AUTODESK

Building resilient communities and protecting our environment for a sustainable future

Integrated catchment modeling for stormwater and wastewater management

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01 | **Planning a better, more sustainable future**

Our landscape is constantly changing through natural weather cycles, development of towns and cities, and population growth. Advances in technology have allowed us to adapt and adjust our surroundings to ensure that the impacts of urbanization and extreme weather do not put our environment or communities at risk.

Stormwater and wastewater engineers, planners, project managers, and consultants are faced with many evolving water challenges that are driven by regulations, level of service, customers, environment, and operations. Meeting these emerging challenges requires innovation and advanced capabilities that empower water professionals to quickly delve into complex infrastructure challenges and return with comprehensive understanding and solutions.

By building accurate and holistic models, you can understand how a system will respond to varying conditions before they happen. This allows you to better respond, plan, and fulfill the needs of your community by reducing the impact of flood risk, spills, pollution, and asset failures.

Investments in water infrastructure are increasing to support the build of resilient water systems. There is a strong opportunity for small and large organizations across the world to invest in technology to maximize those investments by making sure that the right assets are going in the ground in the right areas to deliver exceptional quality to the community.

In this e-book, we look at the importance of flood and spill risk management and planning for capacity improvements, system expansions and emergency scenarios.

“Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all.”

Goal 9, United Nations

02 | **The challenges we face**

Increased rainfall caused by climate change and the impacts of urbanization have a damaging effect on natural habitats and economic systems.

What are the impacts of increased rainfall?

As of 2017, humans are estimated to have caused approximately 1.0˚ Celsius of global warming above pre-industrial levels.* Higher temperatures have stirred weather patterns across the planet, producing more weather rainfall events than we have witnessed in history.

The impact of increased rainfall is floodwater that has the potential to deluge networks, carry pollutants from urban areas to rivers, and leave communities helpless when their homes are swept away.

What are the impacts of population growth?

Buildings are rising alongside temperatures. The population is increasing and moving all over the world, putting a higher demand on water systems. The impact from rapid urbanization can be underdeveloped plans for expansion and inundated and overflowing networks that spill and threaten public health by contaminating the environment.

*United Nations, 2022

03 | **Where positive change begins**

Stormwater and sewer professionals are key drivers in creating actionable, flood readiness plans for catastrophic weather events, capacity improvements, and system expansions.

Paired with the most intuitive and innovative technology of our time and incredible amounts of data, we are able to determine where bridges should be made higher, when to commence dam upgrades, and ensure towns and cities are better planned with resilient stormwater and wastewater infrastructure.

Evolving technology is critical in shaping the future of water in a positive way that improves the lives of our customers, greater community and shared environment.

Equipped with reliable tools and technology, stormwater and wastewater professionals can confidently plan to ensure:

