

CDM Podcasts: Cities of the Future A Conversation with Jim Smullen

Paul: Hi, this is Paul Brown President of CDM's Public Services Group and host of our podcast series Cities of the Future. Each month we talk with experts from around the globe about the challenges and issues facing government, utility, and community leaders. Our podcasts cover topics like greening cities, urban sustainability, climate change, and smart growth. Our focus is on practical solutions, innovations, and best practices that balance environmental values, quality of life, and economic development; always challenging ourselves to take a more holistic view of urban infrastructure and urban ecology.

Today, we discuss low impact development and its role in stormwater management with Dr. Jim Smullen. Dr. Smullen is a registered professional engineer and nationally recognized leader in stormwater management and water resources planning, with extensive experience in combined sewer overflow, sanitary sewer overflow, and stormwater planning and permitting. He's joining us today from our Edison, New Jersey office. Jim, Welcome.

Jim: Thank You.

Paul: Jim, maybe we can start by just defining the term low impact development. What does it comprise?

Jim: It comprises actually two very different modes. One is when you're developing what we call greenfields or new land development. And there, it means simply to take a green approach from the perspective of stormwater, reduce the amount of stormwater run off, improve the quality of the stormwater runoff, essentially try to make the site, hydrologically, look like it hasn't changed from its predevelopment condition. Then, the other mode of low impact development is really low impact redevelopment, especially in urban areas where we go into an area that has been developed previously, and – typically without completely removing everything that was on a site – develop it in such a way that again reduces its stormwater impact on the receiving waters and the volume and the quality of the discharge, but also does it in such a way that doesn't harm the existing surrounding urban environment. You know often issues can come about from infiltration, urban subsidence, and things like that, so it's a slightly different approach in a redevelopment, but in many cases even more important because you're attacking a problem that already exists.

Paul: Jim, let's start with a redevelopment situation what are some of the measures that get implemented under those circumstances?

Jim: Well, typically these are driven by stormwater rules that are adopted locally, but the physical elements that they address are to reduce the effective amount of impervious cover. And, impervious cover of course is important in stormwater because it prevents stormwater from infiltrating and recharging groundwater. So, much of the focus for low impact redevelopment is to reduce the amount of stormwater runoff from the pre-

redevelopment condition, which is often a highly impervious surface, rooftops, parking lots, and the like. Reduce the amount of runoff and also use controls that, when there is runoff, the amount of pollutants in the runoff is reduced.

Paul: Let's first talk about the reduction in impervious surface on a developed site. How much can you really change the runoff from rooftops and pavement?

Jim: Oh, often very dramatically for the first inch of rainfall. Often, the site can be configured so that it does not runoff at all, or when it does runoff, runoff is delayed for say 24 hours when the down stream conditions and the receiving waters are such that they can better absorb the runoff.

Paul: And what specifically would I be changing on the site?

Jim: For instance, if you're going to rebuild on a site, put up a new building the more common approach today is to treat the rooftop in such a way, that the rooftop begins to look more like undeveloped land or pervious land. And, the way that we do that today is either trap the rooftop runoff and put into a device and subsurface, essentially a cistern, where it can be stored and released over time or the latest techniques are to green the roof, to create a green roof situation, where a soil layer is placed on the roof, plants are grown. Then, the hydrology – the rainfall runoff process – is altered because of the evaporation and transpiration from the plants of rainfall back in to the atmosphere and just a simple moisture holding capacity of a soil layer and the plants.

Paul: And is that technology pretty well established at this point for green roofs?

Jim: Yes, it's been revolutionized in the last 8 to 10 years, and today it's becoming more and more common. We're seeing more and more urban redevelopment site plans being submitted, specifying green roofs because often in urban in an older urban area in redevelopment the foot print of the site is such that it's difficult to get the land available for some of the other management practices that you might use for stormwater. So, it's a logical thing to use the roof as a way to control stormwater.

Paul: That explains how we can reduce runoff from the vertical structures. What about the pavement? What are our options there?

Jim: Well, there are a number of options. One of them is, in the more traditional development approach, the pavement would be sloped in such a way to run off to collection appurtenances that would take it to storm sewers in the street. What we like to do today is to pre-prepare the subsurface to store water under the pavement and the way that we get that there is a number of ways, we could put cuts in the pavement where they could infiltration plates, what's coming more and more common today is the use of porous asphalt or porous concrete, which allows the rainfall to go directly through the paved surface into the subsurface storage. And then there are other alternatives, which are really starting to come on line, one of which is the use of strategic placement of street trees, for instances along sidewalks, that have water collections

basins that will channel the water to the tree and then from that street tree footprint into the subsurface storage under the pavement. So, there are a number of ways to do that.

Paul: This seems like a significant re-thinking of the traditional approach of using pavement as a means of stormwater conveyance.

Jim: It does. The concept of best management practices, which is the term we've coined over the years, really developed in the late 60s and early 1970s, but it's taken quite a while for the receiving water problems in the United States to reach a point where these now become important. So, in many cases these concepts are 20 years old, but they've really come to fruition now and they're being implemented widely and as we implement them more intensively now, there's much more innovation in the thinking of how those management practices are designed and how they're implemented.

Paul: That leads us to the benefits that are created by these approaches. What do we accomplish when we implement low impact development?

Jim: Well, Paul, the highest good of course is that we would like to restore our urban water ways and bring them back to a condition, not necessarily pre-historic, pre-man's influence, but certainly to a condition where they can have a far better use for the people who live in the city. So, one of the issues for stormwater control is to improve the water environment in the city, which then allows us to implement remedial measures to restore the habitat of these urban streams, typically we're talking about streams, and that restoration of habitat will then bring back the living resources, the fish and the other wildlife which thrive in a healthy water way. And then, many of our cities in the United States are under very strict regulatory requirements to meet water quality goals with the federal government and the meeting of those goals can be quite expensive through traditional methods. These low impact development, low impact redevelopment methods, led to a potentially lower cost, better urban environment approach which can bring environmental compliance to the city and avoid not only the cost of more the traditional approaches, but also the cost of federal fines and penalties that come along with not meeting the goals that the federal government has set for our water ways.

Paul: Is there more uncertainty associated with going on a low impact development approach than just building the large scale infrastructure that would have traditionally been the solution?

Jim: No, I don't think so. I think that has been a perception that we have steadily worked to bring people to understand that it is not a higher risk that actually the proper implementation of these controls and their designs so that they are resilient and last over the years is really beginning to turn people's heads about using these low-impact developments as approaches, as alternatives to more traditional structural, environmental control.

Paul: Can you talk to us about some cities that have been successful accomplishing this kind of program?

Jim: Well, you'd have to say that the city that led in all of this is Portland, Oregon. Where I would say for probably over a decade this approach has been nurtured and brought along and has really become part of the way they operate. But other American cities now on the east coast are beginning to move. Washington DC, in its recent interactions with the federal government, is beginning a low impact development program. The city of Philadelphia has turned out to become an east coast leader in low impact development approaches and I judge the degree of seriousness of a city, urban areas commitment to low impact development, as to how they develop their regulations. And, in the city of Philadelphia for instance, they've completely revamped their stormwater regulations that require very innovated low impact development and low impact redevelopment situations.

Paul: It sounds like it is almost a transformation in the way we look at urban infrastructure as it relates to stormwater and water resources.

Jim: I think it's more than that Paul, I think it's a revolution. I've been in this business for 30 years. And been talking about stormwater best management practices for the last two to three decades and it just really feels like its all been worth it in the last couple of years.

Paul: Jim thanks for joining us today. I'm Paul Brown please join us for CDM's next Cities of the Future podcast.