting situation. You said sewer separation in those neighborhoods is really unlikely.

MR. BRUECKNER: We prefer not to do it for reasons stated.

MR. COLT: If there was some way to do that along the green infrastructure, would that alone be adequate to reduce the surcharge problem for the Branch Avenue interceptor, or do you need that West River interceptor regardless?

MR. BRUECKNER: Beyond evaluating that as part of the modeling we're doing, I think we would still need some relief because

right now the flows that are coming in from 56 and 39 are regulated before they go into the interceptor, so basically what happens is there's a very small pipe that takes the flow during wet weather from the main coming down to the overflow to allow the flow to get into the interceptor, so that flow is regulated to a very small amount.

What happens is the flow that can't get through that regulator pipe is discharged, so that's why the overflow occurs. So,

basically, when you do a sewer separation, that flow that's now going out is still going to go out, but it's going to go out as stormwater, and the sanitary flow is basically going to be pretty much the same as it is now, but it's going to go into the interceptor, so you're not going to take a lot of the stormwater flow out of that interceptor if it's already not there. So the answer is no, you're not going to get a lot of reduction in the flow going out.

MR. COLT: And then finally, maybe you didn't know before you did it, but you've said how difficult sewer separation in certain areas on the East Side was. What led you in the

first place to do sewer separation in those areas? You would have known it was going to be hard anyway.

MR. BRUECKNER: I think mainly it was too far from the tunnel to be cost-effective. Based on the numbers we came up with for the evaluations, just not cost-effective to get that flow down to the nearest location to get it into the tunnel. There really were no sites for storage, so it

kind of left us with sewer separation, and it's been done in numerous communities.

And I'm not saying that it doesn't work because it does take the flow out, but based on our experience and what happened in the neighborhoods, it's so disruptive, and the fact that now we've created another stormwater discharge, that some time down the road will need to be addressed. It's just not something that we are keen on doing, so we'd like to find a better alternative, let's put it that way. And I would say that our decision to try and stay away from sewer separation in the next phase is based on our experience with construction of doing an actual sewer

separation, learning from experience.

MR. COLT: Okay, thank you. That's it.

MS. KARP: I have another question. Could you give us some data at some point on the precipitation profile for this part of Rhode Island, and also projected precipitation, because my understanding from the USGS presentation is that maybe a three-month storm is no longer a 1.6-inch storm?

And I guess I heard from a presentation by David Bali that if storm precipitation changes over the next 10 to 50 years, that that will have a lot to do with the sizing of these and also the number of overflows.

So, for instance, if you could just explain quickly if we get more frequent two-inch per hour rainstorms, how many overflows are we going to get a year if we designed 1.6.

MR. BRUECKNER: The storage capacity is based on the total rainfall, not the intensity, so two inches per hour if it's less than 1.6. If we exceed 1.6, or we get back-to-back storms, obviously, the tunnel will

not be able to handle it, we'll have overflows.

UNIDENTIFIED SPEAKER: Tom, could we get a probability on that?

MR. BRUECKNER: Four times a year. Going forward, the question has been asked, Angelo would ask that we update the 3, 6, 12-month and 24-month storms based on more current rainfall data. We have talked to NOAA, also.

They're now doing that throughout the country, they're evaluating and updating their information. It's scheduled to be done here in September of 2015. Then they'd have done this region. And what they found in the other region, the two that they did which I think were in the midwest, that there was no appreciable statistical difference between the old numbers and the new, which people find hard to believe, but that was what they told us.

So we are either going to look at it now, or wait until design to come up with that, but another factor in terms of what we should design for it, it isn't just the size of the storm, but it's also affordability. So let's say we say, oh, what used to be a

three-month storm is now a six-month. We now have to spend this much money doing it. We can't afford to do that, so we wait to get more money, or we have to do something else. So that's another factor that's in here. And in fact, one of the major questions raised is what size storm are we going to design to, how do we determine that? So that will be part of this evaluation.

MR. BISHOP: I brought this up last month, and statistically, I understood that after you go past the three-month storm, theoretically a three-month and a one-day storm, but I think the brunt of what I was suggesting is differentiating.

What elicited my comment was that EPA had said something to the effect of how about the signing for the six-week storm, or something to that effect, and I just wanted to make sure we were looking the other direction in the sense of, how large are those distinctions, how large effectively would the overflows be? So that requires comparative volumes, whether they be new 2015 figures. So we know we're trying not to only have four a year, but if we

have four little overflows a year versus major ones, or it may suggest that from a prioritization standpoint perhaps we should try to address larger outflows and catch the six-month storm and stick to relatively low costs temporary, or screening and disinfection solutions at more disparate locations.

MR. BRUECKNER: Food for thought.

One of the things that we were doing now as part of the evaluation, when we come up with a recommended alternative, we're going to run that alternative for the current average year, run it for the year and see how many overflows we get with that new proposed system. So that's part of the evaluation that will be done.

MR. BISHOP: You're talking about the number of overflows. I assume the way that's done it'll also tell us how big they are expected to be?

MR. BRUECKNER: Right.

MR. REITSMA: Just one more clarifying question. So when we talk about using the data about weather events, are we talking about large data, about past events up to the present?

MR. BRUECKNER: Yes.

MR. REITSMA: We are not looking at projections for the future?

MR. BRUECKNER: No.

MR. DOMENICA: Okay, I think that has been a good summary of the grey infrastructure, the questions to date, the parking lot issues. We're ready to move on to

the next item on the agenda, which is one of the parking lot issues, the critical one, and that's the affordability issues. And to address that, Mr. Turin from EPA, I believe has some remarks based on previous discussions in the workshop, Number 1 and 2, regarding affordability; is that right, Dave?

MR. TURIN: Even better than that, though, I brought Michael Wagner to speak to these issues because he has a lot more experience with regard to both interpreting the EPA CSO policy, which is another issue that we're discussing, and any affordability analysis, discussions that have come up.

MR. DOMENICA: Very good. You have the floor. And let's hold questions until Mike makes his comments.

MR. WAGNER: Is there a more precise question I could respond to, because this could go into a thousand different directions?

MR. BRUECKNER: I think the first question is the affordability process, the new policy. What changes are there that allow for

more flexibility? That was brought up. And the other is we are looking at what level of MHI median household income can be used to determine affordability? We're looking at going down the census tracts. Is it by one community, is it the whole region?

How is that interpreted? And then the second part of that question is how does affordability relate to achieving water quality standards? We had presented at a previous meeting based on our understanding of EPA policy that it's a requirement that for the CSO program we would need to spend up to our limit of affordability to do any program, and when we were done spending that limit of affordability and if we still didn't meet water quality standards, then we would be required to do something else to meet water quality standards

when we could afford it, and again spend to the limit of affordability. So the question is how does affordability relate to what we're required to do and meeting water quality standards.

MR. WAGNER: To begin with this is obviously a state led effort, and has been since the beginning. We, EPA, has been aware of

what's been going on, and has been following the progress. And initially, I must point out that EPA has never tried to step in or take more control over what the state has done because the progress to date has been consistent with the range of enforcement, or the range of progress that the states have been achieving, and overall I think everyone here knows that New England has been doing very well in dealing with water quality problems.

More expressly addressing the questions, the Clean Water Act was established as a mechanism for restoring our waterways. Essentially, the goal is and remains that we have water quality that allows for recreation and wildlife obligation across the United States, wherever that's achievable, and the water quality standards program was established

to provide encouragement and motivation and a background which allowed permitting enforcement efforts to achieve that goal. That goal has not gone away. We don't expect it to go away, and we do see some day in the future when people will be able to jump off the piers all over

Providence, and be able to have water that supports recreational use. When will that happen?

Obviously, we don't know, and it's happening at different rates around the country where resources are affordable. And we've all heard the story of Boston Harbor. It was, in fact, the dirtiest harbor in the country, and it was beyond anyone's wildest expectations that anyone would ever be able to swim in Boston Harbor in the Charles River. We're almost there.

It's phenomenal what can be achieved when enough effort is put into achieving that goal. So where does that leave us here? We have a program that is designed to get us roughly to four overflows a year, and our expectation, of course, is that program will be implemented. When it's done, if we can afford

to implement the program as designed, we're going to have a situation where we have a certain number of overflows a year, and we're going to then step back and look at those results and say, can we do better? Is there a higher level of control that's affordable or

achievable, and at what schedule do we get there?

So at this point, it's my understanding that we're looking at now, okay, so we have this Phase III. Can we afford to do it, should we do it, and what is the right thing to do? Again, watching what the state's done, we've been satisfied, and this is a process that we encourage all communities to go through when they get to this point. Where we are now in terms of deciding what is affordable is not substantially different from where we've been all along.

If you look across New England, there has been horror stories about rate increases. We had newspaper articles about two thousand, twenty-four hundred dollar a month rates in Boston that we've never seen, and we've never, ever tried to enforce anyone to get the

rates that high. We have rates in Springfield less than 1 percent of the median household income. Essentially, we're at that position because each step along the way we look at every individual community, we gather as much

information as we can about that community and say, what is the right level of effort from this community based on its population?

How that works in a commission type situation or an MWRA type situation is we looked at community by community and say, okay, if we are to adopt a schedule that requires a certain level of expenditure, what will that mean for rates to start with? And under the water quality standards program you're allowed to vary the water quality standards if achieving that water quality standards would cause widespread social and economic impact.

By policy, we look to wastewater rates as an initial matter. Say if anything goes over 2 percent we're going to presume that that's probably going to cause widespread, social and economic impact, so as an initial matter, that's a screening level. If it's going to go over that level, then we really need to

look closely at the community and say, okay, can this community afford to do that? And so far there's very few communities across the country that we concluded that we should be enforcing at such a level to cause that.

At the other end, where wastewater rates are less than 1 percent, we tend to presume that we can get up to at least 1 percent, because we've seen all across the country that even at that level communities with very low income proportional to their neighboring communities, that that is achievable.

MS. KARP: Could you just clarify something for me. When you say 2 percent to 1 percent, is it 2 percent of net income, is it 2 percent of gross income, or what are you talking about?

MR. WAGNER: I believe it's net income, so if you look at the taxable, when people do their tax returns they have an income, so we look at household income as a screening matter. So when we looked at rates in Boston, the only place I believe to date where there has been a change in water quality standards based

upon widespread, social and economic impact concerns is in the MWRA and Boston Harbor. To reach the decision point that we were going to accept the change that the state proposed,

again, this is not EPA driven, this is driven by states, where the state proposed a change in water quality standards.

We looked at the rate impacts on a community by community basis, and so there were a handful of communities in the MWRA district that rates were going to go over 2 percent. And that's the point where we said, okay, we will not at this point, we will approve a change in water quality standards that the state requested based on an impact of over 2 percent, for two or three communities in the Boston area.

MR. DOMENICA: Just to clarify that, are you referring specifically to the Charles River?

MR. WAGNER: The Boston Harbor, itself, has actually a change in standards. Portions of the harbor have been changed. In Massachusetts they have a change in the standards for Boston Harbor which means that we didn't envision any ability to achieve

recreational uses at certain portions of the harbor for the foreseeable future, so there was a change in the CSO, which means during the CSO events you don't expect the harbor to meet those

standards which would support recreational use. We have variances in place for other portions of the harbor, the Charles River and Mystic River.