Networks run reliably

Aging assets cope with growth and climate change

Sanitary and combined sewer overflows (SSOs and CSOs) are reduced significantly

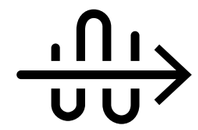
Flood risk is reduced

Customer service, environmental, financial, and regulatory targets are met

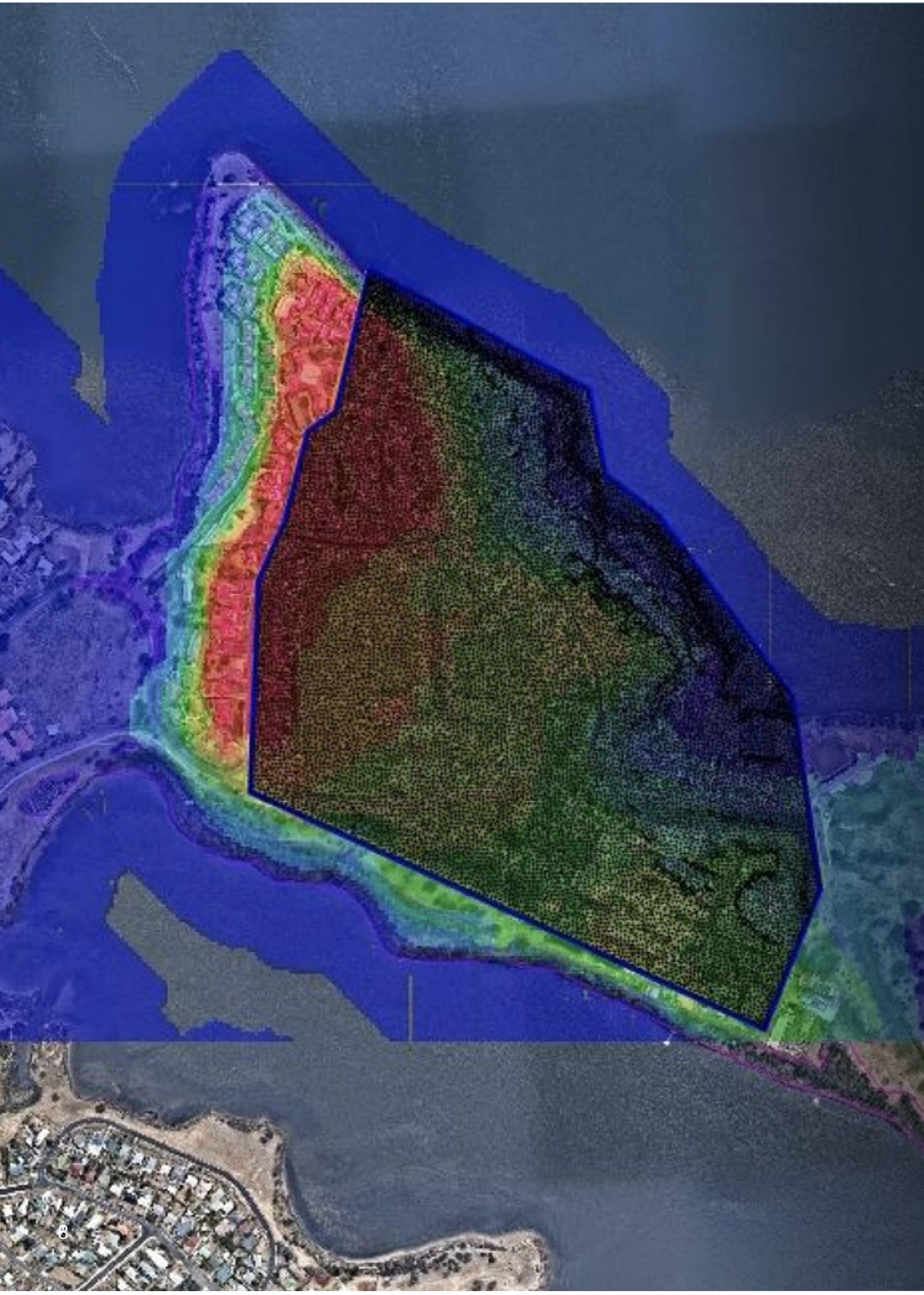
The right infrastructure is where it’s needed

Communication is efficient

Action plans and decisions are defendable



Resources are used wisely



“Our design teams have found a lot of value in running varying flow patterns. It provides verification of what they’re doing with strong insight and low effort to ensure positive impacts are being made.”

Steven Rhodes
PE Asset Management & Modeling Engineering
Freese and Nichols, United States

04 | **How to better plan and manage stormwater and wastewater networks**

What does your current modeling situation look like? Are you using older technology that limits your abilities? Imagine having accurate representations of the natural and constructed elements impacting your network and having up-to-date reports that visually represent and highlight relevant items that will provide intel in your decision making.

Integrated catchment modeling software enables you to model complex hydraulic and hydrologic network elements quickly, accurately, and collaboratively so you can improve your stormwater and wastewater planning and management. Capabilities for 1D and 2D modeling, advanced simulation, and robust collaboration enable you to build models that you can trust for planning with confidence.

1D and 2D modeling

Model 1D network elements and 2D hydrodynamic simulations in urban environments and river floodplains.

1d modeling helps you to understand your underground pipe network and provides the ability to do rapid assessments of river systems. 2d modeling focuses on above ground surface flows and is used in floodplain management where the effects of underground pipe network are negligible.

Having both 1D and 2D modeling in one package gives you a full holistic view of the interactions between your above ground and underground network.

For example, in wastewater, having them interact will allow you to understand the impact to customers of a potential sewer spill. For stormwater, it provides understanding of flood risk and where improvements can be made, so you can confidently decide where pipes can be replaced, roads need to be widened, where you might choose to place a pond, and many other solutions that you might consider.

Simulation

Powerful hydraulic simulation with multiple engine options provides fast and reliable simulation of rivers, sewer systems, runoff calculation and overland flooding for informed decision making.

The use of spreadsheets in the past limited our ability to understand networks as a whole and the different solutions available as they were slow, required many mathematical assumptions, and were unable to be scaled.
Advances in technology and innovation have created a space where well-adopted, robust, fast, compliant, scalable, and reliable models can now be created to support complex decision making. Opting for the latest, purpose-built technology keeps projects running on time, with accuracy to assure that you are making the right choice for your clients and customers.

