

Speaker 1: [00:23](#) Okay, thank you for having me. It's a pleasure to be here tonight to talk about the proposed interim stormwater development standards for the Samanage town center. These standards will require implementation of innovative stormwater management techniques in the, in the town center, um, including implementation of low impact development techniques, um, which is what we've recommended in the stormwater plan for the town center. Um, the main point with these standards is that they will limit offsite discharge of stormwater volumes in excess of pre developed forest conditions.

Speaker 1: [01:05](#) The purpose of the standards are to provide guidance for town center developers, um, and they're intended to be interim until ecology develops a definition of what is feasible for low impact development techniques. Currently the state department of ecology has two work groups working on feasibility for low impact development. There's a technical work group and an implementation work group. They're running a bit behind and I'm coming to some conclusion of what is feasible that was supposed to be done in March of this year. Um, but they're, they're not done yet. So this would be an interim standard for the town center. The standard would be protective of natural resources, especially the wetlands, um, that are located in both the Thompson and Inglewood basins.

Speaker 2: [01:50](#) Gotcha.

Speaker 1: [01:52](#) The standards would be consistent with the adopted goals, including the 2008 town center plan and the 2005 comprehensive plan for the city. I'm just going to read some of these goals for the town center, um, employ and an integrated strategy to managing stormwater and enhance ecology. These standards would do that, support the protection and enhancement of the city's natural systems, including the surface water and groundwater system, um, and policy ECP 3.13 in the comprehensive plan. Um, it's pretty explicitly mentions how storm water, um, could be managed. The city should restrict the runoff rate volume and quality for all new development and redevelopment, critical drainage or erosion rates within the city limits draining directly to Lake Sammamish. George Davis, AKA Eden Creek, which is in the Inglewood basin E bright Creek, which is on the Thompson basin pine Lake and Beaver Lake should be subject to stricter requirements and conditions. Such conditions may include the limitation of the volume of discharge from the subject property to predeveloped pre-development levels, preservation of wetlands or other natural drainage features or other controls necessary to protect against community hazard.

- Speaker 2: [03:17](#) Okay,
- Speaker 1: [03:17](#) It's just a diagram that explains the differences of runoff characteristics from a forested condition to a developed condition on the left side, um, is a diagram showing a forest of landscape and it shows how water reacts in this landscape. You have a forested environment, so you get a lot of evaporate transpiration from plants. You have canopy interception of the rainfall. Um, you have infiltration into the ground because it's all pervious. So there's very little surface water runoff, and you can see the arrows. Um, the difference here in a developed condition on the right hand side, you build houses, um, parking lots roads, sidewalks that are hard surfaces, and the water has to run off from those surfaces and something happens to it. It can go into the ground and the open space areas, you have less forest, less evapotranspiration. So the main differences are more surface water runoff in an urban environment and less inner flow cause you have less infiltration.
- Speaker 1: [04:26](#) Okay. This is another diagram of the effects of urbanization on stormwater runoff. Um, this is a hydrograph that shows flow characteristics in a stream over a period of one year. And if you can see there's a green line here, and that shows your forest and runoff conditions, um, on the Y axis is the runoff or discharge, um, in the forest it condition when it rains a lot in the winter time, that's when you get more flow in your streams and that's what you see around here. Um, in the end, you don't, you just have run off in the winter, primarily less. So in the summer, in an urban situation where you have more impervious surface, you get hot, much higher flows. So your, your peak flow for your forest or condition, well, it might be here for a forested environment and almost double the amount in an urban environment.
- Speaker 1: [05:30](#) And you also have many more peaks even in the summertime. And the other thing you get is more stormwater volume. So the area under the curve is the amount of storm water volume that comes off in these two different situations. Currently the state, uh, what we, um, our current regulations in Washington and Sammamish, we address the higher peak flows and the runoff with our standards, our traditional detention ponds. Um, we collect the water and then we meet her at, out at lower rates, but we do nothing about the stormwater volume. You still have the same amount of water running off into our streams and wetlands and receiving waters.
- Speaker 1: [06:16](#) So how has this standard different, um, the standard recommended for the town center, um, addresses a stormwater