In a variance, they use a specific decision that it would cause widespread social and economic impact to achieve recreational use of portions of the Charles River and Mystic River. In other words, it would cause rates to them to implement the level of control necessary, to achieve those standards would cause rates to go 2 percent for, again, a handful of communities, I believe, Revere, Chelsea, Cambridge, maybe Boston Harbor were in that situation.

With that again, that's the screening level. So if it's over 2 percent, we said based on what else is going on in the community at this point we're not going to seek a higher level of control through enforcement effort or a permitting effort, so we can change the standards. But that's a range,

and there's a great deal of emphasis now because of pressure from municipalities, municipal organization to recognize that even under the

water quality standards program, that's only a screening tool. To actually look at a community, you need to look much broader than our wastewater impact.

You want to look at economic opportunities, you want to look at other environmental pressures, you want to look at anything that is really going to impact the amount of resources available for that community, and more specifically, what are the demands on household income in that community. So if we're looking at landfill closures, we're looking at drinking water infrastructure needs, if we're looking at any type of community-wide costs that are going to impose a high demand on household income, then we want to be aware of that when we respond to a state recommendation to change water quality standards. So when we're dealing with a community that has 25 or 30, or even 40 percent unemployment, that's a fact that we want to be aware of before we again react to a state recommendation of water quality

standards. So we are aware if a community has a 40 or 50 million dollar need for wastewater infrastructure at the same time we're asking for

a 40 or 50 million dollar investment in CSO controls. We want to balance that before we make a decision, and so where rates are at .25 percent of median household income, obviously, there's going to be room for a pretty substantial increase in rates before we believe that it would actually cause any negative widespread social economic impact to achieve those goals.

On the other hand, if you're in a community that has one and a half percent of median household income of wastewater rate and they're facing a huge expense in other infrastructure needs like drinking water and landfills. But we're all aware of what basic needs that communities have. Then we're going to look very closely. So when the state comes to us and says, we see rates of 1.75 percent of median household income indefinitely into the future, and on top of that we have drinking water needs, and on top of that we're looking at a need to repave most of our roadways because

it's been 30 years since we've really had a wholesale improvement in that infrastructure,

then we're going to be very flexible in terms of a decision not to require a higher level of control on a combined sewer overflow.

So it's a concerted effort to be aware of all of the costs that a community is facing when we are dealing with a recommendation to change or not to change water quality standards. That being said, the goals of the Clean Water Act aren't going anywhere. So whether it's 12 years from now, or 15 years from now, or 20 years from now, we expect at this point that the goals of the clean water are still going to be there, and that we hope that some day every community really does want to get to the point where they can say, you know what, children, feel free to play in that water because we're very sure it's safe, and we have yet to have a community that's made an investment in their infrastructure, look back and say, gee, we wish we hadn't done that.

MR. DOMENICA: Mike, that's a very good explanation. There's one question there, and then a couple of others that I've seen that

I think we want to address while we're still close to the topic.

MR. WALKER: You spoke about widespread social and economic impact in making a determination, yet the only thing I heard you speak about is residential ratepayers and household income. Where and when does the impact on the nonresidential consumer factor into the equation?

MR. WAGNER: When you're dealing with changes in water quality standards, when you're dealing with industries which are substantially water dependant in a community that has an already fairly high rate, that's something that's reported to us. And for a smaller community, that is a real critical issue.

Sometimes there are communities that have two or three large employers that are very dependant on water, and the cost of water, and that gets reported to us, and that is a critical part of the information we need, and that is partly where unemployment comes in. We don't want to see businesses leaving town, we don't want to see businesses shutting down

unnecessarily because of an immediate need to

address combined sewer overflow, which, again, it's a delicate balance. There's no easy answer except to say that if you look at our water quality standard handbook, impact on industries is very much a consideration, and we would expect that if you fell upon the State of Rhode Island to recommend any changes, that if there is information related to industrial use of water in NBC, that that will be part of the equation that the state looks at.

MR. WALKER: If I can follow up on that, that's nice, but what about every other business that isn't a water-dependant business but is a ratepayer? And when I look at NBC's tariff and I look at the residential tariff and then I look at everybody else, the residential tariff, in essence, is subsidized by the commercial and industrial ratepayers to make the numbers work, and I see big numbers now, and we keep tieing back to what's the poorest in the neighborhoods so we can set affordability on the residential. But I don't hear -- although Tom said we're going to look at it, I don't see the analysis that says that we're also going to look

at the impact on whether or not we have a

competitive economic climate for businesses to be able to exist, survive, and stay and not leave the region, including region I, because our rates are so expensive.

MR. WAGNER: And I would say that EPA would never say what you're saying is not important. In fact, it is important. And what I think what you're hearing out of headquarters is certainly what we have tried to do in region I, is take into account information that you're suggesting. And so if the state, if it's important to you, presumably, it's going to be important to the commission, and presumably it will be important to the state when they make recommendations.

And if the state comes to EPA and says, look, here's the issue, we looked at wastewater rates in North Carolina, and we're looking at wastewater rates here, and we have x number of businesses that are borderline, and they have opportunities to move elsewhere, that's a key piece of information for the state, and as such, it's going to be the key piece of information for us. We do not, and again,

that's the extent of the emphasized look at water quality standard decisions. We want to know what the impacts are across the board. If it's material to the economic status of the community, whether it's industrial, residential, or commercial, then it should be factored into the decisionmaking, and so I urge you, with that information, as the state looks at its alternatives, make sure the state has that information, and we're going to look at it, too. If there is a change in water quality standards, then there's going to be close coordination between EPA and the state.

But primarily, again, it's going to be a state recommendation, and we're going to be very deferential with state decisions as long as they're the area of us. But again, this notion that EPA demand that you spend at least 2 percent of the median household income and anything less than that is not sufficient and we're going to make you continue spending up to 2 percent every single way we look at this without consideration of anything else, is not accurate and it's not reflective of where we've been so far. Again, we look across New England,

and while we have been -- everyone knows here we've been fairly aggressive on overflow litigation, we've done it in the way which we hoped that's reflective on the information that we're getting on the economic impact, and we've tried to avoid causing rates to go over 2 percent. I don't think there's anywhere in New England when you look at actual costs where the rates are over 2 percent, and in many communities they're at one, one and a quarter, or slightly higher. And that's been our goal, and it will continue to be our goal. And I want to emphasize again, it's been primarily the state, and we intend to work closely with the state, support the state where it wants to be supported.

MR. BRUECKNER: Mike, I have a specific question for you. So when the affordability analysis is done by us, we then present the report to the state, because as you mentioned the state is controlling the program. Who makes the decision about whether or not what we're proposing is affordable, is it the state or is it EPA?

MR. WAGNER: In the first instance,

it's the state standards, and so we are not going to step into the role of the state and say, we think this is affordable, and anything less than this is unsatisfactory. However, if the state comes to us and says, look, we've looked at it, and 10 years from now the rates are going to be 3 percent of median household income, but we want to change the standards anyway, then likely it's going to be a negative reaction from EPA.

So all I can say is initially, it will be the state's decision. But there are guidelines that we have to look at, they're very flexible, as it stands, and we do want to look at all the impact. But in the first instance, it'll be a state recommendation, and then we will have to look at it. And just one last thing:

The requirement that the state continues to look into the future comes from the regulatory program which is every three years there's supposed to be an evaluation, the state's supposed to do an evaluation of whether or not further controls are achievable to obtaining the goal uses of the Clean Water Act.

And so, again, that will be a state led issue. And so in the first instance, in every case, it is the state recommendation to which EPA will react. It should be significant to recognize that this hasn't happened.

We haven't changed water quality standards anywhere else in the United States other than Boston based on CSO controls because there has been a concerted effort to make sure that we remain within the economic capacity of communities. And as we bump up against that capacity, as we appear to be doing here, we want to make sure that we're making decisions.

It would be a shame to make a decision now that here's so much we can afford, and so we're going to spend that, and we're going to stop now, and then recognize that 10 years from now we're going to relook at that, and if we relook at it, will we have then decide that we wasted money now. So we should be looking beyond three years, five years, and ten years. Let's look into the future, and is there a way that we can achieve our goals at the rate of progress that communities can afford. And it doesn't mean that every three years we're going

to stop and say, okay, let's do something different. Where we ended up in the variances of Boston, is we ended up with a 15-year window where we said, okay, this is it, for the next 15 years this is all we're going to expect to do, and nothing has changed.

And after that period, there was going to be an evaluation of where water quality standards work. So I'm not suggesting that we go look at everything three years, but it makes sense to do that when you are looking far enough into the future.

MR. DOMENICA: Mike, thank you. One quick comment, and then there's several questions, and I think we have about five more minutes here, or maybe ten. We could take a long time here.

Just in perspective being involved in this area for 30 some years, what Mr. Wagner has just related as EPA's approach to affordability is substantially more flexibility than what it was 10, 15 years ago. When affordability guidance first came out, it was pretty much by the numbers then. This is much more encompassing and flexible, and I think an

appropriate approach to look at all of these issues in the community as opposed to just Clean Water Act to find Clean Water Act capital expenditures and/or operating. But just to drill down on the MWA Boston Harbor standards change, it went from a B to a B CSO, but just tying it together with your comments on the triannual review of that, that is tentative. It's re-looked somewhere between every three years and every ten years, so it's not the final, necessarily final determination there. It could be the economics changed. So this is linking together from interpreting that correctly to the discussion we had at the last meeting as to how long do you have to keep spending. And there's a fact that you do get, as in Boston, the only case in the country that changed its standard, still doesn't mean that you're at the end of the line. Is that correct interpretation.

MR. WAGNER: That is correct. But, again, when we approved the variances, EPA rightly or wrongly approved variances for 12 years. We essentially said looking ahead, we've seen 12 years for nothing. It could change

dramatically enough to allow for a high level of control. So we approved variances that were going to be submitted every three years in advance, knowing that things weren't going to change.

MR. DOMENICA: And that was a negotiated settlement.

MR. WAGNER: That was a negotiated settlement. And so I would say that we know enough now about how quickly economic conditions can change that we can look 10 or 15 years into the future and say nothing is going to change. And so based on these resources we have, a decision, do nothing for the next 15 years and wait until we can take a high level control, or to take a new approach and say, okay, this is what makes sense now for this community. And we don't see a higher level of expenditure between now and then. So unless the Clean Water Act changes, that's the way it was written to work to see reasonable future, reasonable progress toward our future goals. And so what we encourage, and we just had a conversation, if you will, with the State of Maine over a

decision to put in $40 million dollars worth of

storage into a community where it looked to us like resources would allow ultimately a higher level of control, and in looking at that and based on those resources, did it make sense to look back and say, well, we're glad we did that. But the state looked at it and said, yep, this is what we want to do, and so while there was room for a debate, and it was within the parameters of what's reasonable, so we said, okay, stepped back, and let the state implement the program.

MR. DOMENICA: That gives us some hope here. And Carolyn has a question, John. I'm going to just let Angelo go first because being a regulator, he may from a state's point which has primary in Rhode Island.

MR. BISHOP: Can I just have a point of order. I think, especially because Mike is here, this is a real critical issue, and I have a question and didn't want to jump in at first. I think a lot of people may want to continue this after the break even if it means we don't get to the entire presentation on green infrastructure.

