

2022 Spring WRRRC Seminar Series

The Future of Storm Water Management on Oahu: Understanding Stormwater Impacts and Using Technology to Identify Solutions

Ms. Lauren Roth Venu and Mr. Randall Wakumoto

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[Keri Kodama (host):]

All right. Hi and welcome everyone

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to our final seminar in the Water Resources Research Center spring seminar series. This

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week we have Randall Wakumoto and Lauren Roth Venu talking about storm water management on O'ahu.

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So to introduce our speakers first, Randall Wakumoto is the program administrator for the City

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and County of Honolulu Storm Water Quality Division within its Department of Facility Maintenance.

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Randall's responsibilities involve administering the city's storm water management program,

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including coordinating with the various city departments to ensure compliance under the Federal

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Clean Water Act requirements. Lauren Roth Venu is the Founder and CEO of 3Rwater Inc.

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that develops software and data platforms to support municipal green stormwater

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infrastructure programs, and is the Founding Principal of Roth Ecological Design and that

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provides integrated water resource management planning and green infrastructure design.

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[Randall Wakumoto (speaker):]

Thanks, Keri. And hopefully,

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my internet connection is okay for me to get through this. But as Keri mentioned, I'm Randall

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Wakumoto, and just want to thank all of you

for giving us this opportunity for presenting

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just a glimpse of what the future here at the City and County of Honolulu, of what we see,

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things that currently is happening, but also what we kind of want to envision the future

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of where we need to get to. And part of it will be kind of focused on

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presenting what is referred to as a stormwater utility, which is basically a funding mechanism

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in order to support the, you know, various aspects of stormwater. And for those of you that are maybe

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in the field, or at least somewhat familiar, you know, stormwater does encompass a lot of things,

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you know, and I'll try to touch on a little bit of it. I'll just kind of give a little bit of a

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heads up that I do have quite a bit of slides, and I'm going to just kind of

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breeze through it real quickly. So some of them, as you'll see, there's going to be some, you know,

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a lot of text and photos and images, but you know, kind of just glance over them and just spend a few

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seconds on each one of them. I think it's more important that, you know, we kind of want to make

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sure that we give Lauren a good chance to present, you know, who we're working in partnership with a

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lot of the things where you can actually start seeing the benefits and why things like green

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stormwater infrastructure really are important.
And what we can envision as being the direction

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that, for the City and County of Honolulu
especially, is where we're heading towards.

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So, I'll just kind of give a little, little
background. And I think a lot of you folks in the

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water programs kind of are somewhat familiar with
this, you know, where you see some of these things

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happening throughout the island. Things like
sediment, dirt, trash, debris, oils, and other

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chemicals. You know, it's all kind of happens
where when it rains, it sheet flows off of a

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lot of these properties, it gets into the—into the
roadways where it goes into the storm drains. And

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that ultimately gets into our streams and into our
nearshore waters, where it affects the coral reefs,

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as well as a lot of the fish habitats and
things that do live in it. So that's why it's

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very important that we need to take care of the
land, you know, because what happens on the land

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directly affects our water, which we do cherish
and want to make sure that we're preserving.

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Other impacts you can see here in these
photos are things like climate change,

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where you're starting to see more frequent
flooding incidences in low-lying areas,

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because in some cases, they're tidally
influenced. So water is starting to pop

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up through the line and coming up through the
storm drains, causing some of these kind of

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problems in certain areas like you can see here in
Māpunapuna, on the left. Other things are like

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your aging infrastructure, where the the actual
storm drains themselves are starting to fail,

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because they've been in place for 50 years plus,
and starting to run the course of their lifecycle

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and that, that ends up becoming a much more costly
effort in order to replace it. So we need to make

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sure that we're staying on top of being able
to repair a lot of this aging infrastructure.

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And then when it comes to flood mitigation,
you know, it's things like having to

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maintain a lot of the streams. Here's some
examples on the Kāne'ohe side on the Windward

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side where you can see there's a lot of debris,
a lot of trees and big boulders. And being able

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to remove a lot of that in order to allow the free
flowing of water so it doesn't contribute to a lot

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of flooding. You know here on this island, we
rely heavily on the streams in order to convey

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water from the top of the mountain down to the
bottom. So we need to be able to maintain those.

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This is real quick, I won't go
through all these numbers. But

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the bottom line is that for this island,
there's a significant amount of infrastructure,

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things that, you know, miles of pipes, culverts,
there's over 100 streams that the city is

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responsible for maintaining, you know, segments of
streams. And, you know, being able to stay on top

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of it does take a lot of resources and effort.

And it's not just one particular department,

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in our Department Facility Maintenance, but it kind of crosses over many different departments of

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the city. And that's where our Storm Water Quality Division, you know, really is put in place to kind

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of administer a lot of the efforts. One is to comply with the permits, but also to work with

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a lot of these agencies in order to ensure that they're doing what their responsibilities are.

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Here, we have kind of a busy slide where you can see currently what the city is, right now doing.

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A lot of it you can see on the left in blue is the things that demonstrate how we comply with

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the Clean Water Act, you know, under those permits that's issued through the State Department of Health.

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So we have monitoring, volunteer activities, maintaining our infrastructure, things like that.

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But also on the right hand side, we also have things that we're having to replace a lot of

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that aging infrastructure, like I mentioned, and maintaining a lot of the streams and being able to

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install things that could help to prevent a lot of the pollution from getting into the water.

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But as you can see, we need to do a lot more. And that's where we can,

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we can anticipate that the regulatory requirements under that Clean Water Act is going to continue

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to get more and more stringent, requiring us to do even more inspections and do more

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enforcement and more outreach. In addition to that, like I mentioned, that having to do a lot

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more replacing of our aging infrastructure. And you can see there's a big gap on that where we

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need to do a lot more. And the same thing with maintaining a lot of our streams where we only

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able to do a certain percentage of that, but we need to be able to get to all of those streams.

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And in addition to that, what we're anticipating is that we're going to have to start doing a lot

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more green infrastructure, because that is really where we can see a lot of the direct benefits.

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So in order to kind of, you know, project and figure out how we're going to be able to stay

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on top of all of these issues, both from the regulatory side and but more, more importantly

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on the maintenance and replacement side is that what we're proposing at the city is a—

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establishing a Storm Water Utility. And what that essentially entails is, it's a funding mechanism,

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like I mentioned, in order to provide the services for the whole entire island of O'ahu in order to

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maintain and operate that whole complex system, like I talked about. So we've been doing this

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study over the last three years, starting in 2019. And really what to look into what the feasibility

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and ability to establish the storm water utility. And we have a dedicated website you can see at

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the bottom at "StormWaterUtilityOahu.org" where you can get a lot more information

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of what I'll try to cover. So how does the storm water utility work? Where it's basically,

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basically like any other utility, like your Board of Water Supply, just like your wastewater.

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Electricity is a fee for a certain service and that fee must be correlated to the work that is

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being provided for stormwater management. You know, what, as part of what we're proposing

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is that all properties pay a proportional share and that even includes the federal

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government. And this has been established all across the country. So there's more than 2000

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cities across the country that have done something similar to what we're proposing.

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And you can see here on the right is the way that we're proposing it is based on the total

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amount of impervious area. And that's how that proportional share comes into play, because

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the more impervious area, like the areas in blue, where it's like your rooftop, your driveways, your

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hard surfaces, that's where the fee comes into play, versus your landscaping and grass areas,

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which water can soak into the ground. That's not what the fee would be accounting for,

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it would actually disregard that part of it because it actually directly is in alignment

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of what the goals of—in order to get more water into the ground, keeping it on people's

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properties, and not necessarily shedding it off and putting it straight out into the ocean.

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So with the utility, all properties pay, so includes shopping centers,

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federal facilities, like I mentioned, state, city facilities, as well as any public and private

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schools, as well as condominiums, high-rises, and residential properties.

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With a storm water utility, there will be more certainty as far as the funding because now

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you can, you know, there's something that you can rely on that is going to be always there.

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It provides more transparency because we can actually see what comes in and what gets

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actually what's being spent for that. Currently, right now with the city is all of its storm water

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programs typically are funded through the property taxes, which goes into a general fund.

