# Melbourne Waterway Research-Practice Partnership

# WSUD assets (water tanks) on private land

This webinar is a recording of a presentation by Dr Belinda Hatt on 18th July 2024, as part of Melbourne Water’s Waterways and Wetlands Research seminar series.

In the webinar, Dr Hatt presents findings from a research project focused on stormwater control measures in the private domain. In this project, four case studies where rainwater tanks were widely installed on residential properties were reviewed to identify factors that can support or hinder the effectiveness of stormwater control measures on private land.

## Speakers

Speaker 1 – Rhys Coleman – RC

Speaker 2 – Belinda Hatt - BH

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**RC**

I am Rhys Coleman, Waterways and Wetlands research manager at Melbourne Water in the Research and Modeling team. Welcome to another edition of our Waterways Research Lunchtime seminars. Before I go any further, I just like to acknowledge the Traditional Owners on the land in which we're all meeting today and pay my respects to elders past, present and emerging and acknowledge their deep and long connection to waterways in the region for tens of thousands of years.

I'm joining today from Wadawurrung country. Today's research seminar will be presented by Doctor Belinda Hatt, who's in the Waterways and Wetlands research team at Melbourne Water, but also seconded full time to the Melbourne Waterway Research to Practice Partnership with the University of Melbourne. Belinda will be talking about one of her research projects, which is understanding the management of water sensitive urban design on private land, using contrasting case studies across Greater Melbourne.

And this research is really important because we know it's important part of achieving our healthy waterways strategy. Stormwater targets that we need to do things at the lot scale, streetscape, end of pipe and precinct. We're going to have to combine these efforts to achieve the targets. So Belinda's research is really helping us to understand the role and opportunities in the private land space.

Belinda will be talking for about half an hour, and then at the end of that there's an opportunity for questions. So I hope you enjoy Belinda's presentation and over to you, Belinda. Thank you.

**BH**

Thanks for that preamble, Rhys I think I can just get straight into it. Other than, I'd like to start by acknowledging my colleagues that I've been working with for several years on this project.

So Dr Darren Bos and Doctor Stephanie Lavau. So two step start with step back a bit. We know that stormwater is the biggest cause of degraded waterways in urban areas. And we also know that to protect waterways from stormwater we really need to keep this. as much don't want it out of the waterways as possible.

And so for the last few decades, there have been concerted efforts to intervene and manage stormwater on, particularly on in the public domain. But, privately owned land makes up a large proportion of urban areas. And so to give you some figures for context, and in Mount Evelyn and, suburb near Lilydale, about half of the impervious surfaces that are directly connected to waterways are on private land.

And, in more inner Melbourne, about a third of the runoff volume that's generated each area in the Merri-bek Local Government Area comes from private roofs. Urban areas are also really highly space constrained spaces, and there's competing lots of competing demands for public land. And we also know that it's more feasible to achieve stormwater flow targets if stormwater is managed at or close, as close to source as possible.

And that's because the hydrologic impacts are compounded as scale increases. And so for all of these reasons we're studying, we're increasingly starting to see municipalities requiring onsite stormwater management on private land through the planning schemes. But there's lots of barriers to success for water sensitive urban design assets. And I'll start by talking about the general barriers. So that includes things like, our planning and institute practices, our capacity to design and construct, quality assets.

This figure down the bottom illustrates the stages in the lifespan of, of water sensitive urban design assets or stormwater control measures, which are probably used interchangeably throughout this presentation. But there is a tendency to only focus on the stages up until the construction period. and that often can result in insufficient maintenance for a multiple in the multiple reasons, including financial barriers, a lack of knowledge on what to do and how often that needs to be done, and a lack of clarity about roles and responsibilities around maintenance.

So all of those things apply to both public and private domains. But then we when we think about private land, there's some additional challenges as well. So for organizations that have an accountability for stormwater management, there's generally a lack of oversight beyond the planning process. It's also reliant on community participation and the capacity and interest of a community to get involved in.

Urban water management is highly variable, and there's lots of changes in ownership of a private land.