25 MR. DOMENICA: Let's consider that

1 during break, but Angelo is the regulator here
2 of record.
3 MR. LIBERTI: First of all, last
4 time the CSO stakeholders convened, we did put
5 forward a water quality standards change. We
6 put it up to EPA, and we said we want to
7 designate a partial use designation. I don't
8 want to get too technical, but there's a
9 difference between a variance, a slight
10 difference between a variance and a request to
11 change water quality standards.
12 Both of them, though, have to get
13 re-looked at every three years, so I don't want
14 to get too much into that. But we did take the
15 three-phase plan, changed our water quality
16 standards, and said these waters are not going
17 to meet their standards when we exceed the
18 volume of this three-phase plan, and that will
19 be okay.
20 That's what it means to meet water
21 quality standards. It's really misknown. When
22 we say meet water quality standards, that's not
23 what we meet when it comes to CSOs, unless you

can do complete separation, which we really are not talking about here. When we say in this

context, meet water quality standards, what we mean is we've spent enough money to meet this threshold and we've gone to EPA and we said, within your guidance, within your national consistency, we believe we've met that target, we're going to change our standards.

Well, when we did that back at the end of the first stakeholder's process, we did know that we weren't there. We were close, but not there. NBC had looked at a lot of these factors, then we talked about impact on business, the unemployment taxes, as I recall. They were looked at in a sort of generic way, how do they compare nationally.

There's not a bright light anywhere in this process. So I'm not faulting that EPA should have approved it when we submitted it, but we've been through this process. If you look at our water quality standards, you will see that we have a partial use designation for CSOs, and we actually applied those to waters north of Conimicut Point. They're still there, but they're not approved by EPA. We didn't go

back and take them out of our rules, but we understand that they're not really legally

applied at this point. So I did just want to clarify that. Frankly, whether it's worth the effort of trying to officially make that change, is something I really question now. When we wrote the consent agreement with NBC, it had this reassessment, and it said that we were going to reassess it and change it as needed to meet water quality standards.

So as that document exists, we're supposed to, at the end of this process, do whatever it takes to ship up a request to change the standards and have EPA approve it. But the presumptive approach that we hear about is what 99, or everyone else in the country except Boston Harbor did.

They picked a plan they liked, they looked at all these factors and said, I don't care if EPA's going to approve the standard change, I'm not even going to ask them, I'm just going to proceed. And that's what most of the country did, this presumptive approach where you take all of this into account, and you just

proceed, and when you're done, then after you've built all your phases, you'll take another crack at it. And I think in the end this is something

this group needs to understand. When we get to the end, are we going to put this effort of shipping it up there and asking for formal approval, which is good for maybe three years, technically, or are we just going to march on, and we understand we're doing it under this presumptive approach because we think it's the right thing to do, and we'll deal with the legal technicality down the road.

MR. DOMENICA: Just to summarize, if I might. What you're saying, or what I'm hearing is that there's water quality standards, and then there's water quality standards. Mike's talking about national use, goal uses, fishable, swimmable everywhere that's in the Clean Water Act.

That's not going to change. It's going to be fishable, swimmable, and then those are the final standards right now. However, practically, as you go through these programs, you set standards, water quality standards, where it says, yes, you obtain water quality

standards, but they always have either a variance or a three-year or a twelve-year review of that, such that they're interim standards,

64

and as soon as the affordability picture changes, you could then spend up to again, back up to the affordability level to go higher up that curve to get to that ultimate fishable, swimmable goal; is that a correct characterization?

MR. WAGNER: I'm not going to argue with you. I don't want to say that's correct, but I'm not going to disagree. I think the key piece of that, and is consistent with what Angelo is saying is that as long as communities are making the progress that the state thinks is adequate and it's in line with what EPA might do if it were the primary enforcement agency or permitting agency, then we haven't seen any nuclear wars.

We haven't seen citizens stepping in and suing communities. I think there's just a realization that the goals of the Clean Water Act are -- it would be nice if we had an economic climate in the country that would allow

us to put some resources in to achieve those goals in the next five or ten years, but that's not happening, we're not seeing that change. And so as long as commissions, if you will, are

going through this process, they're doing what appears to be the right thing, or at least it's within the range of what we would expect the community to be doing, then there's not any over-filing, there hasn't been any disagreement, and so do we want to get into the niceties of actually formally changing the water quality standards, going through that process, having the debate?

It's up to the state that they want to do that. We've only done had it once in the country, and it may not be the right way to proceed. And frankly, there's, I think publicly it's been known that there's been a disagreement about this. The overarching policy of headquarters, EPA's headquarters, once you achieve your level of control in 15 years, extend whatever you can within 15 years, and everyone should be able to meet water quality standards.

But that's not the reality we've

been dealing with in region one. The reality we've been dealing with is there's been an intermittent process, where we have Phase I, Phase II, Phase III, and we're only at the point

now where we're achieving the level of control that appears to be easily affordable. So the decision on what to do next is coming down to processes like this. And we don't want to be in the position of saying you need to do a whole lot more now, and we don't want to say you need to go over 2 percent of median household income, or you're only spending one and a quarter of saying you ought to be able to go up to one and a half percent.

So that means you're likely to undo half of what you just spent, and we don't want to be in that position. We also want to encourage commissions not to be unnecessarily drawing hard lines that are undoable later. So whatever progress is made now, should be -- we ought to be able to build on progress now, and this is why tunnels seem like such a great idea.

And I'm not saying I'm trying to encourage you do to one thing or the other, but

when the state made the decision to go with tunnels and get down to four overflows a year, even at that point if they'd come to me today and say we want to change the standards, I think the answer would have been no, because frankly,

it appears to us that there are slightly more resources available, and major tunnels could be 20 percent bigger, but that wasn't the game we were in then, and we're not in it now.

MR. DOMENICA: So the bottom line here, which I think is pertinent to this Phase III evaluation is, correct me if I'm wrong, but Phase I and Phase II tunnel interceptors meet the interim water quality standards agreed to in that process by DEM and EPA, however, they are not necessarily done. Phase I and Phase II could be reopened based on affordability, future affordability changes?

MR. LIBERTI: Not really. I don't think it's fair to characterize it that way. It was agreed that we were to proceed to Phase I and Phase II without making a determination of whether it met water quality standards. It was deemed to be the right thing to do, and that we were going to move forward, and we were going to

reassess it, and if necessary, change it so that it would meet water quality standards.

MR. DOMENICA: However, what I'm hearing EPA say is that if you had submitted that --

MR. LIBERTI: We did submit it, that's what I explained. We did submit it.

MR. DOMENICA: If it had carried through, they would have said no.

MR. LIBERTI: They did say no. They did a hypothetical, this is real life. We submitted it, that's what I was trying to explain, knowing though, I think all of us knowing that it did not really pass the test, it wasn't 2 percent based on the projections at the time, and we all know the numbers have changed, but at the time it really didn't meet the threshold, but all the work was done, it was fairly close, so we submitted it.

We made the change, we asked EPA to approve it, and in the end, we had some meetings, they denied the request to change it, and we modified language in the consent decree, it was drafted at the time, so that it would

encompass this approach. And we're going to look again in the future, and we're not going to say anything right now, anything more, but they did deny what we requested to change officially, and the consent agreement was the compromise.

MR. DOMENICA: And that's a good

point, and I think this is a good understanding, because the key point here, Mike, and correct me if I'm wrong, but EPA, region 1, EPA headquarters, Department of Justice may have different goals than the states.

And I think that if you look at a case like Milwaukee where they started a tunnel program in the '70s, spent two and a half billion dollars on a tunnel program, and my understanding is that EPA has now come back to get to one, I believe, overflow in a year because it was near Chicago's water supply, EPA has now come back and said we think you can do better, so that tunnel isn't sufficient, and they're now doing more under their CSO/SSO program to get there. So I think this is a good context to put this in, so we're looking at Phase III, but Phase I and Phase II still have some questions there. Carolyn.

MS. KARP: Mike, I have two comments: I want to address three Mikes, so this is very convenient here. I want to address Mike Walker, first of all, in that role of commercial activity with respect to CSO abatement. Many businesses in Rhode Island, in

fact, have lots of pervious surface, unless what we're dealing with is a combination stormwater and sanitary flow, so to the extent the private sector contributes to stormwater, they have a secure role to play in this. That's minor.

The bigger issue is the goals of the Clean Water Act front end actually says, the goal is restore the chemical biological integrity of the nation's waters. And then it has three legs. And one of those legs is we're going to eliminate discharges by 1985. That was going out to municipal wastewater.

The second one was fishable, swimmable. All of your comments that addressed fishable, swimmable, and the third is no toxic and toxic amounts, and I actually, because we have these three goals, it means, of course, the state's obligations are going to change over

time because we're basically trying to restore the water quality of the nation's waters and the ecosystem, not just water quality, not just so they can fish and swim, but to try to restore the entire system. So of course these standards are going to change over time, and asking the EPA to say, well, we've reached the end of all

these tunnels is fair, given that the Clean Water Act did meet that. So I actually, also then want to get to this point of the third leg, which is no toxic and toxic amounts. And I would like to make a request to have DEM and EPA basically talk to this group about looking forward 10, 20, 25 years that the issues facing, say Narragansett Bay, be contributories because I can look at it ecologically and say, we spend a lot of money at this, but it's not bacteria that is causing harm in the Narragansett Bay. We've got other problems going on Narragansett Bay, we need to address those, and the Clean Water Act is relevant in where we spend the money.

And I would like to hear DEM and EPA say if we actually went after no toxic amounts and we try to protect the ecosystem,

here's what we do, here are those costs. They need to be factored in as we're looking at CSOs. One last point about CSOs. I would like to have you, Angelo, or one of the other Michael's address this. I hope we're not looking at a point in the future where we think we're going to have fishable, swimmable standards right at

that outfall where the sewer treatment plant is. That's for the birds. I think a reasonable civilized society is always going to have some waters that are considered to be non-fishable, non-swimmable because we've made choices about other economic priorities. So there are areas that will clearly always going to be clean waters or water, and we're not going to aim to clean those up.

MR. DOMENICA: Mike, you can answer that in a second. I think the first point on the toxics be looked at that parking lot, Tom. It's just something to consider going forward with the planning. Regarding the second point on the fishable/swimmable. I had a question: Maine allows wastewater plants not to disinfect in the winter.

A lot of good reasons for it. So what they have is a parameter specific, bacteria specific preclusion from water quality standards for very good reasons that last six months, or plus or minus of the year. That seems to me to be -- I'm wondering, maybe it's a question, is that the kind of option we should be looking at for CSOs? It's been in effect for a long time.

It's a parameter specific excursion, or whatever you want to call it, water quality standards, that is permanent and reasonable. And when we're dealing with large events, which we're dealing with here in a complex heavily populated urban environment, should we be looking at something like bacteria in the same way that they look at it in Maine.

MR. WAGNER: Without knowing a whole lot about the rationale and specific permitting decisions, I believe that the seasonal use with bacteria has to do with various levels of recreational use in the wintertime, and so what we're not doing is impacting expected uses of the water. The problem with CSOs, of course, is that they happen in the summertime too. And so it's, I

think it would be inconsistent with, or certainly not consistent with what's going on in Maine, say during a CSO event.

MR. DOMENICA: I'm not talking about the specifics, you know, wintertime event in Maine when there's no use, but the principle of what happens in large storms.