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So that's shared amongst all the city departments, whether it's police, fire, emergency management

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services, parks, all of those are tapping into that general fund. So of course, you can imagine

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it gets kind of difficult in order to have anticipate what the budget is going to be

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in the future because you never know what's going to happen. And so it's on a year-to-year-basis.

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And that kind of situation, you can't really do any of that long-range planning. In addition to

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that, we can't really tap into other sources of funding like federal grants, because we're

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not sure if we're going to be able to provide the match, which a lot of these federal grants require,

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you know, so that's why what we're doing is with the utility, we will be able to do more proactive

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programming, being able to replace a lot of the

aging infrastructure, like our pipes and storm

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drains, being able to get out in maintaining our streams, and then being able to install

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a lot more of those green infrastructure, like I talked about, in all the different neighborhoods.

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I won't really necessarily go through all of this,

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but you can see that there is a tiered structure we were proposing as part of the utility. And you

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can see it kind of bases it upon the total amount of impervious area. So the more impervious area,

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the higher the fee, and it basically breaks it down, but within those different categories,

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so of course, at the bottom would be the largest properties with the biggest amount

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of impervious area. So that would likely be like your shopping centers and other bigger properties.

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With the utility, we would also propose things like credits and rebates, you know, so what we

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want to do is incentivize certain behaviors, in order to encourage people to put things that allow

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water to go into the ground, thereby helping to replenish a lot of our groundwater supplies,

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also providing some of the water quality benefits. And so in that situation, somebody could actually

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reduce the amount of the fee by digging up some of their hard surfaces, like their driveways,

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or maybe taking the downspouts from their roof and redirecting it into a landscaped area. In that

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kind of situation, they will get a credit, it would offset the amounts that they're currently

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being billed. And then that would be as a sort of reduction in the payments. In addition to that,

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you could also get rebates. So these are usually for that one time installation. So the things like

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if you were to put in like a rain barrel, for instance, or a rain garden on your property,

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you could actually possibly qualify for a rebate, and like a sort of an upfront payment for that one

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time situation of when it's installed. And of course, what we want to also account for is recognizing

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that all households, you know, that, you know, are different in terms of their financial situations.

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And so we want—would want to be able to incorporate some type of a

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sort of a reduction for those that are economically challenged, and then proposing

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some type of a hardship provision. So that's something that we've looked into a lot. And we've

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had a lot of conversations with our stakeholders in order to support what that could look like.

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So this is kind of like a sort of a map, sort of, kind of a timeline. As I mentioned,

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we started in 2019, when we started first looking into this issue of a storm water utility,

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we launched our website, we established what is referred to as a stakeholder advisory group,

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which is comprised of all the various different types of business organizations,

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environmental groups, all the neighborhood board districts, as well as engineering communities,

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land developers, other things that have different interests, that share different ideas. We present

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it to them, they give us the feedback, you know, so this even includes a faith based community.

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So there's a, you know, a wide ranging number of people that are on that board and or that

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stakeholder advisory group. And it's really been helpful to get us to this point. Starting in 2020,

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we started to do some of the community meetings, but that's when COVID hit. And so we had to

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convert it to a virtual type meetings format. And then in 2021, as things were slowly starting to

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open up again, we started to get into all the neighborhood boards. We presented both in March

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and April, as well as in September, October, at all the neighborhood boards. So those are about

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36 neighborhood board. So we went to each one of them. And I've highlighted the fact that what this

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utility, what it would provide, and what are some of the benefits. And then from there, you know,

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of course, getting all the feedback from the community. And the hope was that we were going

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to actually introduce something in 2022, you know, so to actually introduce a bill to city council to

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establish the utility. However, at this time, you know, like what you can see here is that,

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we were hoping to be able to then be able to establish the actual utility in 2022. And the

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idea was that in 2024, was when we were going to actually start collecting the fees. However,

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at this point in time, you know, there has been

some challenges economically, I know for households

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as well as businesses, primarily because of COVID. But more recently, because of the whole situation

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with now having to look at raising property tax—I mean raising property values, as well as for

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things like your, you know, we're starting to see things like inflation starting to pop-up where you

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can see at the pump, that cost of gas is going up and all the cost of services and goods are going

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up as well. So at this point in time, I think with the City Council, we knew that there was

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some hesitancy on wanting to adopt a new fee, you know, because of the current situation.

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And so we're reevaluating that and thinking of when that might be that that timing of when we

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introduce that bill. So that's something that we're currently looking at different

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types of alternatives. And at this point in time, we've kind of put a temporary pause, you know,

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but we're hoping that maybe later this year, there could be an opportunity to present that bill.

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So what's to come, you know, for the remaining

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part of this year in 2022, and going into 2023 and beyond. You know, so we took a step back,

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and obviously, recognize that, you know, as far as the utility, maybe it does be put on pause. But

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what we wanted to be able to do is start working on some of that more long-range planning,

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being able to do things that where we can actually start to express where we are going to be putting

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in our, our investments in order to replace some of our aging infrastructure, putting in more

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green infrastructure, being able to establish partnerships, things like that, and being able

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to come up with certain strategies. And so what we've been working on this year in 2022, is the

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strategic plan. So you can see like this, on the right is kind of like this kind of umbrella where,

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you know, looking at different things, whether it's for drainage purposes, flooding mitigation,

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workforce development, asset renewal replacement, and really coming up with the strategic plan,

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which is the first step in coming up with what is the mission? What are the vision,

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what are some of those goals and strategies, and then having to put all that together,

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that would then lead into what we're referring to as a more comprehensive storm water master

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plan. And that's going to take place next year. And a lot of that effort is going to be using,

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what we're targeting is to be using these recent ARPA funds, the federal ARPA funds. So this is the

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monies that the federal government gave all—to all the states, and then it passed on to the counties,

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and being able to do more of that planning, like we mentioned, you know, so that's where we're

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looking to tap into that resource. And the idea is that, then we could actually start creating

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these strategies, putting it down in terms of the functional plans of where we need to start

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building, you know, replacement plans in certain communities, and being able to prioritize that and

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being more transparent, so that we can kind of see over the long term, whether it's 10 years,

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30 years, 50 years, even 100 years, where do we need to put all of our resources and,

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and in addition to that, we need to also look at what is the, like a more comprehensive Workforce

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Development Strategy, you know, because currently in the city, and I'm sure a lot of companies as

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well as here at, you know, at the University of Hawai'i, there's challenges with hiring, you know,

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qualified staff. And so we need to be able to come up with a strategy of how we can get people

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into the workforce, because we're going to have to be able to plan, design, construct, but also be

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able to maintain it. And that's really the big key part of it, is being able to maintain it over the

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long term. And so this is all going to be part of that Storm Water Master Plan that we're going to be

0:18:04.640,0:18:09.600

developing over the next year. And that we're kind of really excited to see what comes out of them.

0:18:12.000,0:18:16.800

Tying into all of that, we also know that as I mentioned, it's really the heavy emphasis is

0:18:16.800,0:18:21.120

going to be putting in more green storm water infrastructure. You can see here examples of

0:18:21.120,0:18:26.000

throughout the island, especially here on the leeward side, out in Nānākuli and Wai'anae where

0:18:26.000,0:18:31.440

it's very dry, but still, you can see where it can actually support things like green infrastructure,

0:18:31.440,0:18:35.840

and, you know, includes things like trees,

plants, you know, native plants, and grasses

0:18:35.840,0:18:40.240
and brushes and things. And it just helps to beautify the community. But it provides that

0:18:40.240,0:18:45.120
extra benefit of treating the water, filtering it through the natural landscape, and also

0:18:45.120,0:18:52.800
providing some of the more aesthetic benefits. In addition to also, there's a whole number of

0:18:52.800,0:18:56.800
benefits that you get with green stormwater infrastructure, like the heat island effect,

0:18:57.440,0:19:01.200
as well as being able to, you know, recharge some of our groundwater supplies.

0:19:02.800,0:19:06.320
And it doesn't necessarily mean that green stormwater infrastructure is only limited to just

0:19:06.320,0:19:11.280
plants and grasses. You can see on the left is that it also includes things like permeable pavements,

0:19:11.280,0:19:16.400
where you're allowing water to flow directly through the pavers, and then getting it down

0:19:16.400,0:19:20.480
into the ground rather than just shedding it off and going directly into the storm drain. So you're

0:19:20.480,0:19:25.040
providing some of that additional benefits to capture, treat it, and store the water.

