

Green Stormwater Infrastructure Approach to Stormwater Management

[00:06] Eban Bean: Hi, I'm Eban Bean.

Mark Clark: And I'm Mark Clark.

[00:10] Eban Bean: Conventional development, Mark, typically entails converting something that's sort of a natural area, maybe it's a forest, or maybe it's more of an ag setting, of a field that's being converted maybe to a residential or commercial area.

[00:23] When we make that transition, there's a lot of significant changes that happen on the site from a hydrologic or how the water moves across the site from that perspective, and it also influences how water quality or nutrients and pollutants maybe move across the site.

[00:40] Part of the stormwater regulations we have are to mitigate or prevent those impacts from extending downstream, protect water quality, protect our streams, the stability of them.

[00:54] But some of our most common solutions like stormwater ponds, the wet ponds and dry infiltration basins, maybe they may not be removing the pollutants or being as good for water quality as we could be doing. Are other options for how we could be developing better?

[01:08] Mark Clark: Yeah, and I think there's a lot that can be done. There's a lot of innovative ideas. I mean, it's important for us to have habitat, right, in the landscape, in the watershed, and so we now engage in that process of road work and infrastructure and houses.

[01:21] But, you know, we start to fail to recognize a lot of the services that that landscape was providing before. We do have very advanced, I would say, in the sense of stormwater infrastructure, that's attempting to mitigate and provide those services downstream.

[01:37] But as you mentioned, we realize that maybe we're not doing enough for the water quality, and to some extent, quantity. A lot of our infrastructure is designed to protect for flooding issues, but basically, we oftentimes let more water leave the site than historically did.

[01:52] So, where low impact design comes in is to try to look at a whole new set of tools, a whole new approach to how we engage that development process, to try to maximize the infiltration, to mimic the pre-development condition, get the water back into the surface soils, and that actually helps support the trees, supports the landscaping that otherwise we would have to irrigate.

[02:14] And as we treat the water in the treatment train going to that conventional basin, which we may still have to have to deal with the bigger storm, we're improving that water quality, so that the basin doesn't have to do as much work, or we enhance the basin itself to provide more function.

[02:41] So, we are now realizing that what we were doing before, although it was very good and progressive, is still not enough to protect those downstream ecosystems from both the quality changes and the quantity dynamics.

[02:51] So, I mean, we're challenged to actually provide enough water for consumption and also for landscaping and the types of yards that we have. So, all these are trying to get back to a more balanced relationship between humans and their habitat and all those services that also we want to maintain in the landscape.

[02:59] Eban Bean: Yeah, you brought up a good point about the runoff, or how the water moves across, through the site and designing for that larger storm event oftentimes.

[03:10] If we think about a natural site, maybe only 10% of that water goes to runoff, but when we develop it we might increase that to 30 or 50 percent, but that's really increasing it by three times or five times.

[03:25] Mark Clark: Right.

Eban Bean: You know, that would have been water that would have infiltrated into the ground, recharged the aquifer, given us more water supply, and not had maybe pollutants being carried with it.

[03:37] So, I always like the part about Low Impact Development that you talked about, in the design aspect of maintaining that hydrologic balance, like where was the water moving beforehand?

[03:48] And can we try to keep it moving in those areas? And it also emphasized sort of that distribution of stormwater management in the landscape. You don't just have everything going to a basin or a pond back in some corner that we don't look at it.

[04:03] It's really kind of trying to get more functionality out of the landscape itself.

[04:08] Mark Clark: I think that's really one of the big keys, is that we're not just thinking about the critical storm event, not just the big event, which is of great concern for flooding, infrastructure losses, but the movement of nutrients, the volume of water that historically would have infiltrated, is not just happening in the critical storm.

[04:27] It's happening every single storm. So now we're starting to manage that integrated dynamic of hydrology in the landscape.

[04:34] And so that's really the key behind LID. We're thinking of a much broader perspective of hydrology and how its interacting with our landscapes.

[04:41] Eban Bean: Yeah, I think about a lot of conventional development, residential areas. You see a lot of places where the rooftop, water runs off of it, it goes on to the driveway, into the street and into a storm drain, and then goes into a pond or an infiltration basin, you know, oftentimes with no opportunity to even get into the ground.

[05:02] So just trying to integrate the flow of water across the landscape to give it that opportunity to be filtered or to eliminate that runoff by infiltrating it on site.

[05:16] I think there's a lot of ways that maybe we can integrate that more so into the developed landscape.

[05:17] Mark Clark: And one of the things I always think about is that each little incremental step that you're not doing essentially is cumulatively affecting that downstream stormwater system.

[05:29] So if we start putting those little steps back in, or each, you know, intervention of that gutter that comes off your roof, if that can go into an opportunity to infiltrate, it's not adding to this cumulative volume that otherwise we have to treat somewhere else.

[05:42] Eban Bean: So, like turning your downspout into the yard rather than putting it on to the driveway.

[05:45] Mark Clark: Exactly. It's lots of little things that ultimately have a large effect, which in reverse is why we have such a problem in some respects now.

[05:53] But LID goes back and thinks that the individual lot scale tries to integrate practices at that scale and then cumulatively we actually have a lot less water running off, a lot cleaner water running off, and so that the conventional stormwater basin is not dealing with such a large volume.

[06:07] Even though the big storm still may need that storage capacity, all the little storms may not even make it to that basin anymore.

[06:14] Eban Bean: Yeah, one thing I often think about as well is that if you've got a development that's being managed by an infiltration basin, but all of that water's being piped to it, think about where that water is infiltrating to the subsurface. It's all being focused in one concentrated location.

[06:30] But before that development there was infiltration occurring across the entire site. So, there was an opportunity to utilize the entire area for that volume reduction for that storage.

[06:43] So we wouldn't need the flood control necessarily that we now have to include and protect our downstream areas and prevent flooding downstream.

[06:51] Mark Clark: So that's where thinking about things, like you said, the pre-development landscape would have allowed for lots of infiltration, depending on the soil types.

[06:57] And that's one of those things we may not think about, but if you compact the soils, that's going to minimize or reduce that infiltration capacity.

[07:04] So as simple as, you know, how are we preparing the landscapes around the house and that broader catchment area to receive that water and make sure we don't undermine or create a negative effect.

[07:16] And, you know, where one of the real communication components is, that the developer, the stormwater engineer may integrate all of these nice alternative tools, but what that's doing now is putting much of that stormwater interaction in everybody's front yard or up into the neighborhood.

[07:31] And so now the community needs to be aware of how that water is behaving.

[07:35] It's not just sending it downstream to the hill or the depression at the bottom of the basin, instead everybody's front yard becomes a component.

[07:43] And so we need to start being aware that this stormwater infrastructure is integrated in the community and not just, like you said, put out in the back part of the property and kind of ignored.