MR. LIBERTI: I would have to say,

first of all, we have looked at it. Our wastewater treatment plant, I would say nearly every one of them if we allow them to not disinfect with the current shellfish use. We have a lot of wintertime sailing, frostbite sailing activities that go on in the wintertime, kayaking, things like that. So we have, you know, at DEM, taken a look at that idea for wastewater treatment.

Right now, NBCs not chlorinating any CSOs except to the wet weather treatment facilities at the treatment plant, and those are being disinfected, and again, at those two locations, I think you'd find water quality impact if we allowed them to stop their chlorination, dechlorination process.

MR. DOMENICA: I'm not detouring that we should use a bacteria waiver for wastewater plants, I'm saying the principle for parameter specific exclusion for certain parts of the year i.e. certain large storm events, when there's probably not going to be recreation anywhere, is that the principle that could be used here? And think about it, because we're beyond time. And Jan, you have the last

question here, and then we'll move on.

MR. REITSMA: I think I'm guilty for causing some of this discussion by objecting to something that was said a few meetings ago about the affordability policy. Well, they're trying to be balanced, so I'll start out by saying I appreciate the frustration with the cost of wastewater treatment and with a regulatory system that feels like you never done.

I think those are very legitimate frustrations I submitted, but it's something that it should be a collective frustration. It's not something that one party inflicts on the other, it's something that we all inherit from the Clean Water Act, and there is a reason

for it.

I'm going to end up suggesting that the affordability principle or policy does not stand in the way of us working together towards perhaps a better way of finding solutions, and I think we're losing that perspective the way we're going about this. To be very honest with you, I'm a ratepayer, too. I listened to this conversation. I have a really hard time with

it. I think that we're in a rut. We're doing a lot of finger pointing which doesn't get us anywhere. We've been doing this for years. I've been listening to people running wastewater facilities for years, basically, accusing regulators of all kinds of things, I have to say that in Rhode Island people are incredibly polite, you might even say friendly compared to people in Worcester, but you're not getting anywhere by doing what you're doing.

It's not as if people in EPA changed yesterday, they changed 10 years ago. They're as interested in finding solutions as you are. So let's stop already. Let's not do this blaming game. EPA is as interested in

finding solutions that work. They're not interested in ignoring the business interests, and it doesn't help for commerce Rhode Island to suggest that it doesn't care, or it's not looking at information. It's false information. I'm sorry, Mike.

Get with it, read the documentation, and let's look at EPA as a partner in finding a solution, saving those for DEM. I think the idea is not necessarily to

keep doing what we're doing, design upgrades in such a way that three years later, or five years later we're doing it all over again. There are beginnings of ideas here that could be much more proactive, much more long-term solution if perhaps we do different things like not just relying on data from the past, but looking into the future.

If in fact we optimize proactive alternative solutions instead of only the hard technology solutions. I don't believe for a moment that EPA is not interested in that. I happen to know they're encouraging that, even though sometimes they got flack from the environmental community for it. They're willing

to risk something. And my suggestion is that we look at it as a challenge that we share. That was the gist of the remarks that I made in the beginning that I don't think were captured very well in the minutes, but I suggest that is the way we move forward.

MR. DOMENICA: Good comments. It's fun being moderator, jump in whenever you want. From a personal perspective, taking off the moderator hats, having worked with EPA, region

1, and Angelo with a number of places in Rhode Island, there has been dramatic change and productive constructive change in how EPA and how the states work with communities, and I think that not only in affordability but in integrated approaches in looking at different technologies.

In a whole draft of ways there has been much better understanding that's come about the last 10, 12, whatever years with regard to this. While it may appear contentious, this issue about water quality standards and affordability is a serious, serious tension point, and it's a constructive tension point in

a way, it's a dialogue that has to be had.

We shouldn't shy away from it, don't be afraid of it. It's a good dialogue ahead. And as Mike indicated in his comments, it's something that is not cast in stone. They look at each community individually, and it does get customized to each community which is a big, big step forward, but it is absolutely critical. And while residential customers have certain gripes, business entities are a major portion of this. Who is representing the electroplaters at

the table here?

MR. BRUECKNER: No one this time.

MR. DOMENICA: Why were they here before?

MR. BRUECKNER: They were being regulated, and they were a big part of our ratepayer base.

MR. DOMENICA: This is one of the issues that comes up. As industries move out of the northeast, where does the burden for the fixed costs of utility go, to the residential customers. So what we're seeing here is a dynamic situation where all these things have to be dealt with seriously.

We just can't say Kumbaya and throw this issue away. It has to be worked out in this project. And it's serious to ratepayers, residential, commercial, to water quality. And I won't go on there. Having worked in different parts of the world, the Clean Water Act and what EPA put forth in the Clean Water Act and what it's regulated now and implemented over the last four years is absolutely phenomenal compared to other parts of the world, incredible. I can't believe that they wrote that in 1972. It's

amazing in how it's made the U.S. brought us forward environmentally, but it's been through this battle that goes on, which has to be constructive, has to be polite and respectful, but it has to be there. So with that, any other critical questions here?

MR. MANCINI: I think we have a little say in this since we've got to approve the rates and the infrastructure monies that go to fund these projects. A little background if anyone doesn't know. The debt service right now for NBC is about eight hundred million, just to throw some numbers out.

The rate base right now is closing in on a hundred million. I'm not that old, but when I started it was $20 million. So just to give you an idea where the rates have gone in the last 10, 15 years, it's just incredible. Now I understand this project has to be done, and I agree with that, but they need to take a very good look at the affordability as it is today.

As we speak, there are people getting shut off, and I get a lot of those calls. They just can't afford it because the

rates are going up so high, and I understand that the project needs to be done, but certain things need to be looked at, especially the debt service.

The debt service right now is at eight hundred million, but some of that debt was issued in the beginning of Phase 1, which was started, I believe, in '99, or 2000. And what it looks like is a 20-year period of debt service. As the original debt starts to get paid off, there will be monies available to start Phase III.

The problem that the division sees

is it seems that NBC needs a little breathing room before some of this debt gets paid off, so, in other words, starting this project in the next couple of years or three years, or whenever it's anticipated, the problem is that initial debt is not going to get paid off yet, so now you have to increase the rates until that original debt starts to get paid off.

So it seems like there could be some type of balance that either could get held off for a couple of more years, or a few more years, whatever it takes, to try and balance out

some of that rate base, so the original rate can somewhat stay the same, or it can offset some of the increase over the next 10 or 15 years.

MR. DOMENICA: That's a very good point, because oftentimes we look at affordability as a snapshot. And some of the things utilities need to think about is looking over a 20 or 30 year period in terms of trends, as well, affordability as it changes, so that's a good point. One more comment from Brian. He's been very patient.

MR. BISHOP: I guess I'm struck,

and I think I really would change the tenor of my approach, given what Jan had to say and Mike's invitation not to say Kumbaya. I believe number one, I think he spoke about a decade, and of course, was more than a decade ago, or thereabouts, when we started this. And I would say that the process pattern at NBC had something to do, along with many others, in terms of opening a better dialogue with EPA.

So that maintaining a skeptical presence regarding, you know, how reconstructed and flexible and sensitive to broad parameters EPA has become. I mean, I'm from Missouri on

that question. And I think I need to defend Mike Walker in that respect because it has been 10 years, and the trigger we're using is still 2 percent of median household income.

Now, I think people may adduce that, you know, household income is related to industrial progress or, you know, that type of thing, but the reference, particularly to unemployment and water-dependant businesses, I have to agree with Mike, you know, illustrates, perhaps it's an attempt to answer a part of the policy or approach that has often come up in

your considerations.

But what Mike refers to is not only an issue with EPA, I think it's an issue statewide in terms of policy, about what gets paid for by business and what gets paid for by residents in terms of the cost of operating public infrastructure, and I would hope that the considerations then that EPA affords don't take place in a vacuum, but recognize that it's been traditional in Providence, but part of the major service area businesses are taxed at twice the rate of residences. In fact, it was more the loss that it could be more of that than it was.

They're finally trying to walk that back. So I think Mike reflects, you know, a concern that any time government needs to get something done, that the effects that's expensive or, you know, threatens a cost to the voters that those costs, like a seawall to protect the voters, tend sometimes to place those costs on the businesses.

Now, and I'll add, though, that remarkably I agree with perhaps 90 percent of what Carolyn had to say about trying to sort

priorities in these wastewater investments against other things. I might not agree with her which particular pollutants I'm losing sleep over at any given moment, but my recollection of the process and Angelo, I think, said it very well.

Nobody thought in a sense that we were illegal or had crossed off whatever number of CSOs we did in one and two that we never had to go back. I never thought that was on the table in the original process, yet I think it would be completely disingenuous for those of us who thought we were going to take a hard look at Phase III, and then Phase III was by no means a

fate accompli in any sense, even if it was theoretically affordable. It would be absurd of us to suggest that there's never, you know, a lifetime is going to be reopener on one and two, and I think it will just have to wait for the considerations of cost from this body to determine whether we would really be looking to Angelo and DEM to look for the kind of situation that occurred in the MWRA area and in any more formalized relation, or whether we're going to go forward, really charting our own territories

I think we did originally, and I think that's enough said.

MR. DOMENICA: One last question.

MR. HOLMES: I have a fairly simple question for the DEM or EPA. Has anybody spoken to the shell fisherman that has been put out of work because of the combined sewer overflows? Has anybody spoken to the shell fisherman to find out what percentage of their income they have lost because they have lost access to fishing grounds? I can guarantee you it's well over 2 percent. As a matter of fact, I had to quit, and get a real job because I couldn't make enough to live on quahogs anymore because I

worked out of the Warren River, and when the upper bay closed, I had to go all the way down to Narragansett Bay, and instead of burning a gallon, a gallon and a half to get to my fishing grounds, I was now burning six to eight gallons of gasoline a day.

Back then it was probably 2.50 a gallon, or something, but it made a big impact when you're making a hundred dollars a day in the lower bay and making a hundred and fifty, or

better, in the upper bay. It makes a difference. And it's way more than 2 percent. Has anyone gone to the shell fisherman, gone to the docks and say, how much of a difference does it make to you if the upper bay is closed?

How much of a difference does it make to you when you lose grounds like Hundred Acre Cove and the Palmer River and the Kickemuit River? The Kickemuit River was open for 350 years, granted the Providence sewer plant has nothing to do with that, but it makes a difference in the Barrington River and the Palmer River. I had a two thousand dollar week in the Barrington River one year. Holy smokes, are you kidding me. That was huge. And

Carolyn, if you want to know what toxics are going into Narragansett Bay, you need to talk to the Narragansett Bay Commission to the pretreatment program, and find out, because the toxics going into the bay in the last 20 years have dropped by greater than 98 percent, so talk to them.

The only person today that has mentioned shell fisherman as a viable job is Angelo. I've heard it once. Fishable, what is

fishable? Is that bass, bluefish, what about shellfish? It's a fish, it's a mollusk. Rhode Island is increasing. Its agriculture is growing by leaps and bounds. There's a guy down in the Matunuck, the Matunuck Oyster Bar, have you ever been there.

He shucks his own oysters. He grows them in the pond and he opened a restaurant, and he's got a huge -- I mean, people stand in line. I've stood in line to get into that restaurant to eat that guy's oysters on a half shell. I love them. When I get an opportunity to go someplace to eat I can afford, I drive all the way around the state, and who does that. I don't even stay over night on the

West Bay. I drive back home again. Nobody in Rhode Island does that, but I've done it. My question is, have you talked to the shell fisherman in Maine? Soft shell clams, Boston Harbor, soft shell clams. They're million dollar industries. Has anybody in this room thought about that? I know I do, that's why I'm here.