0:19:27.440,0:19:31.680
So here at the City and County of Honolulu, what we have is, in place is what is referred

0:19:31.680,0:19:39.040
to as standards. It's—it was basically developed back in 1984, is this Department of Public

0:19:39.040,0:19:44.320
Works Standards, both the standard details as well as the specification. And that applies to

0:19:44.320,0:19:50.080
all the construction, new development as well as redevelopment. So when they're putting in a new

0:19:50.080,0:19:54.800
subdivision for instance, they're going to refer to the standards. But over that time,

0:19:54.800,0:20:00.560
it hasn't been really updated significantly. And so there was a real big push, especially on our

0:20:00.560,0:20:04.800
department, within our Department of Facility Maintenance to update those standards. And so

0:20:04.800,0:20:10.080
you can see here in 2020, we took that effort to actually go through all the different standards to

0:20:10.640,0:20:15.600
try to incorporate new technologies, new designs, and getting it to the point where at least it's

0:20:15.600,0:20:21.280
something more up to the current codes and requirements. And so we address things like

0:20:21.280,0:20:26.480
drainage. So these are like your catch basins, your storm drain pipes, your storm drain culverts,

0:20:27.840,0:20:34.160
manholes, and things like that. We also address transportation, so like sidewalks and street lights

0:20:34.160,0:20:39.760
and traffic signals. And in addition to that, what we did was created this whole new section that

0:20:39.760,0:20:45.760
wasn't existing in 1984, which is focused on green stormwater infrastructure, like I just mentioned.

0:20:45.760,0:20:49.840
So we have a whole new section just dedicated to this green stormwater infrastructure,

0:20:49.840,0:20:54.800
where it provides those details that contractors, designers use as a reference tool

0:20:54.800,0:21:00.640
in order to, you know, help streamline it, and making sure that the city or whatever developer or

0:21:00.640,0:21:06.160
designer is following, is something that the city would, you know, basically accept. So

0:21:06.160,0:21:12.240
this is one example of a typical green stormwater infrastructure detail for a vegetated biofilter.

0:21:12.240,0:21:17.680
So you can see here where it talks about what the different layouts are, the depths, some of the

0:21:17.680,0:21:21.920

depths, as well as what needs to be done as far as what a contractor would be following.

0:21:22.560,0:21:26.800

And then, you know, an example of that is like a tree box filter. You can see on the right hand side,

0:21:26.800,0:21:31.600

where it's one that was installed at a McDonald's in Kāhala. So it's just more like a box,

0:21:31.600,0:21:36.400

you can see and then it has like a root ball as well as the tree stump inside of it. And what it

0:21:36.400,0:21:42.880

acts is is a filter. So water flows into it, it allows the water to naturally get filtered to the

0:21:43.520,0:21:49.280

the plant roots as well as the soils and other things in order to provide those direct benefits.

0:21:50.400,0:21:54.880

And this is just another example of one that is for a bioretention basin.

0:21:55.600,0:22:00.480

You can see on the right some photos, examples of like in the Ala Wai Neighborhood Park—

0:22:00.480,0:22:07.200

Neighborhood Board Park, where they have like a bioretention area, as well as the

0:22:07.200,0:22:12.400

biofiltration swale that was installed at the Honolulu Police Station out in Kalihi.

0:22:15.360,0:22:20.080

So I just wanted to wrap up that, you know, what we mentioned was I talked about is really trying

0:22:20.080,0:22:25.840

to establish more partnerships, being able to tap into other federal sources of funding.

0:22:26.880,0:22:30.720

And this is actually one example of one that we're hoping to be able to do in the future.

0:22:30.720,0:22:36.320

And this is really directly tied to the University of Hawai'i at Mānoa, where we've had conversations

0:22:36.320,0:22:42.000

with the, working with the Water Resources Research Center. We've been working with a

0:22:42.000,0:22:44.960

an individual, her name is Dr.

0:22:44.960,0:22:49.600

Amanda Cording and she kind of specializes in biofiltration, rain gardens, and things.

0:22:49.600,0:22:54.560

And what we've been talking about is putting in together this pilot project where it's focused on

0:22:54.560,0:23:00.560

developing what is going to be referred to as like a living laboratory that allows for students at

0:23:00.560,0:23:05.520

Holmes Hall, which is mostly comprised of engineers, in order to come up with different designs. And

0:23:05.520,0:23:10.000

the idea would be to direct a lot of the runoff coming from the city portion, which is along Dole

0:23:10.000,0:23:16.880

Street, and in having that water going into the landscaped area onto the University of Hawai'i's property,

0:23:16.880,0:23:22.160

and being able to come up with these modular type units in order to monitor the benefits of these

0:23:22.160,0:23:27.760

different type of bio return—green stormwater infrastructure, installations, and designs. So

0:23:27.760,0:23:33.200

this is something that we're talking about, we're using the storm drains coming from the roadway,

0:23:33.200,0:23:37.360

directing it into it so that you can kind of create a real life situation on what the direct

0:23:37.360,0:23:43.200

benefits of these layouts. And so this is just some preliminary, you know, field reconnaissance

0:23:43.200,0:23:47.920

work looking at the different drains you can see here along East-West Road. But more importantly,

0:23:47.920,0:23:53.200

along also on Dole Street and being able to get that water into the adjacent property, you can

0:23:53.200,0:23:58.800

see on the University of Hawai'i side. So we've had some preliminary discussions, I know we've talked

0:23:58.800,0:24:06.880

to the Dean of—the Dean of Engineering, and he's very supportive of this idea. He's kind of put us

0:24:06.880,0:24:12.000

in contact with the facility side. And now it's a matter of trying to see if there is an opportunity

0:24:12.000,0:24:17.760

to kind of put together a grant package that could qualify for some kind of federal funds, in which

0:24:17.760,0:24:23.600

case the city could then come up with a design in order to redirect these flows into the property,

0:24:23.600,0:24:28.560

build this living laboratory so that then it can be turned over to the universe—University of Hawai'i

0:24:28.560,0:24:32.320

to allow for the students to be able to come up with different types of designs and layouts.

0:24:33.520,0:24:38.320

So this is just another example of where the storm drains are and how that water would essentially

0:24:38.320,0:24:44.160

need to get onto the adjacent property, right. So rather than going directly into the drain, going

0:24:44.160,0:24:49.440

out into Mānoa Stream and then going out into the ocean, we would intercept that water and be able to

0:24:49.440,0:24:56.160

filter and treat that. So this is just again another example of what preliminary was thinking

0:24:57.040,0:25:01.360

but again, this is just still at the initial stages of the conversation and so we're

0:25:01.920,0:25:08.400

continuing to have those conversations with the University of Hawai'i. These are just some resources I just

0:25:08.400,0:25:14.080

want to direct your attention to. So this is where we have our storm water utility study I mentioned

0:25:14.080,0:25:19.920

and where we have all the information as far as the plans for having to establish a fee for all

0:25:19.920,0:25:26.080

properties, where credits could come into play. But also other things like the cost of services

0:25:26.080,0:25:30.400

and what the cost that the city is currently spending, and then whether it was a projection of

0:25:30.400,0:25:35.440

where we need to get to in the future. We also have guidance for homeowners, if they ever are

0:25:35.440,0:25:38.640

interested in installing green infrastructure on their properties like putting in the,

0:25:39.520,0:25:44.720

you know, redirecting their downspouts or putting in a rain barrel, or whatever, a rain garden. And then, of

0:25:44.720,0:25:49.280

course, the last one is our website where you can get any kind of information as far as our program,

0:25:49.280,0:25:54.800

which focuses a lot on water quality, and as well as on complying with those permit requirements

0:25:54.800,0:26:00.480

under the Clean Water Act. So this is at "cleanwaterhonolulu.com." And at the bottom, you can see

0:26:00.480,0:26:05.200

there's other resources. So if you ever have an issue, you can always go to the city's 311 app.