volume as well as the peak flow rates and durations that are already addressed in current regulations. Um, it's more protective than current standards and innovation would be encouraged to meet the standard. So is this standard achievable? We think it is. And I'll show you an example. Um, this is an example of the civic mixed use area. This is, um, the design alternative that David Evans and associates did in their infrastructure plan. It's about 18 acres. The civic mixed use area has many different types of surfaces that are represented in this pie chart. Um, sidewalk parking road building, what's the blue it's kind of hard to read and then green space. So this is an alternative of how the stormwater could be treated from this site and meet the standard in for the sidewalks.

Speaker 1: [07:28](#) Oops, I'll go back for the sidewalks. Um, we would, one way to treat the sidewalks would be to have pervious pavement on most of the sidewalks area areas so that the water infiltrates do the pavement or the concrete into the ground, um, for the roads and the parking lots, those surfaces are what we call pollutant generating surfaces because they have traffic road cars on them that have drip pollutants that could be into the surface water. So we would recommend, um, bio infiltration so that you get treatment of the water and also infiltration. And our preliminary analysis shows that you would need about one acre space of space to do that. That space could be, um, part of the green space, that it could be a dual purpose area for the buildings. The rooftops rainwater harvesting would be a way to meet that volume standard. And we've done a preliminary analysis of how big your cistern would be for the total site, which is four acres would be about 50,000 gallons.

Speaker 2: [08:42](#) Okay.

Speaker 1: [08:42](#) Okay. So this is, um, just a representation of the challenge here, um, for your 18 acre site in a forest condition on an annual basis, it rains about three inches a year, which is about three and a half feet over the whole area. So in a Forester condition that water that three and a half feet of water that's over the whole year can infiltrate. It can be the Apple transpired by the plants. There's very little runoff from that. When you take that same 18 acres and you only have two acres of green space left to manage that water, that's about 28 feet of water that you now have to take care of if you only take care of it in your green space. So that's a, it's a big challenge.

Speaker 1: [09:35](#) So one of the key ways to manage the stormwater volume is to do rainwater harvesting and reuse. We used the Washington state department of ecology's rainwater, harvesting calculator

to figure out how big a cistern would need to be to be able to use reuse that water for toilet flushing and irrigation there non-potable uses. Um, I just mentioned it rains about 43 inches a year. And on average in Sammamish, um, the roof area in that 18 acre site or parcel central mixed use areas, four acres, um, based on the different types of uses in the area we estimated there'd be about 788 people with the total daily toilet usage of 15,000 gallons. And that's how we came up with a cistern of 50,000 gallons. There would not be enough water rainwater to be used for irrigation by just collection of the rooftops.

- Speaker 1: [10:36](#) So what does 50,000 gallons look like? Um, it seems like a lot of water. This diagram shows, um, these are about 60 foot tall Douglas fir trees, a smart car, and a five foot seven person right here. And, uh, the big tank is a 50,000 gallon tank. This is a 5,000 gallon tank, the smallest one, 10,020 5,000 gallons. So if rainwater harvesting were to be used in this central mixed use area, you probably wouldn't have one 50,000 gallon tank cause you have multiple buildings. You'd probably more likely have smaller, smaller storage facilities associated with each building so that you have less piping back to the building for reuse are bio infiltration facilities that would be managing the stormwater runoff from roads and parking lots. Um, we assumed a very low infiltration rate as most of the site is glacial till which is, um, not very permeable, uh, 2.25 inches per hour. And that 90% of the runoff volume could be infiltrated in a one acre space.
- Speaker 2: [11:50](#) Oops. So what happens
- Speaker 1: [11:54](#) If the standard isn't achievable in some areas there's a builtin out for people for developers that if they can't meet the standard there's they could come up with an alternative stormwater treatment technique that could be approved at the discretion of the city engineer. And there's many techniques that are possible. The example I just shared is just one way of integrating different techniques to meet the standard, but the applicant has a choice and the staff will advise and problem solve
- Speaker 3: [12:23](#) With them. And that's all I have. Thank you. Good questions, Nancy.