And I've been doing this since

December 18th, 1989, when I went to room 315 in the State House and spoke before Jack Reed when he was a state senator, and a guy named Norton from Fall River about pollution, and what are we going to do about point source pollution and non-source pollution. There's more to this than fishable, swimmable and how many jobs inside Rhode Island Commerce, but I know your jobs are important, but my jobs are important, too.

MR. DOMENICA: Thanks Phil. Well, I think this frames the issue very well. I think there's been a lot of understanding, good points raised here and good discussion. Mike, any comments, any final comments?

MR. WAGNER: I would say that we do consider shellfishing in a lot of our actions,

and we don't necessarily talk about it publicly, but the word fishable is intended to include any type of environmental life, if you will.

MR. HOLMES: Just use that word once in awhile, just for giggles.

MR. WAGNER: In dealing with Gloucester, we hear a lot from the shellfish industry. And you can see the difficult position that the agency is in with having to

respond to the pressure on your livelihood and your very existence, and on the other hand, other pressures. And that's the balance we're taking.

It's because of interest such as yours, it's because of interests such as yours that we didn't say yes to Rhode Island's proposal to change water quality standards, right, and that's why we're suggesting that we don't want to necessarily change those standards, we want to continue making progress as much as we can. And the thing is, which is slightly contradicting what I'm going to say to you now, neither did we come down here and say to Angelo, Angelo, you wimp, what the hell are you doing, you can do much better than that and

much faster. This is the balance that we're looking for communities to make, and we haven't drawn a line, and say, this is good enough. And your expression of interest, I hope, is balanced in the decisionmaking. Okay, how quickly can we get there? And that's kind of a dilemma we're looking for. We want to get there as quickly as we can, not be too overbearing, recognize that

we've got a lot of conflicting pressures here, and as long as we keep making progress, we're heading in the right direction.

MR. HOLMES: I just want to say that what the Narragansett Bay Commission has done so far, we are very pleased with, because it has made an impact and access into the upper bay. Do we want to see more, yeah, we want to see more, but it's not just the Narragansett Bay Commission that needs to do it. We need to look at some of the cities and towns around here that have gotten soft on sewer connection, and stuff like that.

MR. DOMENICA: Good point, though. Just to get to your point about shellfishing, the reason why bacteria is probably the primarily driving pollutant here is because of

shellfishing, the reason the focus is on bacteria is for the shellfishing business. There's a lot of other issues here. And Carolyn, we have to move on. Montgomery Watson is going to be pressed to get their presentation in in 50 minutes on green infrastructure. So let's take a 10 minute break and come on back.

(SHORT RECESS)

MR. DOMENICA: That was a great discussion with excellent points, but we need about five or ten more minutes to cover this. If you have to leave the presentation will be on the website. Please look it up and follow through it so we're ready for the next stakeholder workshop. Rich?

MR. RAICHE: It might be a little difficult to shift from far-ranging policy discussions, and I think everyone intuitively here may have a very large indication on what we're talking about for Phase III and beyond, to some detailed engineering-type analysis here, but I think in the spirit of what Jan had said, I think the idea now is to move forward collaboratively and try to look at some innovative solutions, both in the near term and

long term, so I appreciate your attention here as we go into the next three hours of our presentation.

(LAUGHTER)

So we'll start with just an overview of where we are in our stakeholder engagement process, and give a general overview

of green stormwater infrastructure, which is the title of today's topic. In the context of the CSO program, we'll spend most of our time getting down to some details for how we actually may apply these in the Phase III areas, and then zoom back out, and describe to you how we're able then to from the detailed analysis determine what the area wide benefit from implementing GSI throughout the Phase III area, and how that translates to CSO benefits.

We were hoping to wrap up today's discussion with a summarization of our discussions here. We may push that detailed discussion to the heart of the June meeting where we end up.

So, again, last month we focused on developing grey alternatives which Tom hopefully summarized. For the head of this meeting today,

we're looking for grey infrastructure alternatives. The idea of sort of widening our focus, looking at a wide range of options and what they look like in the Phase III area.

The next two meetings will then narrow that down, evaluating those different options and alternatives to then try to work

towards a cohesive plan. And our time frame here is that we do that by the fall.

So our format again will issue a category of GSI, described in general some of the advantages and disadvantages of those technical approaches, and then dive down with some examples, specifics, because in general, in my view, talking about these things in abstract terms doesn't lead to the sort of conversations as it does if we have a specific example, or even sort of put meat on the bones, and generate some decent discussion.

Again, invariably, as we start looking at those details, we may start venturing into discussion of how to evaluate those options, those alternatives. That's not the focus of today, that's the focus of the June meeting. It's great to have those ideas,

because again in the abstract it's hard to do those, what your evaluation criteria are, so if they come up, please do offer them. We'll put them in the parking lot, and it will become the basis of the June meeting.

So before we get any further, I do

want to put this in the context of the regulatory context. While we are sort of on the leading edge looking at the green stormwater control of the CSO program, we're not in uncharted territory.

EPA, particularly on the enforcement side, has been a big proponent of incorporating these sort of green stormwater controls throughout the watersheds in efforts to reduce CSO volumes, and particularly seeing them as having other benefits in the watershed in terms of community benefit and reduction.

EPA is a champion of this, and I will not read all of this -- these handouts will be on the website in case anybody does. But in terms of how to incorporate this guidance and how to incorporate into a long-term control plan. The big takeaway from this, and I think a question that needs to be answered is that in

general, in very few rare instances could GSI be the total encompassing solution for the CSO program. EPA's experience nationwide is that GIS can help reduce the size of associated grey infrastructure to control CSO discharges, and tend to be a cost benefit in there in terms of

reducing that grey infrastructure.

But in almost no cases are there any examples where the green stormwater control can entirely eliminate the grey alternatives. So these things really need to be done in concert of each other. Again, our focus today is in the Phase III areas, so we're looking primarily at Central Falls, Pawtucket and a few adhesives of northern Providence.

Now, so when we're looking at grey infrastructure alternatives and designing them, it is somewhat simple because it is the source pathway receptor model that we talked in the first meeting, it's a respecter type of solution.

You're at the end of time, you know what your CSO volume is because you have a pipe discharge and you can size your infrastructure around that. When it comes to green

infrastructure, you have to look the other way around. You have to look out in the region of the watershed because you're looking at source control, and determine from an ecological technology standpoint, what can be done out in

that water shed to reduce stormwater flow into the combined system, and then work your way down to the end of the pipe and figure out what your CSO benefits are.

So we've got three sort of major categories that we can think of. I'd like to break things in sort of sizable chunks that we can discuss it. Infiltration is the sort of main approach that we prefer. Again, the idea behind this is trying to mimic the original natural hydrologic cycle, increasing the impervious area that then increases runoff. We're trying to reverse that.

So the idea is to keep the rainwater as close to where it falls as possible, and infiltrate it into the ground. These are typically intensive systems that do require a lot maintenance, because you do need to maintain the permeability of a pavement or a soil matrix if you have sort of a planting. You

don't want any of that to get compacted and then become hard and promote runoff. So you have quite a bit of significant ongoing maintenance to make those things continue to work.

Then the next sort of stage is the

detention sites. This could be along the lines of detention basins that you see in subdivisions that temporarily holds water year to year, is that you're not entirely keeping runoff from getting into the combined system, you're just detaining it during those periods of time when the interceptors are stressed, and that's what leads to the CSO. So you hold it for a while and then release it later when you won't be having a CSO event.

The final group and that, of course, requires some moderate maintenance to keeping silt out of the basins or whatever of the particular technology is. The final category is retention where you keep things on site and then reuse that rainwater for some other purpose.

This is difficult to do in a retrofit situation where we are essentially here with these developed areas. These are the sort

of things that you hear in terms of building and preservation and this sort of approaches where a new development maybe able to harvest rainwater for toilet flushing. In a retrofit situation it

becomes a little more difficult to do.

It's also important to note that these sort of have higher operational requirements because you're then capturing rainwater for reuse and you have to pipe it elsewhere, so you're going to have an ongoing operation in addition to the maintenance considerations.

MS. KARP: So if you have a constructed wetland in the street where the sea -- in the Moshassuck, is that a detention system?

MR. RAICHE: Generally, I would call it a detention, yes. You could have a retention type that doesn't outlet, that would then require either infiltration or evapotranspiration as the exports. You could sort of bridge into their detention plant generally. So when we're looking to apply GSI techniques you're there obviously through technical considerations. The primary is what

kind of soils you have. You're taking up a whole litany of GSI techniques off the table. Generally, you want someplace that's flat, less than 5 percent slopes, because you're in very

steep areas, over 25 percent is essentially in between but it's by a case-by-case basis.

Now, most of our Phase III areas you do have some favorable soils on infiltration. Areas around Pawtucket and Central Falls, soils that generally infiltrate are shaded in these blue colors. The unshaded areas are not that conducive for infiltration. So you see the areas that probably won't work are around East and Hope Street in Pawtucket and Providence, so essentially that ridge line that defines sort of the Moshassuck basin and the Blackstone Seekonk basin, those don't have very good soils.

We also have areas where the soil data that we have is masked by past development, because the large industrial area, the historical area is very hard to determine what the underlying soils are because there is so much disturbance during that original development in those areas. Those areas may

also be more prone to contamination issues, and so we probably wouldn't want to put infiltration type solutions in these areas, and then run the

risk of making the contamination migrate. But, you know, it is on a case-by-case basis, so in general our potential is a little bit lower, but we don't necessarily take it off the table, we actually do have an example that specific site example later, which we'll get to about 2:00.

UNIDENTIFIED SPEAKER: Before you get to that, do you automatically exclude the impervious surface paved area?

MR. RAICHE: No, this is the underlying soil. So you could be removing a parking lot and putting a permeable pavement. Most of this area is impervious. In terms of slopes, in terms of determining where we can and can't do GSI, again, we've got large areas where we're relatively flat and very high potential.

As it happens, that ridge between the Moshassuck and Seekonk, Blackstone where we've got the unfavorable soil, also happens to coincide with steeper slopes, so you certainly have the same blackout neighborhoods in terms of where our GSI potential is low. The next

criteria that we need to look at is land and ownership. In terms of selecting GSI, you do need to look at what your development density

is, because, you know, some techniques require more square footage on the ground than others. We have buildings that are very close together where we're kind of tied into certain green roof kind of solutions, where we can think about water quality swales, and other approaches like that.

It also benefits the one who owns the land. Clearly, this is something that we do out to reach the watershed, and a lot of that is privately owned. So we would be looking at the potential of implementing these on private property. There's also potential of doing the same sort of technologies within the public way, which in this case may require some sort of public partnership between NBC and member communities.

In the interest of time, we can go quickly through these. They will be on the website if you want to look at them. The idea is to match specific technologies to different land use types with the recognition that whether

you're looking on-site or the public way, you have different variances of the technologies

that you can consider. Then there is the issue of how do you implement it? You know, in this instance, even work in public ways would require collaboration between NBC and the member communities.

In terms of private development or work on private land, there has to be sort of partnership between NBC, the number of communities, and the landowners. So with that, I'd like to yield the floor to Scott Lindgren from Pare. Again, we'll dive into some details here, and hopefully facilitate some discussions on the different technology.