0:26:05.840,0:26:10.480

There's also an environmental concern language, you can call as well as sending an email to,

0:26:11.520,0:26:15.680

to this complaints@honolulu.gov, which will eventually get to us. And then of course,

0:26:15.680,0:26:20.800

we also have a Clean Stream Hotline, where if there's any issues in terms of what's happening

0:26:20.800,0:26:25.040

in the streams and having to be able to maintain it, there is a hotline established for that.

0:26:27.040,0:26:31.120

So this time, I just wanted to thank you again for giving us this opportunity. And

0:26:31.120,0:26:34.640

at this point, I'd like to turn it over to Lauren Roth Venu,

0:26:34.640,0:26:38.240

who's going to talk a little bit more about some of the opportunities, we're partnering with them,

0:26:38.240,0:26:43.520

but also how they're working with different nonprofits and organizations. Thank you.

0:26:49.440,0:26:50.080

[Lauren Roth Venu (speaker):]

All right. Thank you,

0:26:50.080,0:26:55.760

Randall. And thank you WRRRC for inviting us here today, I'm just gonna get this set up.

0:26:56.640,0:27:00.880

And I think Randall gave a really great background about where the city's going

0:27:00.880,0:27:06.320

and also some background about green stormwater infrastructure. And so I'm gonna kind of take the

0:27:06.320,0:27:11.760

baton there and there and move this forward and talk a little bit

about Follow the Drop, which is mobile and data

0:27:11.760,0:27:16.960

platform that is designed to actually help the private property owners identify green

0:27:16.960,0:27:23.040

infrastructure solutions. And so I'm as mentioned in my intro, I am the founding principal

0:27:23.040,0:27:27.411

Roth Ecological Design and this mobile app is actually housed under a new startup called

0:27:27.411,0:27:28.160

3Rwater.

0:27:30.000,0:27:33.280

So again, I'm sure this audience is also

0:27:33.280,0:27:38.320

very well familiar with the issues we're having today. I mean, not only are we impacting, you're

0:27:38.320,0:27:42.480

getting the impacts of climate change, but just increased urbanization alone and more and more

0:27:42.480,0:27:48.560

hard surfaces. It's just leading to the likelihood of more flooding, more pollution in our water,

0:27:48.560,0:27:53.200

and even impacting our future water supply, since that water can no longer get back into the ground.

0:27:54.720,0:27:58.560

So again, just to, you know, as, as Randall had mentioned,

0:27:58.560,0:28:03.840

the whole premise is how can we think about

the predevelopment hydrology and think about

0:28:03.840,0:28:08.960

natural systems and ecosystem services and rebuild these systems back into the urban spaces.

0:28:09.600,0:28:14.080

And so green infrastructure includes a whole bunch of things from rainwater harvesting, to bio-

0:28:14.080,0:28:20.080

retention, green roofs, renewable pavement, and Randall gave a good background on their benefits.

0:28:20.640,0:28:25.520

And as you mentioned, it has a whole host of other benefits other than just managing stormwater.

0:28:27.920,0:28:32.400

So Follow the Drop really was then about how can we increase that access to these types

0:28:32.400,0:28:36.800

of solutions to everybody. So, you know, I'm sure a lot of folks in this audience

0:28:36.800,0:28:42.000

are familiar, maybe designers or engineers of such systems are seeing them play. But there's

0:28:42.000,0:28:46.240

many folks out there that just literally have never heard of green infrastructure,

0:28:46.240,0:28:51.440

understand how they contribute to the stormwater runoff problems. And so the whole idea behind

0:28:51.440,0:28:56.320

Follow the Drop was how do we essentially take that knowledge and make an easy to use platform

0:28:56.320,0:29:00.960

for everybody to be able to identify their own footprints of stormwater and then importantly,

0:29:00.960,0:29:08.240

also be part of the solution to capture it on property. And so we work specifically with cities.

0:29:08.240,0:29:13.280

And so we're working with, for example, the City and County of Honolulu, and the whole idea too is to modernize

0:29:13.280,0:29:17.440

their programs so that they can really increase and accelerate that community engagement piece.

0:29:18.000,0:29:23.840

But then importantly, on the back end too, which

I'll get into, the app actually also helps them be

0:29:23.840,0:29:28.080
able to track these assets. So this is really important, because oftentimes, what's happened

0:29:28.080,0:29:33.920
is these systems get installed, often they will be left not maintained. And then of course, and

0:29:33.920,0:29:37.760
then that they're not going to be functioning the way that they were intended. So the app will help

0:29:37.760,0:29:43.440
them provide those opportunities to see, to track those projects over the course of its lifetime,

0:29:43.440,0:29:47.440
as well as collect stormwater metrics, track that maintenance, and again,

0:29:47.440,0:29:53.840
also offer opportunities for customer or a future utility customer communication and engagement.

0:29:55.120,0:30:00.720
So just want to acknowledge kind of a little bit of background, so back in 2018 and 2019,

0:30:01.280,0:30:05.360
we originally received funding to kind of move forward with this idea Follow the Drop

0:30:06.080,0:30:11.440
with a grant from the Water Security Advisory Group, which was hosted by the Commissioner of

0:30:11.440,0:30:16.480
Water Resource Management, as well as the Hawai'i Community Foundation. And so we had a whole

0:30:16.480,0:30:21.440
fantastic group of partners that kind of came together to think about how we can develop

0:30:21.440,0:30:26.720
this tool, and importantly, have it be a great educational resource. So initially, when it was in

0:30:26.720,0:30:32.000
development, we really wanted to make sure it was super easy and fun to use. And so we had fourth

0:30:32.000,0:30:36.880
and fifth graders piloting it at their campuses. And in the meantime, in partnership with Kupu,

0:30:37.440,0:30:42.640
we developed a 13 lesson plan curriculum that basically teaches about—teaches

0:30:42.640,0:30:48.400
middle school aged students about the issues of water and climate change, but also, importantly, you know,

0:30:49.280,0:30:54.160
introducing them to the solutions such as green infrastructure. And so they had a

0:30:54.160,0:30:58.320
great time actually, you know, auditing their campuses with the app, and then importantly,

0:30:58.320,0:31:05.680
providing us feedback to make sure it'd be fun to use for those in the future. And so again today,

0:31:05.680,0:31:10.160
on the app is really then being tested in piloted, and I'll get into a little bit with what we're

0:31:10.160,0:31:14.560
doing with the city. But the whole idea is then how can we support bringing in more green

0:31:14.560,0:31:20.080
infrastructure practices to private properties, and public properties throughout the island.

0:31:20.080,0:31:22.480
So I'm just going to give

0:31:22.480,0:31:27.040
you a little bit of a walkthrough of how it works. So basically, the administrator

0:31:27.040,0:31:30.720
would would be the someone like the City and County of Honolulu, where they have a license

0:31:31.520,0:31:36.000
to view all of the data that's being entered into the app. And then the user would be,

0:31:36.000,0:31:40.480
for example, anyone within the jurisdiction of the city, so the island of O'ahu. You'd be given

0:31:40.480,0:31:46.000
a license key under the administrator. And then after you register, you, essentially login.

0:31:47.120,0:31:52.240
And so the app then ideally was going to be trying to do is identify opportunities on your

0:31:52.240,0:31:58.640
property, where you can capture stormwater and implement green infrastructure solutions. So

0:31:58.640,0:32:03.680

it'll guide you first to try to identify different drainage devices around your home, in this case.

0:32:03.680,0:32:08.720

In this particular one on the left, you'll see what's called an open downspout. So

0:32:08.720,0:32:13.760

the downspouts bringing water down from the roof of this building. And we created these icons

0:32:13.760,0:32:17.920

on the bottom that you can kind of scroll back and forth on in case, you know, many folks maybe

0:32:17.920,0:32:22.160

not, don't understand the terminology, for example, of what some of these drainage devices

0:32:22.160,0:32:26.320

are called. So they can just select the icon that best matches to what they're looking at.

0:32:27.200,0:32:31.920

It'll then ask them to classify the surrounding area. So looking around that downspout,

0:32:32.480,0:32:38.080

what are the conditions, is it flat, is it sloping, bare soil, pavement, and you're going to select

0:32:38.080,0:32:43.760

what those conditions are to help them guide what practice will be best for that situation.