So what we wanted to do, what we did in, in, in this research project was we we reviewed four different case studies where stormwater control measures had been that been widespread in public, installation of stormwater control measures on residential properties. And in reviewing these case studies, we sort of really wanted to explore and the condition of those assets and try to, and identify whether they were, you know, what factors influence the success or underperformance of what I stormwater control measures.

and I'll probably stop talking about stormwater control measures in general now and refer to them more just as rainwater tanks, because this is like this is the focus of this project. I'll tell you a little bit about each of those case studies. before I then talk about what we learned from this routine. So Coburg Hill was an urban renewal project.

It's located on what was the former Kodak film manufacturing site in Coburg. And when that plant was shut down in the early 2000, the portion of the site was redesigned for residential development. So it's a 21 hectare site that has about 500 dwellings and a range of densities, in response to local government requirements, for stormwater management, the developer decided to install rainwater tanks on about 80% of those properties.

And so each of those properties, were required to install a the 2 or 3 kilolitre tanks, and the tank size was tied to the roof area. There was also, streetscape assets that were installed, but given that they are on public land, that's beyond the scope of this project. and actually that's sort of the case for all of the case studies, all of the streetscape or public or public land assets were out of scope.

So, probably one thing to note about this case study is that owners bought the lots and then they were it was up to them to engage their own builders and that included for installing rainwater tanks. So I'll come back to why that's important later. Partway through the construction process, local government really wanted to know how it was going.

And so an audit was conducted to confirm tank installation and connection to toilet, that that connection to toilet and irrigation was occurring as planned. And those areas that are shaded pink on this map of the areas that were included in the audit. The other areas hadn't been constructed at that at the time. so many of you will be aware of the Little Stringybark creek.

It's a 20 year catchment scale experiment, a proof of concept type experiment that really aim to ask the question, can urban development and ecologically healthy streams coexist? Or in other words, can we keep enough stormwater out of the code to protect it? And so, this was an existing area where the project team and, worked with, with residents and other private landowners to install and meet a range of stormwater control measures on, on private land, rain garden rainwater tanks tended to be the most popular and those rainwater tanks were connected to toilet and laundry.

And because it was an existing urban area, but it relied on voluntary participation, and that was encouraged through a range of financial incentives. Because it was a research project, there was lots of monitoring that was undertaken and that included asset performance, strain response to these stormwater interventions and community participation in the project. And, the part of the research that we're particularly interested in for this project was a self-assessment survey of tank owners.

Just over the other side of the Dandenong Ranges is Dobson's Creek, and this is another catchment scale experiment that started after Little Stringbark Creek experiment and really aimed to, you know, sort of look at, well, can we take what we've learned from the Little Stringybark Creek project and apply it to another location? So again, a retrofit into existing residential properties this time, rather than offer a range of stormwater control measures, residents were offered just rainwater tanks.

And then the number of rainwater tanks that they are offered depended on the size of their roof area. And those tanks were all connected to toilet and laundry. And I also included a dripper hose that enabled a portion of the tank to slowly draw down, and passively irrigate adjacent garden areas. Again, participation was encouraged through a range of incentives through two rounds.

In the first round, residents were offered free tanks, and then in the second round there was a co-fund model. And I'll talk a bit more about that as we go on. Again, a lot of research and monitoring was undertaken, including maintenance, audits, monitoring in the stream, health and community participation in the project. The final case study is Aqua Revo and this was a residential redevelopment of what was formerly the site of the Cranbourne treatment plant.

So South East Water owned this land and they saw this as an opportunity to pilot a range of integrated water management with energy saving initiatives and amongst those initiatives, each to the end as part of that pilot. But part of that pilot project, each of the residential properties received a and two kilolitre rainwater tank, and that that tank was connected to showers, pads and laundry.

What was different about this project is that, real time monitoring and control of those tanks was included. And so that included active monitoring of the operational status alerts for potential maintenance requirements and the option to release water from the tanks ahead of forecast rainfall in order to capture incoming storm water. The other key difference with this project was that South East Water assumed responsibility for operation and maintenance.

For the first ten years. So to sum up the the ways that each of these case studies differed. So there was different organizations involved. The timing for installation of the rainwater tanks, differed from either as part of the initial construction process or retrofit into existing properties. Some were compulsory, some were voluntary maintenance responsibilities. But either the that that owners let the property owners or in the case of Aqua Revo outsourced to a third party.