MR. LINDGREN: Thank you, Rich. Scott Lindgren with Pare Corporation. It's nice to see everybody today. As Rich indicated, I'm going to spend a little bit of time talking about some of the different types of GSI stormwater infrastructure that we could maybe implement in the Phase III area.

As Rich indicated, we're going to start with infiltration solutions. These are typical examples, they're not all the examples.

As Rich indicated, he had spoken about green roofs or water quality swales, but for this

presentation we're going to concentrate on a few that we feel that may be alternatives that we could look at in the watersheds.

Shown on the screen here is just a typical public way streetscape. And just to step back, I will reiterate that anything that I'm showing here today can be utilized either in a public way or a public area, or on a private property, and it hasn't been implemented over the course of some of the programs that I'll talk about NBC having later on. But this case, it's just a public way.

For example, we have stormwater rain garden bumpouts which are erected on the shoulders where we'll talk about those. Tree box filters, tree box trenches, pervious pavement solutions. Just to begin, stormwater rain gardens: Stormwater rain gardens are a GSI alternative that in this case is showing as a midblock installation along the curb line of a public way, where it allows stormwater along the gutter to be intercepted prior to the receiving catch basin that discharges to combined sewer

for most infiltration through underlying soils

that are permeable, and before this case, is a bypass solution where it would then flow through and into the system, but it does provide a water quality and infiltration alternative to catching stormwater along the streetscape.

A tree box filter is similar to a rain garden, except that it's in board of the street line. It's usually placed as you see in the lower right, along a walkway system, where the stormwater is intercepted, either within or before the combined sewer inlets, and there's usually an underlying force media that filters water quality and filters infiltrated stormwater into the underlying soils.

These, as with rain gardens, once they're full, they take as much stormwater as they're designed for, and it bypasses to inland. Another alternative are catch basins dry wells, which are installed along the edge of the roadways, so they don't have any vegetated, what you'd say green, to them, but they are a GSI technique to infiltrate stormwater within the watersheds. Another section is the infiltration chambers. These are usually larger

installations. A lot of these you'll find when

either new or retrofitted construction, that they're constructed underneath parking lots, taking roof runoff or parking large impervious surfaces, and with good underlying soils there can be a direct volume recharge that does not go to the combined sewer.

Another example, pervious pavement. There's a number of different types that can be utilized in parking areas, along walkways and along streetscape, and in this case, private development. They can be pervious pavement or pervious concrete, or in this case in the lower pervious paver types that you see around here in different installations for driveways or parking, they do work for infiltration, and they do work very well.

The more residential scale besides implementing a rain garden or disconnecting their roof runoff directed onto lawn surfaces, this is just a ribbon driveway, which you've probably seen around the communities. It's just taking the impervious surface that normally isn't driven upon on driveways and replacing it with a grass strip that can be maintained. In

this case, it's a small amount, but you can see the benefits and the amount of impervious removal if this was a standard case around the communities. As Rich indicated, the soils and infiltration are a big part in implementing GSI in any of the watersheds.

In this case, we're going to take a look a little bit, focusing on the CSO 39 and 56 area, where you can see that everything that is shown here that is in color is a good infiltration characteristic in underlying soil. So there's good opportunities. And as the topography, you can see mostly in the greener shade, it definitely has the flatter slopes in certain areas where we can implement some of this GSI.

So I took a look at the typical watershed, and just to give an example, this is Grand Broadway Street, which is just off of Douglas, and this which is kind of hard to tell here, but this is about a 40-foot plus roadway for a residential area, and it's an extremely large amount of impervious surfaces. There is some parking that's done along the side streets, but in general, it's wide open. So we took a

look and said, well, what could we do? GSI alternative: In this case, we put in some stormwater rain garden bumpouts, maybe some pervious pavement shoulder. There's still parking areas allowed for the residents to be there, but it will intercept the stormwater before going to the combined sewer inlands, which there's actually one right at the lower right-hand corner, so the slope is towards you. So you can see pervious pavement shoulders, stormwater rain garden bumpouts, and the water is filtered, infiltrated before it goes into the sewer.

MS. KARP: Is the census that these two areas would be intercepted?

MR. LINDGREN: No, that's where you get into design. Definitely the opportunity is there because of the underlying soils, so each of these would be sized accordingly to the percentage that you want to infiltrate and remove.

MR. WALKER: As I look at this with the pervious pavement shoulder, it's my understanding that that material needs special treatment in the wintertime that normal asphalt

pavement or other surfaces can have ice melt and salt, and that sort of stuff, where pervious pavement loses all of its effectiveness, or essentially gets clogged or ruined if you use those treatment chemicals. What does that do for keeping the streets open in our New England climate, and essentially when the frost line comes up, does it stop working?

MR. LINDGREN: That's a good question. First one was obviously the pervious pavement has a definite maintenance criteria to it. And part of it is a yearly vacuuming and cleaning to remove that sediment that would clog the pores. The second piece was about chemical applications. And most in most cases when I've worked with local communities and DPWs, those chemicals have been looked at in terms of safe application where there wouldn't be a contamination issue with underlying infiltration.

But if it is pervious concrete, then there is more than that pervious pavement. The third question was whether during a storm event, during the frost, would it not work? In our experience usually during a storm event the

ground water and the temperature is such that it actually does infiltrate during that process. This is just another example in the same watershed of Vandewater Street, which you can see is a more narrow street, walkways on both sides.

In this street, it doesn't have a lot of inlets along its length. From here to as far as you can see, there's no inlet to the combined sewer, so there's long reaches of pavement that eventually get to the intersection where there's one curb inlet. So what can we do here? The alternative is to interdisperse something that would be either a tree box filter or a dry well, which would infiltrate the stormwater before it gets to the corner curb inlets.

So there's opportunities to do some combination here in a smaller scale to intercept. In this neighborhood, actually, there are a combination of dry wells and combined sewer inlets already in certain areas. So you can see that there are opportunities to install these. Obviously, advantages and disadvantages obviously provides infiltration

volume reduction, and obviously a water quality improvement. And these types of infiltrations can be on a larger scale, but they can be installed on a smaller scale. Underlying soils and infiltration characteristics are important to this design, and as brought up as part of the question is maintenance as a key component, whether it be a pervious pavement or the small rain garden application. It is a higher intensity because you want to keep the underlying infiltration characteristics positive.

MR. SULLIVAN: What is the liability assessed with infiltration and nonpoint pollutants into private properties, is there any assessment for remediation or liability if it's discovered at the point of infiltration?

MR. LINDGREN: As Richard indicated, the environmental considerations for contaminates soils, especially in the urban areas, are such that you're not going to look at infiltration because of the liability of migration for contaminated, in particular. So each of these cases, and specifically as we're

going through the GSI alternatives, in the investigation stage on a case-by-case basis would have to make that decision because there's a requirement that infiltration not be done with soils that have a contamination problem.

MR. SULLIVAN: In terms where you have properties with non-contamination and you bring in non-point pollution such as a school bus going by breaches its radiator, now you have BOCs, PCBs going into the soil which is nonpoint. How do you assess that liability when it will infiltrate on a private homeowner or a commercial business that may deal with petroleum products, or those type of products?

MR. LINDGREN: It's easier to answer the question of a private entity that deals with petroleum products. Obviously, we would not design these types, or they would have a containment aspect to it for spill containment before the infiltration system, whether it be a system like this, or whether it be a detention type of system. The consideration of just an accident happening, I don't have any costs to kind of outline for you what that might be.

MR. REITSMA: Two things: One is I

want to echo Carolyn's question about is there a way to quantify what kind of difference this can make in terms of how much flow can be diverted?

MR. LINDGREN: Well, we actually have an example later of a specific project, and it will kind of give you a sense of the type of volume that's being used.

MR. REITSMA: The other question is about co-benefits. For example, when you look at some of these solutions, they have co-benefits in the area of climate change, and Sheila may be able to comment on this further.

There may already be research indicating how those can be quantified in terms of actual benefits. But is there a way in this process to take those into account so that they can be considered as you consider the relative advantages of one solution compared to others.

MR. RAICHE: That's an excellent example of an evaluation criteria that we want to discuss in June. So if we could, in interest of time, table that for now, and we can get into that in June.

MR. HOLMES: If you look at any

parking lot or any street, and oftentimes you'll

see a bump, and there's this big brown spot, or black spot right after the bump where people's cars when you hit the bump, the oil that's dripping out of the engine, or whatever, transmission fluid, falls off the car, and now you've got an oil problem on the street, and when it rains the oil's going to flow because that's part of the first flush that every municipal sewer system has to deal with is that oil flow.

And now you're directing that directly into the water table. And then the other thing is the silt that builds up in the rain gardens and the tree gardens, and stuff like that, you get silt into it, and it builds up and eventually the dry well is useless. I mean, I've had to rebuild dry wells at my house a couple of times over the years because the sand comes off the roof, or whatever, micromediates, and they say they can get them off your roof, too. I mean, there's always dust and dirt in every -- they all clog up eventually.

MR. LINDGREN: And to answer your

question. There is ongoing maintenance that's

definitely required.

MR. HOLMES: So it's not that you can dig out and put all new stones in it?

MR. LINDGREN: In some instances depending on the volume sediment, there might not be.

MR. HOLMES: Who pays for that?

MR. LINDGREN: Well, that's an agreement between whether it's a public or private entity. If it's a private entity, obviously a private entity has that cost-bearing, and if it's a public, those are public dollars. And in terms of the oils, there's design criteria that can be done to before any of these rain garden type facilities that could capture the oil with a, to capture the particulars before it hits the rain garden.

MR. DOMENICA: Just a request here. If it's a clarifying existing information being requested, we'll look at those questions, but we're going to have another chance to come back to each of these alternatives and talk about pros and cons and evaluation criteria, so in the

interest of time, let's minimize questions.
Brian has a critical one, though.

MR. BISHOP: I appreciate what Phil put on the table, because while we might try and look at your example and see how much flow is reduced, and whether there's even any sense looking at these at all, the maintenance side, it's critical to look at, and then the other benefits, I think an important negative consideration, not in whole, but a narrow one that should be part of that is anybody who actually works with sewer infrastructure understands the trees are the enemy, and we have a very densely built city, generally, with clay tile sewers.

And trees are an enormous problem. And they're most often put right over the sewer because that's the only thing that's not marked when they go to put trees in. Now, that doesn't mean somebody thinking about it might not think differently, but it goes to some of the further, like sewer separation questions. This could be something you change forever. It could be the greatest thing, and maybe we should all be out there with our shovels, but that's the point.

MS. DORMODY: Maintenance is not unique to green infrastructure solutions. Grey

infrastructure also has very significant and costly maintenance requirements that we may or may not spend, or we might spend it when emergencies happen, but just as we are looking at these different approaches, some of the requirements are going across whatever we decide to do.

MR. LINDGREN: Thank you. As we go forward, I'm going to have to speed up a little bit. I think there are some important things that are on the back end. So in the next couple of slides, they're going to be detention and retention.

I think we can generate some real good conversation if on the next slides, and it really specifically plays into the Narragansett Bay's stormwater mitigation program. So these slides are going to be up here, and we can continue the conversation.