0:32:45.840,0:32:51.040

So after that, it will take you then into basically a Google Maps and it will ask you

0:32:51.040,0:32:55.360

then to then draw the drainage area. So this is the area, in this case of the building,

0:32:55.360,0:32:59.520

there was several, there were several downspouts that they wanted to collect from to move into a

0:32:59.520,0:33:03.520

rain garden. So they just tapped on the screen to draw the area of the roof that they want to

0:33:03.520,0:33:08.400

capture the stormwater from. And so it's just basically using a simple Google Earth tool.

0:33:08.400,0:33:13.200

And then that drainage area will then auto populate there at the bottom. And

0:33:13.200,0:33:18.640

once that's confirmed, it will then bring in the rainfall data. So we're currently using the Hawai'i

0:33:18.640,0:33:23.440

Rainfall Atlas data. But we're excited that we have been working with Tom and others to bring

0:33:23.440,0:33:29.280

in the new portal data, which will be much more up to date. And as I—as I'll get into later,

0:33:29.280,0:33:34.080

we'll be developing a dashboard that will give forecasting and also be able to give you real time

0:33:34.080,0:33:39.440

stormwater about volumes that your projects are capturing. But anyway, in the meantime,

0:33:39.440,0:33:44.800

what it's doing is based on that pinpoint in the geolocation, it's bringing in the rainfall data

0:33:44.800,0:33:49.440

for that particular site. Again, here it's populating at 35 inches of rain per year.

0:33:50.960,0:33:55.600

And so with those with the drainage area and those pieces of information, it's been able to populate

0:33:55.600,0:34:00.720

the stormwater runoff volume. So if you look here, then on the on the left-hand side that tan bar graph

0:34:01.600,0:34:06.880

is saying that that downspout is producing roughly about 80,000 gallons of water per

0:34:06.880,0:34:13.920

year. It's pointing at the rainwater catchment and provides then an optimum or ideal value of a size

0:34:13.920,0:34:19.600

tank that'd be roughly about a 2300 gallon tank. But let's say you don't have the size or you don't

0:34:19.600,0:34:23.840

have the space or the money for that size tank you can enter whatever size you deem feasible.

0:34:23.840,0:34:29.440

And then the blue bar graph will be animated and tell you approximately how much of that stormwater

0:34:29.440,0:34:34.480

per year you'd capture based on the size and type system you selected. So again, a 500 gallon tank

0:34:34.480,0:34:40.000

here is roughly about 15,000 gallons of water,

that's estimated that you'd capture per year.

0:34:40.800,0:34:46.000

On the right-hand side is when this, when the stormwater utility gets going, it will then tell

0:34:46.000,0:34:52.000

you—it'll estimate the area of impervious area treated or removed, which will then you know,

0:34:52.000,0:34:55.760

basically is how you'll be billed. And then it'll estimate then what your fee credit would

0:34:55.760,0:35:00.320

be based on the size and type system entered. And so this will become valuable so that you

0:35:00.320,0:35:06.400

would understand potential financial gain. And so specifically with the rainwater catchment, because

0:35:06.400,0:35:11.360

currently the Board of Water Supply does have a rebate, we also are looking into adding a

0:35:11.360,0:35:16.560

button, if you select a catchment tank that will link you directly to getting that rebate as well.

0:35:16.560,0:35:21.680

So then in UserVOD, basically—I should maybe

0:35:21.680,0:35:26.320

a step back for a second. But basically at this point, you can either save the project as a

0:35:26.320,0:35:30.800

draft, if you just want to play around with the tool and you're not sure yet how you want to move forward

0:35:31.920,0:35:37.520

or you would then eventually be able to submit these projects directly to the city for review, to

0:35:38.400,0:35:45.040

eventually receive that credit or rebate. So it also then has summary views. So let's say

0:35:45.040,0:35:49.120

you're an engineer or planner, or just someone who has a lot of opportunities on your property,

0:35:49.120,0:35:53.920

you can take a variety of data points, and you'll only see your data. But you can see

0:35:53.920,0:35:58.800

it in map view all the drops representative of the different types of green infrastructure practices,

0:35:58.800,0:36:02.640

you can see in chart view. Importantly, you can also see it in list view.

0:36:03.520,0:36:07.440

And so on this view, you'll be able to then follow along with the status of your project.

0:36:08.880,0:36:13.920

This history icon button, which you see on the left that's highlighted in red, that essentially

0:36:13.920,0:36:19.440

if you press that, it'll tell you where your project is and the status of of its lifetime.

0:36:19.440,0:36:24.080

So essentially, when you first submit a project, you would only get, you only get the blue checkbox

0:36:24.080,0:36:28.800

where it says submitted. And then only the City and County would be able to change the status of

0:36:28.800,0:36:33.920

the project. So after you've submitted it, they'll be able to review your project, and then update

0:36:33.920,0:36:38.880

that status to approved and it would be time stamped on both ends so you could see, you know, when it—

0:36:38.880,0:36:43.520

when your project was approved. With that, they'll—you'll receive a notification

0:36:44.560,0:36:49.680

from them that essentially, that essentially that you would have to upload a new photo

0:36:49.680,0:36:55.280

to verify, for example, that it has been installed to be able to get to that new installed checkbox,

0:36:55.280,0:37:00.560

and at that point, you'd be considered for that credit or rebate. And then importantly too—it's

0:37:00.560,0:37:06.400

important to keep track of the maintenance. So it might be annually or every few years, the city

0:37:06.400,0:37:12.880

might decide to send an automatic notification for then a new photo to be uploaded

0:37:12.880,0:37:17.440

to verify that it's still being installed and maintained, to maintain that credit status.

0:37:19.200,0:37:22.320

And so importantly with the city, as I mentioned, they'll be able then to see

0:37:22.320,0:37:26.320
all of the users data that's coming in so that they can easily track their location

0:37:26.960,0:37:32.480
status, including when status changes happen, as well as the different volumes of stormwater

0:37:32.480,0:37:36.320
that are being managed in these various green stormwater infrastructure practices.

0:37:37.760,0:37:41.120
And importantly, as I mentioned before, they can also then send these notifications

0:37:42.000,0:37:47.120
to the users to when new photos are needed, it could also be to announce when rain barrel workshops

0:37:47.120,0:37:51.040
are available, for other kind of alerts they might want to send out to their customers.

0:37:53.360,0:37:54.240
I'm just going to briefly

0:37:54.240,0:37:59.120
give you an overview of what we're currently doing with the partnership with both the City

0:37:59.120,0:38:03.120
and County of Honolulu Department of Facilities Maintenance as well as Mālama Maunaloa,

0:38:03.120,0:38:06.480
which is a nonprofit group located in East Honolulu.

0:38:07.440,0:38:12.560
And so this was generally our overall like scope that we've been working on for the last year and

0:38:12.560,0:38:19.120
a half or so. I'm really going to just dive in to how we, how we are using the app and a specific

0:38:19.120,0:38:25.280
watershed. And so basically, what had happened was we wanted to identify a priority area that

0:38:25.280,0:38:32.160
was experiencing not only nuisance flooding, but obviously, there's pollution issues into Maunaloa Bay.

0:38:32.160,0:38:36.080
And, but the other piece to this that was interesting was that this was also

0:38:36.080,0:38:41.360
'Āina Haina was also a priority watershed to the Board of Water Supply because of the

0:38:42.480,0:38:47.760
potential of how the amount of water that the community is needing, versus the amount of water

0:38:47.760,0:38:53.840
that is in the aquifers in the area. So basically, when there's not enough supply in this area,

0:38:53.840,0:38:59.200
Board of Water Supply will then have to pump from Hālawā Shaft or other locations in Central Oahu,

0:38:59.200,0:39:05.040
which increases the cost of operations. So anyway, so we looked at Follow the Drop to basically think

0:39:05.040,0:39:12.960
about what would be the benefit if all of the 1800 odd properties were to implement the optimum

0:39:12.960,0:39:17.680
size green infrastructure because at the time we didn't really have an understanding of what would

0:39:17.680,0:39:24.320
be the impact of a program that would support green infrastructure going in. So what we did is

0:39:24.320,0:39:30.800
we were able to use the app remotely and actually go into these 1800 odd properties that are

0:39:30.800,0:39:36.800
primarily residential, a few—not a few schools and nonprofits as well as the shopping center

0:39:36.800,0:39:41.840
there. So the data was was interesting because we were able to kind of separate out the data,

0:39:42.400,0:39:47.200
you know, in different quadrants based off of different rainfall isohyets. So, for example,

0:39:47.920,0:39:53.680
and then in just the residential area, we've had this upper watershed group of about 80 odd homes,

0:39:53.680,0:39:59.760
and the app was able to provide the following information that there's from 55 inches of rainfall,

0:39:59.760,0:40:05.120
the average building roof area was roughly 2500 square feet, and that the total stormwater

0:40:05.760,0:40:12.080

volume just coming off of these homes in this one quadrant is about 6.3 million gallons per year.