And the way that the tanks operated, whether it was passive operation or active through real time monitoring trial. I suppose now be a good time to, to point out that really, this was an opportunist, opportunistic review. we rather than collect specifically collect data for this project, we made use of the information that was available. And so I suppose that was less than ideal in a way, in that the nature of the audits that were conducted in each of the case studies, which was buried in the type and detail of the information that was available, varied as well.

nevertheless, I think we were able to draw some useful findings, from the review, and I'll talk about that now, and I'm going to present it as a series of lessons that are loosely ordered in terms of the typical lifestyle cycle and stormwater control. so starting with planning, local government planning schemes were found to be an effective way to enact stormwater management on private land that were used in two different ways in these case studies.

So Coburg Hill, they were used to require tank installation as part of the initial development. And despite council having no oversight beyond the issuing or planning permits, planning permits, the audit confirmed that rainwater tanks were being installed and connected at 90%, 96% of the surveyed properties. at the Stringybark Creek an environmental significance overlay was implemented because the project team was finding that new impervious areas were being connected as fast as they were able to disconnect existing urban areas, and so, that environmental significance overlay was triggered any time there was an ongoing development, right, of the ten square meters.

Some things to think about, though, when you if you are going to use, local government planning schemes, there was surprisingly no resident awareness of tanks at Coburg Hill. And this is probably pretty consistent with other research on mandated versus voluntary rainwater tanks. But it was of concern in that if residents aren't aware of their rainwater tanks, how can they be, expected to be only done?

It probably follows that there's not a lot of maintenance going on. And at a Little Stringybark creek there were a lot of supporting instruments that are required for the environmental significance overlay, and that included practice notes, to help residents develop a storm water treatment plan, although they tended to still rely really heavily on a storm water treatment assessor, who was a consultant, who was an expert in stormwater management, and to help them develop their treatment plans.

there's also that issue about oversight or the lack of oversight beyond the planning stage and where pressingly seeing local governments in employing water sensitive urban design officers who were conducting spot checks of of new developments to to check that, similar control measures, that were required as part of the planning permit are being installed.

So community engagement is essential for raising awareness and encouraging participation, particularly in retrofit situations. Having said that, though, engagement still really important for the mandate situations. We've just talked about the low awareness of tanks at Coburg Hill and the potential implications for maintenance. but cost and time a key barriers to participation. So some things that the case studies that we found in the case studies that really helped, support engagement and participation with things like knowing your audience, because this enables you to tailor your messaging in a way that resonates with local residents.

And using a range of clear and integrated communications. It was found to be really helpful because it accommodates individual preferences and technological competencies. Having said that, though, face to face, was found to be the most effective and that included particularly at Dobson's Creek and Little Stringybark Creek, that included things like community information sessions. And residents really like the option of having no obligation of home visits, to help, by a member of the project team to really help talk them through what it would look like for them if they got involved in the project and had and had rainwater tanks installed on their property.

now, I mentioned earlier that sometimes tanks were offered free of charge, and sometimes there is a requirement to co-funding. And what the what we found at Dobson's Creek was that even though the tanks were heavily subsidized and that residents were only asked to pay, about 8% of the total cost of installing rainwater tanks, this was, often perceived as, as still being too, too expensive.

and that co-funding model was also found to, of increase the complexity of the participation process. And it was actually found to be a significant barrier to participation at Dobson's Creek.

Trust. Initial distrust can be a key barrier. And so things like receiving unsolicited mail, a lack of familiarity with the agency and organizations involved with the project, and the perception that, offers, you know, the offer of a free rainwater tank is that, you know, is something that's too good to be true and therefore must be a scam.