Data inferencing and connectivity

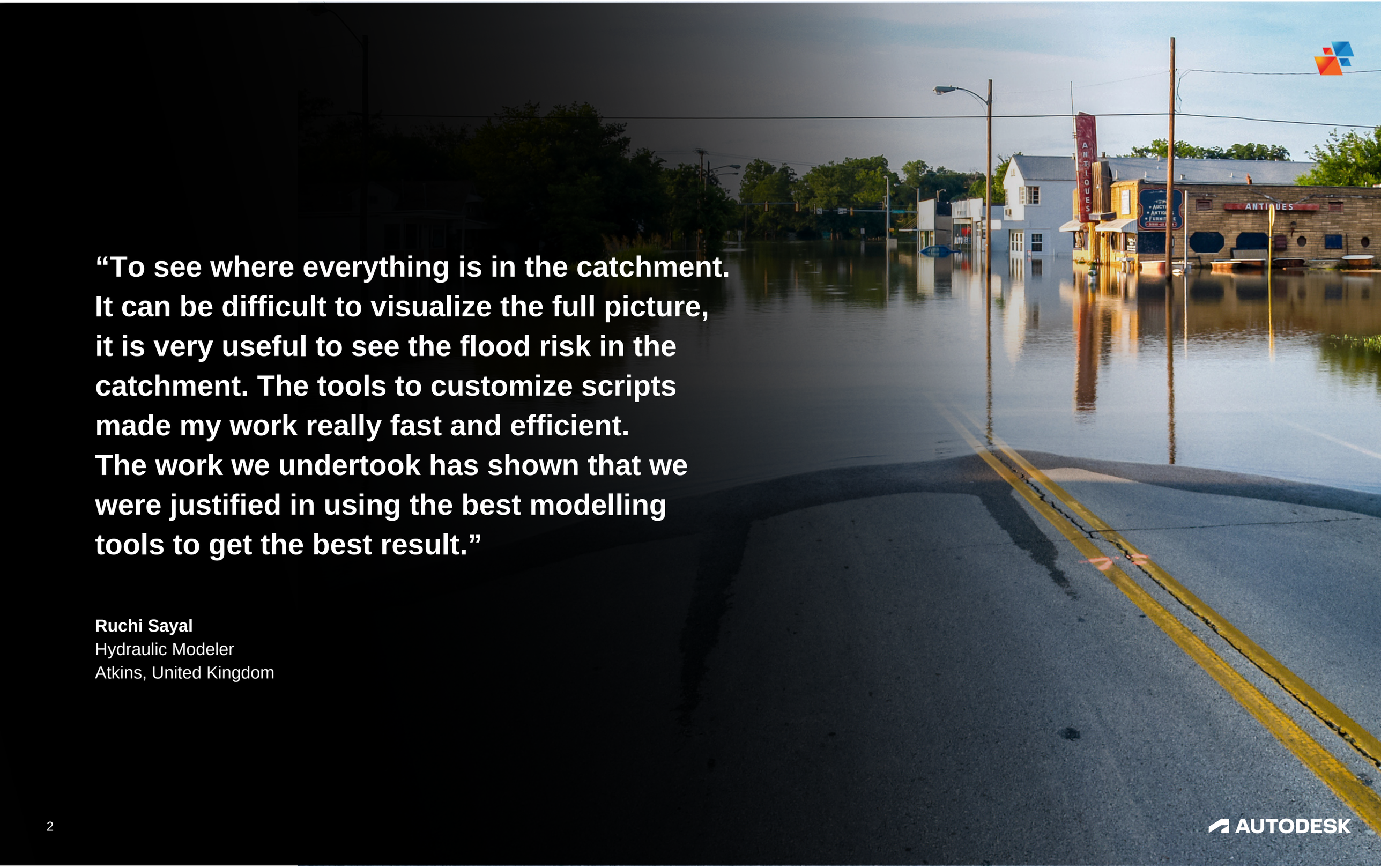
Data inferencing is a quick way to infer missing information based on a set of rules determined by the user, typically based on design standards. Imagine you input your asset data to create your model network only to find that you are missing 90% of your pipe inverts, pit cover levels, and there are breaks in the network.

Your model won't run with missing data, and even if it did, you wouldn't be able to trust the results. The ability to update data from other sources such as survey ground models or CCTV, or infer items based on engineering judgement establishes accuracy in better running models.

Project collaboration

Project collaboration capabilities within integrated catchment modeling software provides a space for project accessibility: one platform, one central point for all stakeholders.

With file uploads in one space, anyone from a project manager to a planning engineer can view the latest model updates and track the commit history to understand when changes have occurred and the user that has made them. A single point of truth for a project creates open communication between stakeholders and is a trusted space for the team to work in collaboration and manage up-to-date unified models that are complete and accurate.



“To see where everything is in the catchment. It can be difficult to visualize the full picture, it is very useful to see the flood risk in the catchment. The tools to customize scripts made my work really fast and efficient. The work we undertook has shown that we were justified in using the best modelling tools to get the best result.”