0:40:12.080,0:40:17.760

And so what was interesting about that number was, that's roughly about 50% of the potable

0:40:17.760,0:40:24.080

water demand that these homes would be needing. So if—when this water is really just coming down

0:40:24.080,0:40:29.040

their driveways into a storm sewer, into a stream, and then into an ocean, you're losing,

0:40:29.040,0:40:33.440

if you will, that storm water and it's creating a problem carrying pollution. But these properties,

0:40:33.440,0:40:37.360

were then able to capture it and recharge it that's getting them that that water back down in

0:40:37.360,0:40:42.160

that aquifer, and importantly offering potentially if they do catchments and alternative supplies.

0:40:43.120,0:40:47.360

And so, we looked at then if they were to implement optimum size green infrastructure,

0:40:47.360,0:40:53.120

the potential reduction could be about 5.6 million gallons, versus only if there was a

0:40:53.120,0:40:57.680

rain barrel program continued, that would only be about 200,000 gallons captured per year. So

0:40:57.680,0:41:03.360

pretty big difference. We also then looked at, you know, the other properties further

0:41:03.360,0:41:07.360

down the watershed, such as the schools and churches, nonprofits, and again,

0:41:07.360,0:41:12.080

there's less of them, but these building groups obviously get larger. And so again, you know,

0:41:12.080,0:41:17.120

we had about 5.7 million gallons of stormwater coming off potential volume for that could be

0:41:17.120,0:41:22.320

captured with green infrastructure is about 5.2 million gallons. And again, if they only continue

0:41:22.320,0:41:27.680

with a rain barrel program, a much less volume of 360,000 gallons could be captured per year.

0:41:29.680,0:41:33.280

And then, of course, there's the one shopping center, the 'Āina Haina Shopping Center, you

0:41:33.280,0:41:38.800

know, obviously a lot of hard surfaces. Obviously their stormwater utility bill would also

0:41:38.800,0:41:44.160

be greatly—would be much, much greater, because of all the parking lots and building roofs.

0:41:45.040,0:41:49.040

And you can see that just in this one space, you know, about 17,000 square

0:41:49.040,0:41:54.480

feet of building roof area, they produce about 5.6 million gallons of stormwater, and again,

0:41:55.120,0:41:59.520

have the potential to capture about 90% of that through optimum green infrastructure sizing.

0:42:01.600,0:42:05.520

And so we just kind of did another kind of just using the chart view comparison.

0:42:05.520,0:42:08.800

Looking at this is just an example of one of the residential quadrants,

0:42:09.520,0:42:13.600

the tan representing stormwater runoff volumes from the different properties,

0:42:13.600,0:42:16.720

the numbers and below are the tax map keys of each of the properties,

0:42:17.520,0:42:21.840

and the blue representing the potential for stormwater capture. So obviously, when it's

0:42:21.840,0:42:29.360

a rain barrel, we estimated that to be about 50 gallons, and then if it's optimal size, green

0:42:29.360,0:42:33.760

infrastructure, you know, they will be capturing 90% of that stormwater runoff on average.

0:42:35.840,0:42:37.280

We are also then, the data is

0:42:37.280,0:42:43.360

also able to be exported into a CSV file where we can then just easily summarize the data collected.

0:42:43.360,0:42:47.920

And this was important just because we wanted to just see what the current conditions are and

0:42:47.920,0:42:52.720

then what the potential could be for reduction of stormwater runoff. And then importantly, then what

0:42:52.720,0:42:58.640

percentage of people or types of properties would need to implement green infrastructure to make

0:42:58.640,0:43:03.760

any kind of significant dent. And so the really the numbers that I want you to kind of hone in on are,

0:43:03.760,0:43:09.840

you know, the total on average runoff volume for 'Āina Haina was roughly about 18 million gallons,

0:43:09.840,0:43:15.200

and about, I believe that's around 85% or 90% of that coming from the residential community. So,

0:43:15.760,0:43:20.480

you know, this is pretty common, not only for 'Āina Haina, but across the island that

0:43:20.480,0:43:26.320

really the bulk of stormwater runoff is coming from residential communities. But importantly,

0:43:26.320,0:43:32.480

the commercial facilities that are quite large and have a lot of concrete and hardscapes

0:43:32.480,0:43:39.120

do contribute quite a bit of that runoff as well as other schools and nonprofits. But again

0:43:39.120,0:43:44.080

our, you know, if everyone were to implement this option says green infrastructure, we would have

0:43:44.080,0:43:49.280

a pretty significant dent in terms of improving water quality and getting that water back into

0:43:49.280,0:43:56.400

the ground. So again, about 90% potential capture rate, about 100 billion gallons per year. And if

0:43:56.400,0:44:01.520

they only continue to push out a rain barrel program, then we would have only about a 3%

0:44:02.640,0:44:12.320

capture rate or recharge ability to, you know, capture that volume. So again, this data is then being used in

0:44:12.320,0:44:17.360

relation with our partnership with Mālama Maunalua. But also what we're doing

0:44:17.360,0:44:21.840

with the City then is also looking at updates to the app while we're doing this pilot with

0:44:22.560,0:44:29.440

Mālama Maunalua to be able to test new features and products that were—that we're offering. The mostly

0:44:29.440,0:44:34.560

the main thing is we want to try to align the app with the City program and also continue to add

0:44:35.440,0:44:39.760

different types of green stormwater infrastructure practices that are in line with what Randall

0:44:39.760,0:44:45.840

mentioned in the City's design standards. And then also working on how we can integrate the

0:44:45.840,0:44:51.280

Board of Water Supply rebate program. Importantly, we're also doing some fun dashboard development,

0:44:51.280,0:44:55.200

which we hope will come out soon. And it'll basically be a way for the users to be able to

0:44:55.200,0:45:00.000

monitor how much stormwater they're capturing, as well as the money that they're saving. We'd also

0:45:00.000,0:45:06.000

have some forecast data to alert when storms are coming. For example, prepare their rain tanks

0:45:06.000,0:45:11.920

to drop down the level so it can capture the volume and other types of features like that.

0:45:14.080,0:45:21.280

So, with that, Mālama Maunalua has basically set up a page called rainwaterhawaii.com.

0:45:21.840,0:45:27.520

And basically are offering free rainwater assessments from the Kahala to Hawai'i Kai

0:45:27.520,0:45:31.200

area. And what they'll, what they're able to do is come in, by appointment,

0:45:31.200,0:45:35.920

coming into these properties and using the app and working with the property owners, they can

0:45:35.920,0:45:41.120

help identify the stormwater runoff footprint that these properties have, importantly, helped

0:45:41.120,0:45:46.800

size and identify locations where these different types of green infrastructure practices can go.

0:45:47.440,0:45:50.800

And then with that, they're actually then surveying the community to see,

0:45:51.360,0:45:55.440

you know, would the property owner install these projects that are being recommended,

0:45:55.440,0:46:00.400

with or without an additional incentive. And this information is really important so that we

0:46:00.400,0:46:06.720

can help bring that back to the City to help maybe engage what might be needed to get property

0:46:06.720,0:46:12.320

owners to actually implement these projects. As another carrot to this, if when you get your

0:46:12.320,0:46:15.680

property owner, when you get your property assessed, you'll be entered to win a free rain barrel.

0:46:16.480,0:46:20.400

One will be drawn the end of this summer and another one at the end of the year.