But detention solutions have a lot of hydraulic controls that are necessary to actually have an end of pipe detention systems,

so hydraulic controls are a key point to detention systems that we want to consider as we're looking at them as GSI alternatives. And

when I say GSI alternatives, you have to figure that usually detention systems or retention systems have some soil infiltration or green GSI alternative placed in them. And in part of this is for detention is stormwater detention examples.

You've probably seen them around. There's two examples around, some around the state. The top in Bristol, and then URI, and a few others in parking lots. They're there to detain and reduce peak stormwater discharge. But in most cases, they also have an infiltration characteristic to them.

Underground stormwater detention systems are more structural. They're usually more in the urban sense, because they can be placed under parking lots. In this case they do the same thing. They reduce peak stormwater discharges. We have a couple of examples here. Just coming back to just an example is CSO 35. You can see the soils are not very favorable to infiltration, so we look at opportunities with

the slopes that we have in this watershed to hydraulically throttle the stormwater to an area where we can paint it. And in this case,

there's the center area and suitable slopes bringing it down to North Main Street. It's possible through design to try to capture stormwater through troweling the existing catch basins to collection point down at lower North Main Street.

As you can see, this is North Main Street, but there's opportunities that could be a stormwater detention along the shoulders or medians that would detain the peak flows. It is disturbance to the non-traveled way, and there are, obviously, costs associated with that. But we try to say that in combination, minus the pervious pavement, and you can see some stormwater bumpouts that can be over above the detention system.

They can be placed on the shoulder, they can be utilized in the center median. It's possible to reduce any of the underlying soils there for some infiltration and some water quality. So we've got a couple of those.

Advantages are reduction in peak flows and water quality improvement. Retention solutions: As Richard indicated, this is more of a retain and reuse. A lot of newer developments or existing

developments in mills and such around the communities use a retention system to retain and utilize it for fire protection, irrigation, flushing of toilets, and whatnot. It is a structural approach, but it removes stormwater from the system. Another section is the stormwater well.

As Richard indicated, it can be a detention system with metering back out, but in some sense, it can be a retention which is a more natural solution. It definitely needs a larger land area, which might not be a fitting for some of these urbanized areas. So we kind of took a look at this watershed and said, you know, how can we apply some retention aspects to it?

The soils underlying it are more urban, so it's spotty of whether it's actually infiltration or not. There's some surrounding soils that might preclude that say that this area might have some good infiltration, and the

topography seems favorable to try to combine retention and infiltration, so we just took a look at some of the parking areas, large expanse areas. This one is on Roosevelt Ave, next to a

mill. It can be utilized as an area for placement of a retention structure for water reuse at the mills, if so needed. But it also could be redeveloped to have rain gardens and more landscaping and pervious pavement if the urban soils and that there's no contaminated soils underneath prove favorable.

So there's opportunities throughout the communities to try to look at private land and try and improve the situation. This one is on the same watershed up on Montgomery Street, just a large broken pavement that might be pervious because it's broken, but we can make it better.

You can include large tree box filters along Montgomery Street because there's a larger right of way, perhaps maybe there's pervious pavement. It's just opportunities. There could be a retention structure here for reuse for the existing facilities. Obviously

advantages are large volumes of stormwater can be held, and there could be stormwater wetland and water quality improvements, but construction costs, again, as with the intention of land services is quite great. I just want to mention

if some of you are aware, some of you are not aware, but Narragansett Bay Commission since 2003 has been implementing their stormwater mitigation program, you know removing large amount of stormwater runoff from the permits that they apply for new connections, or an increase in 20 percent in sewer flow.

They try to implement and require to implement a green stormwater infrastructure and LID techniques into the new projects, whether it be redevelopment or whether it be a new project within their watershed. And you can see from 2003 to 2013, NBC has permitted over 6.8 million gallons of stormwater being removed from their combined system, and that's based upon the three-month storm mitigating a lot stormwater from getting into their system.

This is just a general Phase III Locus plan and it's kind of hard to see, but everything in the dots right there, there's over

20 projects already permitted and some constructed within the watershed that has implemented GSI alternatives, and that equates to about from their permitting data, about 500,000 gallons of stormwater removed from Bay

Street area just from 2003 to 2013, and that's from their program, which has been quite successful. Getting to the project that I want to talk about, this project actually isn't in Phase III, but it's representative to what is being done throughout their watershed.

This is this is Oliver Hazard Perry School in Providence. Right now it's currently renovated and to be used by Achievement first, the charter school, and part of the process with NBC was to remove the combined sewer and drain system on site and inside the building, and provide infiltration to remove a certain percentage of stormwater from their system before it discharges back to Hartford Avenue.

And in this case, we used a roof infiltration system and dry well installations after separation, and we're infiltrating close to 60,000 gallons of stormwater for the

three-month storm event. We're actually infiltrating a lot more because it's designed for a lot more volume over the 24-hour storm event. So overall, there's a lot more being infiltrated, but that's what will be infiltrated in the three-month storm, so good examples.

This just a plat graph over the years, you can see that the NBC program has steadily increased in the cumulative gallons mitigated over the years. And in general, their project that they permit go up and down but, generally around ten a year that they have. Translating GSI benefits to GSO reductions.

MR. HOLMES: Something you passed over is that the 6.8 million gallons that they have kept out of the CSO project is 10 percent of the volume that's available in the pipe, which is a good thing, because you get rid of that of 6.8 million percent of clean water, you've got that much room for CSO, so that's a good thing, it's a really good thing. That makes a big difference.

MR. LINDGREN: And that's why the program has been successful over that time period, so definitely. So if there's no more

questions, I'm going to turn it over to Nick. He's going to talk about the GSI benefits.

MS. KARP: One of the issues with stormwater seems to be floatables when you just see plastic going down the street. These green technologies are fantastic, but how do they deal

with floatables that some of these people have to deal with? And then something I think that the city has been real good at is Adopt a Tree, and I would like to maybe come back to this for ways to stimulate private partnership on these?

MR. LINDGREN: Floatables are a big concern. There are ways to collect them. Some of these GSI alternatives would have a forebay for a sediment where some of those floatables would be collected. Some of the internal chambers would have either deep stones or footed applications where the floatables wouldn't get into the sewer system, they would actually be able to be cleaned out.

MR. ANDERSON: I'm going to talk a little bit, sort of extending what Rich has talked to you about already. You've seen a lot of good technology, and a lot of clever

innovative things, really. But in terms of my favorite subject is what problem are we solving and the problem we're solving at the moment is the CSO spill.

So what that means is we've got to be a little bit clever about how we apply these and for all of the reasons, and sat in the back

of the room and listened to all of which are very valid, all of which we're terribly familiar with, and all of which really do define what we actually choose for the solutions, because the important aspect of this is that we don't leave a long-term vulnerability or a poor legacy.

So it is solving the CSOs, but it's, it's just not seeming to do the right thing, I think the quote is, "It's not just doing the job right, but doing the right job." And so really considering this across the entire area, this is bit of a challenge. If we dealt with one parking lot and it rained one day of a Tuesday in June, we'd be okay. Sadly, it doesn't quite work out like that.

It gets a little bit tricky. So we're going to try and just show you a little bit of how our process is going on, and so I'll

give you a little insight into what we're doing. Okay, what are CSOs, what do they do?

Now, the question very early in the day was about what they're doing with the SSO and the CSO. Well, hopefully, a CSO is a controlled discharge. When they're not controlled, then we're in serious trouble, but

they have a long history of providing great benefits. There's nothing wrong with CSOs per se, the reality is that they're a good thing, but just to make the point that they do actually encourage water quality, not degenerate it, really.

And so that's something to consider. But I take the point that, you know, what we said in years gone by and what we do has changed for all the reasons that we heard when Mike, and what have you, were talking earlier. It was very much that what we did 25 years ago doesn't apply today, and that's true here in Rhode Island and through the rest of the world. So that pragmatism is very important as we go forward, so a lot of the solutions we're thinking about have to have that pragmatic edge.

Primarily, yes, we are dealing with bacteria, yes, that's the reason that we're in the room discussing it, but there's no reason why we can't look at other benefits and look at long-term legacy, as well, which is why green is a very important factor in this. Okay, so we're going to talk a little bit of urbanization. I know this is very familiar to most of you, but

to couple of folks, this may not be so familiar. If you consider the cartoon in the graph on the left, what you've got there is when it rains on a rural piece of land, that is effectively what happens.

It takes time for the ground to wet, some of it soaks in, some of it gets caught in vegetation, but some of it runs off. Now, once upon a time that used to run off the hills and into Narragansett Bay. And then a few hundred years ago, we all turned up. But the reality is that when you urbanize it, then you change those parameters. So we thought the best thing to do is put it in pipes and get it away. The graph on the right essentially is the runoff of urbanization.

The peak flows are much, much

higher than, you know, basically and the volume extends, as well, because we're basically putting impervious surfaces where they used to be pervious. And that's the absolute crux of what we're trying to do in pursuit of my engineering excellence.

MS. KARP: I think something's not quite right in the cartoon to the right because

what we've done with CSOs is to channelize flow.

MR. ANDERSON: But what we're talking about here is just the effect of urbanization, so pervious to impervious. But you're absolutely right, the channelization associated with building pipes and sewers is the crux of this. So if we consider these four graphs, number one is the one that you've just seen. It's the effect of building on green land.

Now if we channelize that flow, as Carolyn rightly pointed out, and we put it into a combined sewer, that same hydrograph applies. And what we did in to control so we didn't have flooding and sewerage spilling everywhere was built CSOs. Now CSOs have what we call a

control level, and that's what the line across the graph you can see. So the bit that we're talking about today is actually just the blip on the top.

It's just a bit above the line, and so what we're talking about is actually holding that within the system, not necessarily letting that get into the watercourse, or in this case, Narragansett Bay. So if you consider that as

graph number 3, is what we call a receptor control, and Rich very eloquently pointed that out, this is where we know what volume we're dealing with, and we know it's a tank, or a sewer, or a tunnel, or whatever it is, and we capture that and hold it the system so it doesn't get into the bay, but what we're talking about now is doing things slightly differently.

We're now trying to be a little bit more progressive in our thinking and try to open up a number of different avenues, you know, social and environmental benefits. So if we move on to graph number 4, we still got that undeveloped, that's Utopia.

That's 300 years before we turned up. What we're trying to do is we're trying to

reshape the hydrograph you can see in 3 to look like the one in 4. And what does that mean? I'm trying to market this as a sustainable hydrograph.

And what that means is we look across the entire watershed, and we use a lot of the techniques that you heard today, and a lot of the techniques you heard at the last stakeholder meeting in order to hold some back,

infiltrate it, release it quickly, you know, reduce it in first instance. All of those things collectively are designed so that we reshape the hydrograph, the flow that's coming to the CSO in the sewer to a level that we're all comfortable with.

Now, this is the challenge, okay. There is not necessarily one solution for this, and the important thing to note is that every location is different. And when I say that, I don't just mean Providence or Pawtucket or Central Falls, I mean every single location from a single parking lot, to a green field, to a building.

So adding all of these together as

a jigsaw puzzle is what's the challenge. But that's where we're trying to get to and that's what we're trying to promote here. So your input into this process and telling us what does and doesn't work, and the point about what happens when it freezes and the poor weather conditions, absolutely important. The points about the trees over the sewers, extremely important. We've got to capture most of these, we've done this before, but that doesn't mean

that we've done it immediately here in these locations, so your input is absolutely valid. And that's where we're trying to get to, and hopefully at the end of this process, our solutions that we're recommending, that we're bringing to you in October will effectively do that.