Ruchi Sayal
Hydraulic Modeler
Atkins, United Kingdom

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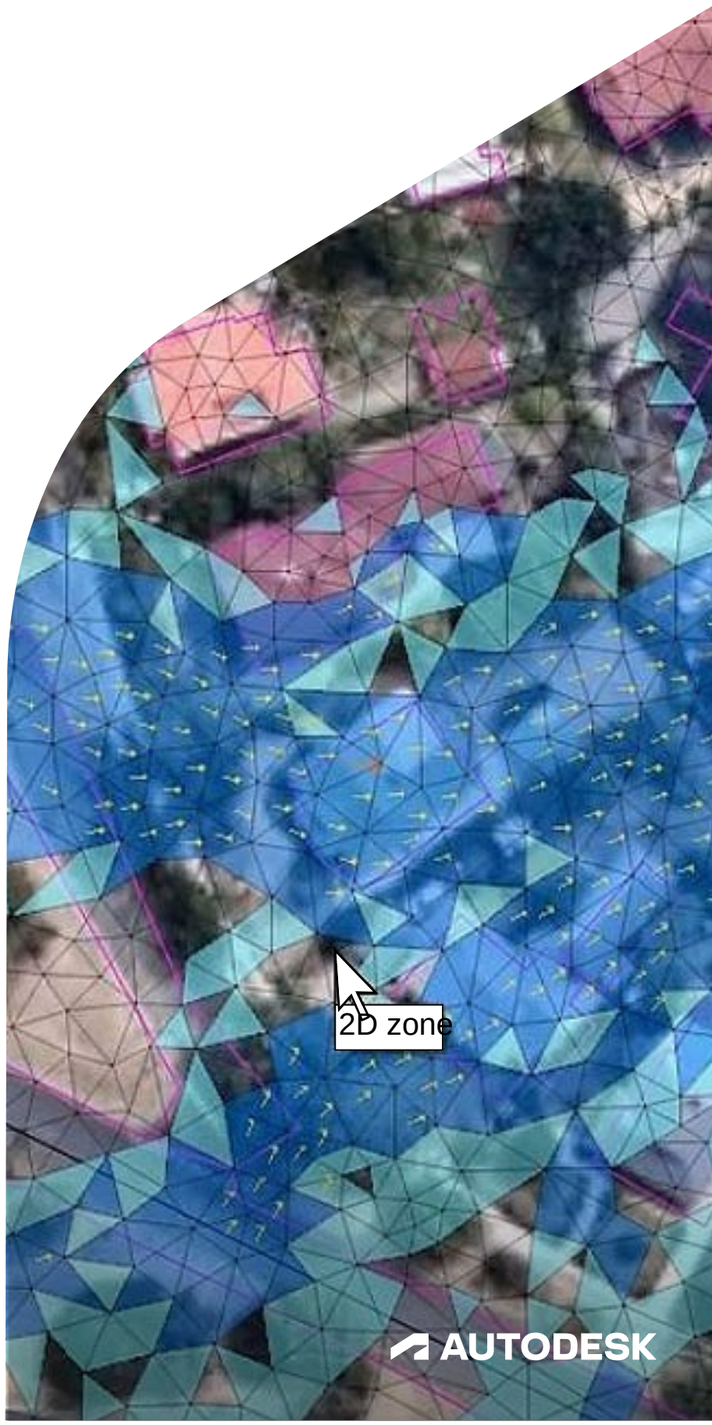
05 | **Benefits of hydraulic and hydrologic modeling for flood risk and spill assessment**

Advanced hydrologic and hydraulic modeling can help stormwater and wastewater professionals build stronger community resilience and improve environmental protection against the pressures of population growth and extreme weather events caused by climate change.

Simulate intense storm patterns to evaluate where system stresses would emerge. You can then leverage these results to develop resiliency plans for situations with high flood risk potential. And because the plan lives within your software, you can share easily with your stakeholders.

High-powered, innovative modeling technology establishes:

- Collaborative workspaces
- Project transparency
- Reduced errors and rework
- Met or exceeded design requirements
- Shortened overall design time



06 | **Getting started**

Autodesk is the AEC industry's partner for digital transformation. With the largest and most integrated portfolio of modeling software for design and engineering, we empower our customers to realize better ways of working and better outcomes for their business, industry, and the environment.

Autodesk® InfoWorks® ICM software empowers you to build models that you can trust using 1D/2D modeling to accurately depict stormwater, wastewater, and flooding scenarios to give you a better understanding of which areas are prone to flood.

InfoWorks ICM advanced modeling solution offers project managers, planners, directors, c-level executives an opportunity to improve their stormwater and wastewater planning and management by reducing time spent on projects with fast simulation, reliable results so less rework is required, collaborative space with workgroup management functionality and the ability to move to an operational platform.

Ready to get started?

To learn more about getting started with our stormwater, wastewater, and flood modeling technology, visit our solution center.

Learn more ›

Contact Us

info@solidcad.ca

+1 (877) 438-2231

www.solidcad.ca