0:46:20.400,0:46:26.080

If you know anyone in the area, please have them sign up, they're certainly looking for more

0:46:26.080,0:46:31.680

houses to participate. And then lastly, they're going out into the community, in different

0:46:32.320,0:46:37.120

types of community events. And then for those that they can't hit, they

0:46:37.120,0:46:40.720

will actually audit their properties remotely and walk them through the process,

0:46:40.720,0:46:47.520

and also get feedback from community members in different locations. And really at the

0:46:47.520,0:46:52.400

end of the day, I think really the future of stormwater, as as we're titled in our talk,

0:46:52.400,0:46:55.840

is really how can we create more access

to these green infrastructure solutions,

0:46:56.480,0:47:01.440

and really start envisioning what our City could look like in terms of, you know, normalizing

0:47:02.080,0:47:09.840

stormwater management across all properties. I'll end there and open up to any questions.

Q&A Begins

0:47:15.120,0:47:17.680

[Keri Kodama:]

All right, thank you so much to both of our speakers.

0:47:19.440,0:47:21.920

I don't see any questions in the chat at the moment,

0:47:21.920,0:47:37.840

but everyone feel free to enter them at this time.

0:47:40.960,0:47:46.160

While we're waiting for the chat, I kind of had a question about the stormwater capture.

0:47:47.360,0:47:51.840

So, there would obviously need to be some kind of treatment done for it to be

0:47:52.640,0:48:00.160

usable for a lot of human purposes. So like, what would people re—how would people repurpose it?

0:48:00.160,0:48:06.400

Or is it mostly just to put it back into the aquifer? Like, they're just kind of, you know,

0:48:08.080,0:48:12.240

you capture it and putting it, try to get it back into the ground itself?

0:48:12.240,0:48:15.040

[Lauren Roth Venu:]

I can answer that question.

0:48:15.040,0:48:17.920

Well, stormwater is gonna have different qualities depending on where it comes from.

0:48:18.640,0:48:23.040

So if you're capturing it off of your roof, that's generally going to be a pretty relatively clean

0:48:23.040,0:48:28.160

supply. Although you know, in between rain events, you will get sort of dustings of,

0:48:28.160,0:48:34.560

of bird poop and other debris. So oftentimes, what

you'll have is what's called a first flush

0:48:35.200,0:48:40.000

device, and then after that, it will then go into your rain tank.

0:48:44.800,0:48:51.360

[Randall Wakumoto:]

Yeah, and I think, you know, I mean, we definitely wouldn't, we're not recommending consumption

0:48:51.360,0:48:55.840

of the water itself. But, you know, I know that there's different ideas that people can

0:48:55.840,0:49:02.640

come up with, like, of course, the most obvious is being able to use it for irrigating your lawn and

0:49:04.880,0:49:10.080

plants that can be used after the rain event has occurred, and then being able to store it for a

0:49:10.080,0:49:15.200

period of time and then using it after, you know, so that's one way. Other things that you know,

0:49:15.200,0:49:20.080

has been talked about is using it for when washing your vehicle, for instance, you know, if having to

0:49:20.080,0:49:23.920

use that as a potable water source, you know, something that could be used for that purpose.

0:49:24.480,0:49:27.760

And I think we've even heard from some folks that, you know, they've,

0:49:28.320,0:49:33.520

you know, are thinking about being able to reuse that water for like toilet flushings,

0:49:33.520,0:49:38.320

if there's a way to kind of have somehow connected to your plumbing [video temporarily frozen]

0:49:42.960,0:49:51.440

and be able to use it as flushing of your toilets, more commercial and bigger properties

0:49:51.440,0:49:57.760

that we've seen where they've actually used large capacity type cisterns and storage tanks

0:49:57.760,0:50:01.920

where they've actually used that to store water and use it for that type of purpose,

0:50:02.640,0:50:06.720

whether for decorative ponds, but also for toilet flushing and things like that.

0:50:09.520,0:50:14.000

[Keri Kodama:]

Thanks. Okay, we got a couple of chat questions

0:50:14.000,0:50:22.720

now. So first one from Dolan Eversole says, "Great presentation to both speakers. I'm curious how

0:50:22.720,0:50:27.040

these green infrastructure efforts would be given credit for an eventual stormwater fee?"

0:50:31.360,0:50:32.800

[Randall Wakumoto:]

Thank you so much for that question, Dolan. [audio interference]

0:50:35.840,0:50:42.800

And, you know, for any type of green infrastructure, or anything that will allow water to flow into

0:50:42.800,0:50:48.080

the ground, what we've proposed is that, as part of the utility, if it were to be established,

0:50:48.080,0:50:52.560

is that somebody could get upwards of 60% of a reduction in their fee.

0:50:53.440,0:50:59.120

It's all depending on the amount of impervious area that you're reducing, and capturing that

0:50:59.120,0:51:05.920

water and we base it upon, under the City's water quality rules. We use a design storm of one inch.

0:51:06.560,0:51:14.800

So that's the ad— [audio interference] For most of the island of O'ahu, the average annual is about one inch, the one inch

0:51:14.800,0:51:22.160

storm. So designing some kind of capture system or bioretention, to be able to store and filter that

0:51:22.160,0:51:28.320

one inch of stormwater, that would potentially qualify for upwards of 60% of the total fee.

0:51:32.000,0:51:36.000

[Keri Kodama:]

Okay, next one. John Ford says, "I was happy to see so many green

0:51:36.000,0:51:39.680

infrastructure initiatives already in place or being installed on O'ahu.

0:51:39.680,0:51:43.520

Is either the county or the state mapping these features and their specifications

0:51:43.520,0:51:50.240

as they're constructed? And if so, what these maps be made available to the public online?"

0:51:50.240,0:51:51.440

[Randall Wakumoto:]

Thank you so much for

0:51:51.440,0:51:56.960

that excellent question as well. So one way is, you know, you can see with Lauren Roth's

0:51:57.920,0:52:06.560

Follow the Drop app. That's another way that we can get sort of the location and installations of

0:52:06.560,0:52:10.560

this different types of green infrastructure. I think what we're doing is with the Follow the

0:52:13.040,0:52:17.120

Drop, we're definitely focusing on residential properties initially.

0:52:17.120,0:52:21.920

But it could also add on larger properties like commercial and industrial, other larger

0:52:21.920,0:52:26.560

developments that could be added as well. But in a lot of those cases, for larger properties,

0:52:26.560,0:52:32.560

especially those that are over one acre in ground disturbance is that the City has what is referred

0:52:32.560,0:52:38.000

to as its rules relating to water quality. Whenever any of these developers, designers

0:52:38.000,0:52:43.920

apply for grading, trenching, building, stockpiling type of permit. And within that, if it does exceed

0:52:43.920,0:52:50.160

those thresholds, that they have to come up with actual designs and plans that would demonstrate

0:52:50.160,0:52:55.920

what type of those type of installations are. And that information then comes over to the City.

0:52:59.280,0:53:03.680

And what we do at our Department of Planning and Permitting, they have a database that tracks all

0:53:03.680,0:53:07.680

that type of proposed installations. And then once it's been constructed,

0:53:07.680,0:53:10.960

gets turned over to our Department of Facility Maintenance, where we perform the

0:53:11.600,0:53:15.120

follow-up inspections to ensure that these property owners are maintaining them.

0:53:16.000,0:53:21.040

When we get that information, we enter it into what is a program that we call CityWorks.

0:53:21.040,0:53:25.280

It's a sort of like an app. It's an asset management type of database of kind of like

0:53:25.280,0:53:29.120

a work order system where we can generate work orders for doing our inspections.

0:53:29.920,0:53:36.080

But that also ties directly to the GIS system. And so that does have it all mapped out. And our plan

0:53:36.080,0:53:41.040

is to become—make it more accessible to the public. Right now it's more internal, because of course,

0:53:41.040,0:53:45.760

how we go about doing our inspections. But with the utility, we've always talked about being more

0:53:45.760,0:53:53.680

transparent. So we definitely want to make it more available for the public as well.

0:53:53.680,0:53:55.920

[Keri Kodama:]

Right. Donna Wong says,

0:53:56.480,0:54:00.320

"What penalties are being considered to deter people from hardening their property?"

0:54:03.760,0:54:10.480

[Randall Wakumoto:]

Well, penalties? Well, in a way, what we're doing is we're more focusing on the incentives

0:54:11.040,0:54:15.920

in order to encourage people to reduce the amount of hard surfaces on their properties.