And declining public trust in a range of institutions is an issue more broadly. But some of the things that we found to help with, with allaying that initial distrust were things like the use of professional and official communications, addressing risks or perceptions of risk upfront. So heading off that idea that, it's, yeah, this is this is fraud or scam and also residents, sometimes had concerns that a tax might later be imposed if they were to go ahead and have an rainwater tank installed on their property at Little Stringybark Creek, having a single point of contact, having a trusted face to the project that often friendly and positive interactions, was

found to be really, important to participation and community advocacy. Advocacy played an important role both at the Stringybark Creek and Dobson's Creek. So Dobson's Creek, some residents that were initially hesitant to get involved in the project watched their friends and neighbors, who were involved in round one of the round one of the project and found that they had positive experience.

This and that, put them over the line, encouraged them to participate in the second round of offers of rainwater tanks. And interestingly, there was also a staff member at a local cafe. I mean, the Dobson's Creek catchment that was a really big fan of the project and, really advocated for the project.

There's efficiency in having a consistent design in that it reduces the design choices to where you can put these system components and what plumbing connections that you need. So it offers savings in both in terms of both time and cost. It also means that the project team can offer consistent information on operation and maintenance, and it streamlines any, centralized inspection and maintenance program that might be offered.

I mentioned before Coburg Hill that residents, were responsible for engaging their own builders, including for installation of rainwater tanks and what this resulted in was, a wide diversity of tanks and pumps and connections that were used. And this really complicated the audit process. But nevertheless, lack of choice might be a part, might be a barrier to participation.

At Dobson's Creek, some residents said they wanted more choice. And so it would be useful to think about, having some flexibility to accommodate either supply constraints, things like slide and space and slope and access and, and individual preferences. And so that might be like a user paid upgrade option to things like slimline tanks, larger tanks, or even additional plumbing connections to internal demand.

Moving on to maintenance. Relying on residents to look up to systems is risky, and the reality is that Aqua Revo, with its real time monitoring and control, is the gold standard. And it meant that, the system's almost always fully operational. And typically maintenance requirements were addressed within 24 hours of a fault being detected. At Little Stringybark creek.

At the time of the survey, 80% of respondents believed that their rainwater tank was operational and 96% of those respondents were confident in that assessment. Nevertheless, a third of tanks had not had malfunctioned at some point, and the most common cause of that failure was pump failure. Interestingly, though, where free inspection and maintenance services were offered, there was low uptake of that offer.

So some things to think about here that might help residents look after their systems is to the the real time monitoring control list. you know, is is the goal. It seems that that is the gold standard. Having said that, though, we still don't really have a good handle on how residents feel about having public good assets on private land and and the potential for there to be misapprehensions about what about perceived monitoring of the private home.

and so perhaps a way to do that, to, head that off would be to frame policies in terms of benefits to householders as opposed to, exerting control on household and construction at Dobson's Creek, there was considerable support for an annual fee based service, inspection and maintenance service, and the amount that residents that that were willing to pay broadly matched the cost of, providing that inspection and maintenance service.

Having said that, though, it was just for the inspection and maintenance service and there was a gap around, cost paying around the cost for any repairs that might be might be identified. Good intentions don't always translate into owner actions. So residents generally had good intentions to keep this their tank systems, functional. And what we're looking at here is some data from Dobson's Creek on the type and frequency of maintenance activities that were undertaken.

And look, they were broadly appropriate. We can see that, most residents said they were cleaning their butters and leaf screens, to a lesser extent there was trimming of overhanging branches and cleaning inlet screens and, and checking that the pump was operational. What was a little bit worrying was around the frequency of which that, those activities were being undertaken in that the most common response was that it was only being undertaken as required.

And this is a little bit worrying in that, most systems have an automatic mains backup, and this means that residents might not know that the tank is not working. It was always coming out of the tap at Dobson's Creek as well. some residents reported concerns about dampness in their gardens and, from the from the dripper hose.

And, and this might be because, you know, not many residents said that they were moving their dripper hose around the garden. And it's probably something that would have been, that was and something that did need to be done to make sure that there was a good distribution of that water across the garden.

most residents said at the Stringybark creeks that it was important to them that their tank was operational. And, interestingly, they were motivated, more by environmental, water savings rather than a financial benefit and water savings from an environmental perspective rather than a cost savings benefit. more than two thirds of the residents at Little Springbank Creek who said their tanks were non-operational, said that they intended to fix them.