So the reality is they probably won't be as nice as that, because these are my idealistic ways of doing things. It will be somewhat different, but that's our intention. I think it's important for the stakeholders that you all get the feeling of what we're trying to do with this.

It's not one size fits all. It's

not, well, we're going to have a guess of what we think is going to bring the most benefit, but what we are doing is we're looking at CSO reduction, abatement, if you will, and then we're looking at other benefits. Don't be mislead by thinking that we can consider absolutely everything.

We've got a primary focus, but if we can do something which benefits the community, doesn't leave long-term probability,

and has actually has some usefulness in the future, then all the better. Okay, just to take that a little bit further, a couple of more cartoons, because I do like the cartoon. Grey versus green.

Traditionally, what we used to do is heading down from the head of the system on your left with the bigger and bigger and bigger pipes until we got just before the watercourse, and then we built something, a tunnel, a tank, whatever it was, and that's what we used to do.

In Utopia, what we would like to do, is we would like to start at the head of the system and we'd like to start infiltrating, and

then we'd like to start using green techniques and we'd like to start encouraging, you know, new habitats and new social use, and all the rest of it, and we'd continue to infiltrate evapotranspirate and encourage, you know, all of the good things that are associated with green. And eventually by the time it gets to the watercourse, then the water quality should also be enhanced, as well. Just because the techniques that you can imply, whether you're talking about bacteria loading and just for a

note point of reference, bacteria loading is green infrastructure and not directly relatable. You can, yes, but in this instance, we're not talking managing bacteria with green, we're talking about managing wet weather with green. And by that, that also includes the point about the oil, the hydrocarbons, the heavy metals, things like that.

We can design these structures and we do design these structures to be, you know, kind of in deep understanding with their surroundings. So if there is a hydrocarbon risk associated with a highway, then we do tank it with geomembranes or with strategic planting.

It's not just a case of -- oils in the ground is a good thing, you know, just as a point of reference. But the reality really is this, and this is where we're getting to.

We're in fairly early stages of any sort of design, but what you'll notice there is there's not as much green as Utopia and not as much grey as the grey conditions. And I think if there's one takeaway from this it's the fact that the tunnel that's just before the receiving waters is a bit smaller underneath these

conditions, and that's what we're trying to get to. The opportunity, the understanding, the evaluation as a collected integrated catch -- management to get to the main wall now, and this is what we're talking about. So that one parking lot that rains once a year on a Tuesday afternoon in June, yes, that's great, but the reality is, and this is the tricky thing, that if this was easy, then, you know, we would have fixed it years ago.

This is complicated stuff, folks, and your input is so valuable in determining what does and doesn't work. Okay, so earlier on

Scott mentioned that we're going to do a couple of examples. So these are taken from our hydraulic model. So we have a hydraulic model of the sewer network at the moment and basically we generate flows based on the impervious and pervious areas.

So this particular hydrograph is showing the performance at CSO 218, which we talked around right at the very beginning of today. What you've got there, is you've got the CSO setting line, which you can see, and then you've got over a period of time, you've got the

flow passing through that CSO. So when it's below that line that means it's staying within the current sewer network, when it's above that line, it's overflowing, it's going to the bay. Okay. Now, the important factor to note here is the relative proportions, okay. So what you'll note is that when you consider what to do, that is what you're bidding with, the bids above the line.

So what I did, there's a couple of, basically, a couple of calculations to what I thought we could do on the green side of things. So this is purely green, okay. So what we're

able do by introducing green reshapes that to the green line. Why does it do that? Well, the simple answer is if you put green infrastructure, which in this case, is a 15-acre coverage in this watershed, okay.

Now, a 15-acre coverage needs a footprint of approximately 75 acres in this instance, and this is just a variety of the green infrastructure, so a lot of those things that Scott talked about, we sort of nominally put into the catchment. So we've reshaped the hydrographs. What you'll notice is if it starts

raining, it takes a long time before you see any flow of that CSO, because the green infrastructures are taking up the rainfall, taking up the runoff, taking up that volume in the system, but eventually, it gets beaten. It can't go on forever, yet we would fit it as much as we can, and that's why you get this sudden vertical climb. That flow's getting into the sewer system. Then once it basically gets to a peak, it then starts to drain down as it's always done.

Now, remember below the line is

good, above the line is bad in simple terms. What we're really trying to do now if we end up with this situation is say, well, green is taking care of that first one-third proportion. For those of you who remember trigonometry from school, it's about one-third of a triangle, okay, so half of the volume, or thereabouts.

So what we're trying to do is squeeze A into B. Now, you don't need to be an engineer to realize that A isn't going to go into B very easily. So it brings into the three words, and I'm a stickler for a three-word heading, or a three-word tag line. So this is

my spin on it. Opportunity, effectiveness, and scale. So number one, for all the reasons that Scott and Rich described to you is there an opportunity to apply green over what area? Can we fit it in? How steep is it? What is the soil like? What's the land use? Things like that.

The effectiveness: Is it really going to make a difference? We talked about affordability at some length earlier, and it is without question the most important aspect when we're in a group like this, but, nonetheless, is

it going to be effective if it's just a blip on the landscape is what we're looking for in terms of effectiveness? Remember, it's not just doing the job right, it's doing the right job that's important, and therefore effectiveness is a huge part in this, the application of green.

If we're going to build something and nobody's going to look after it, that's not being effective, that's just spending money for spending sake. That's not what we're looking for. Scale: What does scale mean? Well, if we did one tree box. Scott described a tree box as a great source of, you know, green

infrastructure. Great example, I should say. If we did one, would it make any difference? Apparently, no. If we did 45 million of them, then it would probably make a bit of a difference, but I'm not quite sure we're going to squeeze 45 million into the northern hemisphere, never mind into our catchment area.

So if I were to implement our green, soil green infrastructure, then what we could ideally do is reshape the hydrograph. Now, that's a much more sustainable look at

things, but the reality is is it still above the line? Are we still going to see an CSO going on. What problem are we trying to achieve? It doesn't add a solution to the problem. So you can see what we're dealing with. Some of these are great examples, but they're not applicable everywhere, not one size fits all.

MR. RAICHE: So everyone understands that this is an actual example that Nick has looked at, this is 218, which you recall from Tom's illustration at the beginning. It is one of the largest CSO, single CSOs. Essentially, if you want to think about it, the eastern quarter of Pawtucket, essentially from

the Ten Mile River to the base and divide between the Ten Mile and the Blackstone Seekonk, so that's the watershed that we're talking about right here.

MR. ANDERSON: Thanks Rich. So this is 202, much, much smaller up on the Blackstone, only a four-acre catchment this time. And we've spread one-acres worth of GSI across the four acres. Not wholly unreasonable in this particular location. So again, we've got the same situation, below the line good,

above the line bad.

The application of the green infrastructure using my three-word bargain basement approach basically reshapes it to that. So, again, we've got that slow buildup, then the sudden release in the flow's infrastructure where we've still got the CSO. So what I looked at was actually readjusting what gets passed forward, what gets retained, what the routing of the flows are?

This gets a little bit more technical because I'm actually trying to look at managing rainfall on the surface now. What we were able to do was actually that. Okay, so A

this time looks a bit more beneficial going into B, okay. So in this instance, green has a lot stronger pull. Now the reality is, of course, say for example we were building the tunnel anyway, yet, what's the potential benefit spin of the back seat controlling it if it was going to go to the tunnel anyway, because relatively, it's a small amount in the tunnel, but you can see the effect.

But the point is you can see, it is

part of the answer. And for all the reasons we talked about today, it is the most definitely a very important part of the answer, but don't believe that we're just going to kind of ram this down your throats and say, green is good, grey is bad. That couldn't be further from the truth. So I've got one last spin offline before I talk about our hydraulic model.

You don't need to be green to be sustainable, okay. Green is not just the only sustainable outlet. There are many reasons why green is unstainable, because of long-term maintenance, but also, Scott talked about very briefly, if you've got contaminated soil and we have to dig out that soil and transport it, you

know, 2,000 miles to be looked after, that is not sustainable, that is a silly thing to do just for the sake of saying we're doing green. So tell us what you really think of it. If it's really something that you want to explore more, that's great.

At the next stakeholder we'll talk about some of the potential benefits, so keep some of these in your mind between now and then. But just to finish my little bit, and I promise

you we will let you go, is to say that we built a model of all of this, that's a very important aspect. Modeling from when this, you know, when the very first Phase I started, it exponentially changed, it really had. You know, the fundamentals of it remain the same.

Water flows down here go where you don't want it to. But the truth is modeling has become much more sophisticated, and we can do much more with it. So the integrated approach to the solution is now very much something we can look at look and look at with a degree of confidence, too. So that was it for me, really. And that's probably enough, I guess.

MR. DOMENICA: Great job, a lot of

material. We're overtimed, and we could take questions, but what I would suggest is we're going to have other opportunities to come back to this and talk about the pros and cons about how they work and don't work, advantages, cost, et cetera. So why don't questions addressed to Scott, either after you break up, and if they're important, mention to me. We'll put them on the parking lot, and we'll end the session at this

point unless there are any absolutely critical closing remarks.

MR. GAGNON: I'd like to put something on the parking lot that I think ought to discuss openly. Is that certainly there's a need for some upgrades to be done, but there are communities that are creating that need, and there's disparity between who's actually contributing to the need and that needs to be addressed.

The ratepayers and communities that aren't bringing any overflow in, they shouldn't be paying the rate. What we're subsidizing for the tunnel now, it just isn't fair. And at the end of the day, EPA's going to come along when we're all done and say, well, your stormwater,

you've got to do your stormwater, and there's going to be cities and towns say, oh, we're all done with our stormwater.

MR. DOMENICA: That's a great parking lot issue.

MR. MARSHALL: That issue has already been addressed in the Rhode Island Supreme Court, and the Supreme Court has said it's one district, one rate.

MR. DOMENICA: A lot of potential discussion of what Ray just said, too, so that will be a hot topic when we get to it.

The parking lot issue, your talk of the green talk emphasizes mitigating stormwater before it enters the system. There are also green technologies constructed instream, and there are these floating wetlands, so there are all sorts of things that could be used to actually improve the Seekonk River, Moshassuck River, but land based, they're water based.

MR. DOMENICA: Thank you. Thank you all for all of the enthusiastic comments with these issues. It's not easy, it's very hard, but this was a great meeting. The next meeting is on Thursday, June 19, same place,

same time, 9 a.m., and we're going to cover evaluation criteria, start getting into how all these things come together to create a plan, so thank you, again.

(MEETING CONCLUDED AT 1:15 P.M.)

C-E-R-T-I-F-I-C-A-T-E

I, PAULA J. CAMPAGNA, CSR, a Notary Public, do hereby certify that the foregoing is a true, accurate, and complete transcript of my notes taken at the above-entitled hearing.

IN WITNESS WHEREOF, I hereunto set my hand this 6th day of June, 2014.

_____

PAULA J. CAMPAGNA, CSR, NOTARY PUBLIC/CERTIFIED COURT REPORTER

MY COMMISSION EXPIRES: April 19, 2014

IN RE: CSO Phase III Stakeholders Meeting
Narragansett Bay Commission

DATE: May 22, 2014