0:54:16.720,0:54:23.280

I know that in the city, of course, they do have certain ordinances and laws that maybe put a

0:54:23.280,0:54:29.920

certain cap on the total amount of that impervious area. But if somebody were to go up to that point,

0:54:29.920,0:54:34.320

we can't necessarily say that you have to take it all out, if it's in accordance to all the current

0:54:34.320,0:54:41.840

laws and ordinances. But with the utility because it's based on that, you know, impervious area,

0:54:41.840,0:54:48.080

then in a way it de-incentivizes by, you know, putting in all that hard structures. And so

0:54:48.080,0:54:51.840

the more hard structures and pavement that you have, the more you would end up paying,

0:54:53.120,0:54:57.760

versus somebody who has landscaping, you know, so in that way, they could also qualify for certain

0:54:57.760,0:55:03.600

type of credits as well. So, you know, we're kind of looking at it on that side, in terms of how we

0:55:03.600,0:55:10.480

deter people from putting in those type of, you know, hard surfaces. We are looking at different

0:55:10.480,0:55:15.600

alternatives with the utility, we've seen in other parts of the country where they've actually

0:55:16.320,0:55:23.200

put on certain things like, you know, it's like a surcharge, that's add on—added on to the actual

0:55:23.200,0:55:27.760

base rate. So everybody pays a certain base rate based on the terms, total amount of impervious

0:55:27.760,0:55:33.040

area. But if you exceed a certain threshold, depending on maybe it's because it's based on

0:55:33.040,0:55:38.240

the livable space, you know, this is where it starts to look at other properties that would

0:55:38.240,0:55:42.800

be considered highly developed, there could be a surcharge that could be added on, you know,

0:55:42.800,0:55:47.120

so those are things that could maybe be phased in in a later date. We've looked at the different

0:55:47.120,0:55:52.640

alternatives and seeing what those calculated costs are. But those are other ways that we could

0:55:52.640,0:55:58.720

maybe be—sort of deter from having to have much more impervious areas on the property.

0:55:58.720,0:56:02.880

[Keri Kodama:]

Okay, I see three more

0:56:02.880,0:56:08.320

questions in the chat. And I think I'll cut it off after those. So Dennis Peter says, "Has there been

0:56:08.320,0:56:13.760

any concern from HDOH, about mingling non-stormwater sources, such as people washing vehicles

0:56:13.760,0:56:18.400

on their property with stormwater in these green infrastructure, stormwater capture systems that

0:56:18.400,0:56:23.440

may infiltrate to groundwater. Or do none of these solutions allow for infiltration to groundwater?"

0:56:26.160,0:56:32.800

[Randall Wakumoto:]

So we do not see—we've not heard that those type of concerns from the state.

0:56:33.680,0:56:39.520

I think they do encourage that people do if let's say they are using rainwater to wash their

0:56:39.520,0:56:44.160

vehicles, and especially if they're doing it on their properties, and capturing it, and allowing

0:56:44.160,0:56:49.040

water to flow into the ground. That's actually a best management practice that we encourage

0:56:49.040,0:56:53.200

homeowners to do is, whenever you're washing your property, especially if you're using any kind of

0:56:53.200,0:57:00.160

maybe—non-biodegradable or biodegradable type of soaps and detergents, is if you can direct that

0:57:00.160,0:57:05.120

into some kind of landscaped area, then at least there's some way to kind of intercept it filter it

0:57:05.120,0:57:09.520

naturally, rather than it just going directly into the storm drains, right, when it's going to all

0:57:09.520,0:57:15.360

eventually go out into the streams and ocean. So it's, you know, in our—the city, as well as

0:57:15.360,0:57:19.440

in the state, it's actually considered as a best management practice, you know, so I think that's

0:57:19.440,0:57:24.480

why we do encourage people to actually try to see how they can get water more water into the ground

0:57:24.480,0:57:29.360

and containing it within their properties. I hope that answers your question, Dennis.

0:57:29.360,0:57:32.000

[Lauren Roth Venu:]

I could just add to that,

0:57:32.000,0:57:36.640

that normally Department Health kind of gets in when it, when it relates to injection

0:57:36.640,0:57:40.480

of that kind of polluted water into the ground. Moreover, like versus putting

0:57:40.480,0:57:44.400

into a landscape that would filter it before it absorbs into the ground.

0:57:49.280,0:57:52.720

[Keri Kodama:]

Okay. Michael Wong says, "Based on the tier one rate,

0:57:52.720,0:57:56.480

how much money is estimated to be billed or received for the utility?"

0:57:56.480,0:58:01.680

[Randall Wakumoto:]

Sure. Thanks, Mike, for that question.

0:58:02.640,0:58:08.960

Right now, for a typical single family home, this is more like actually, like, you know, tier

0:58:08.960,0:58:14.640

three kind of thing, situation two, or three, or four, where there's about 3900 square feet of

0:58:14.640,0:58:23.360

impervious area. We've determined that it would range between about \$19.50 to about \$23 per month,

0:58:24.000,0:58:30.560

for a single family home. For the tier one, then it would be basically around roughly around

0:58:30.560,0:58:40.880

\$5.80 to \$6.70, I think it's what I was showing, or \$6.80. And that would be the—for the very

0:58:40.880,0:58:45.200

smallest properties, right, where they have less than 1000 square feet of impervious area.

0:58:45.760,0:58:51.520

But even on top of that, is that the hardship provision we're talking about would be that it

0:58:51.520,0:58:57.520

would actually reduce that by, cut it in half if they qualify under that LIHEAP program,

0:58:57.520,0:59:04.160

where he would actually be paying somewhere around \$2.50 per month for those smaller type properties.

0:59:08.880,0:59:12.320

[Keri Kodama:]

Okay, and the last question from Dayan

0:59:13.120,0:59:18.000

Vithanage, sorry, if I pronounced your name wrong. "Are there any guidelines to construct

0:59:18.000,0:59:22.400

rain gardens in residential properties to reduce runoff from the property?"

0:59:22.400,0:59:28.960

[Randall Wakumoto:]

Thanks, Dayan. So we do have I

0:59:28.960,0:59:35.520

mentioned on our website, we do have a homeowner's guide that allows for, you know, more quick and

0:59:35.520,0:59:40.960

easy to implement things on their property. And then also even to do the testing,

0:59:40.960,0:59:45.680

like infiltration type of tests where they dig a little hole in the ground, fill it up with

0:59:45.680,0:59:51.840

water and time it to see how long it takes to drink to, you know, at least determine if it's

0:59:51.840,0:59:58.000

feasible and allows for any type of rain garden installation. And then from there, what we do

0:59:58.000,1:00:02.560

is we provide some of that, those sorts of step-by-step instructions as part of the homeowners guide.

1:00:04.080,1:00:09.120

We're hoping that with a utility, then there could

even be opportunities for like small grants where

1:00:09.120,1:00:15.680

we could actually prepare folks that, especially
for those that may not have the means to install

1:00:15.680,1:00:21.680

it, whether because they just don't have that type
of abilities, or maybe it's a financial situation.

1:00:21.680,1:00:26.800

Or even if it's in a location that we're trying
to encourage more in green infrastructure,
1:00:26.800,1:00:31.600
we would try to establish a small grants program
where we could actually cover the costs for the

1:00:31.600,1:00:36.560

installation and bring somebody from outside, a
contractor for instance, to come in and install

1:00:36.560,1:00:41.920

the green infrastructure for that homeowner, if you
qualify. So we've seen that in other communities

1:00:41.920,1:00:45.920

that have established a stormwater utility
because being able to leverage their funding,

1:00:45.920,1:00:51.040

and be able to then use it to directly benefit
homeowners and other residential properties.

1:00:55.520,1:01:01.760

[Keri Kodama:]

All right. That's it for questions. So just wanted
to give one last big thank you to our speakers for

1:01:01.760,1:01:07.840

joining us in our seminar series. And also
kind of saying thank you as a whole to everyone

1:01:07.840,1:01:13.920

who's joined us for this semester, on both our
past speakers and the audience who's tuned in

1:01:14.480,1:01:20.455

every couple of weeks as well. Want to say thank
you to everyone. I'm glad you could join us.

1:01:20.455,1:01:23.840

[Randall Wakumoto:] Thank you.

[Lauryn Roth Venu:] Thank you.