But having said that, there was a lag in in the there was a delay in the time taken to, to seek a repair to that system. And that was, that was found to be because, residents gave higher priority to the repair about the common household assets, like cars and heaters and washing and cooking appliances, and on average, the sort of a 15 day delay in seeking a repair to the tank system.

I think the most extreme example was, a year of a tank not being operational. A way to hit this off would be to design a network with built in redundancies, so that outcomes are still being delivered, even if the system, the overall system, is not operating at 100% efficiency. And this could be done by installing more assets than we think we need, or larger assets.

Still, on the subject of maintenance residents, if if residents are expected to look up to that after their tank systems, then they really need to know what they need to do as well as how often they need to do it and what that's going to cost them. So ways to do this would be to provide would be to provide information on the common issues that are, that might arise, things like blocked inlets or pump malfunction or, how to know where the system, is failing.

So as an example, is your tank always full and information on the types of activities that residents can do themselves and when and where they need to seek professional advice. And look, there was some evidence that providing maintenance information did translate to more action at Dobson's Creek. there was more information that was provided to participants in round two of the program, and they were able to, nominate more specific maintenance frequencies and and activities as a result.

I feel like this is a bit of a no brainer that, higher capital costs in the form of quality components is likely to support more effective function, fewer faults and breakdowns. means that tanks are more likely to be operating at any point in time if a third party, maintenance program is offered, that means fewer call outs.

So cost savings, and greater satisfaction. And for residents as well because, yeah, I think, there was some complaints that some of the in some of the projects that about perceived poor quality of, say, the pumps and say things like pumps being noisy or pumps intermittently switching on and off when water was not used being annoying to either to the residents or the neighbors, particularly if those pumps were located close to two bedrooms and, then they were going on turning on and off at night.

And this is not this is, findings, sort of anecdotal reports from outside of this, this case study review. But we do hear anecdotal reports of residents disconnecting their pumps and even sometimes, and installing their own water tanks. finally thinking about long term engagement because systems really they need to operate in perpetuity for waterway health so that, you know, that really making it clear that the benefit of the asset continues beyond the initial engagement and installation process?

and ways that this could be done would be, could be doing things like providing a central repository of operation and maintenance information. And if participation is motivated by waterway health then residents want to know if this system is working. And so this could be done through things like newsletters, websites, not phone apps. And this image here is, the smartphone app that southeast body uses for their tank talk systems.

And so things like technologies like these could be really useful to providing new live updates and even reminders to encourage residents to in and to maintain their engagement. Having said that, though, given the effectiveness of face to face contact, regular inspections might still be, a really useful option because it means that the project team can check that as it's functioning, that residents are confident to maintain them and to offer support if they're not.

And finally, you know, a really important thing for long term engagement is to think about what happens when property ownership changes, hand changes hands, and how to engage the new owners or residents of those properties. So to sum up, community participation can support urban waterway management, but it does increase complexity. Voluntary participants tended to be motivated more by environmental outcomes rather than financial benefits.

Having said that, though, cost, time and trust. Two key barriers really need to think about how do we make it as easy as possible for the community to get involved? Community advocacy can be really powerful for, for a community participation, but residents need help to help them, need support to help them look after their own water tanks.

An effective long term operation relies on okay, long term engagement. So to finish up, look, I think Darren and Steph and I all felt like this project, in a way, raised as many questions as we were able to answer. And, look, there's still much to be learned from AquaRevo. South East Water have, recently conducted a survey of resident attitudes, and they're also collecting information on the cost of of operating that third party maintenance service.

So we're still waiting to, you know, there's still, if still much to be learned from AquaRevo. I also wanted to finish off by looking ahead and talking a little bit about the Monbulk Creek Smartwater Network project, which is really trying to answer some of those questions that we weren't able to answer in this, in this particular project.

So thinking about it, does that real time control translate to better performance? can we increase, community participation through, having a sense of connection to place or having an iconic species like the platypus in the local waterway? And how can technology support wider resident engagement? I know that's probably all I want to say about the project at the moment, because it is just getting started.

Other than just watch this space. so thank you for listening today, and thank you to the many people who helped provide information for for this case study and review. And I'm happy to take questions.