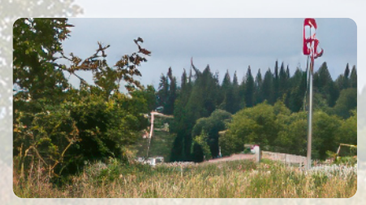
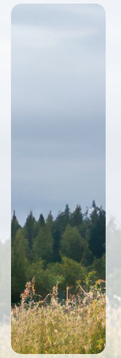
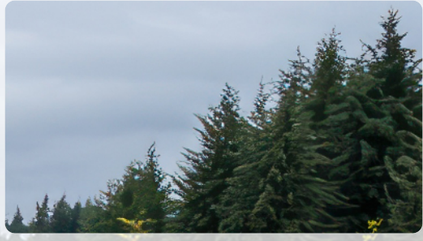
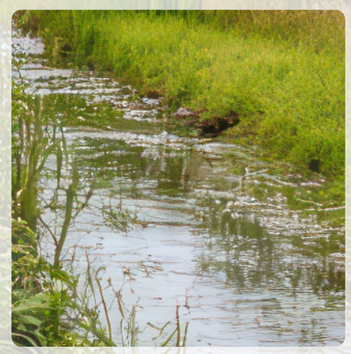
WHITE PAPER | APRIL 2026

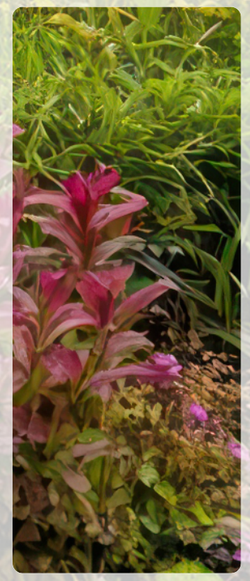
The New Standard for Stormwater

Integrated Drainage Design

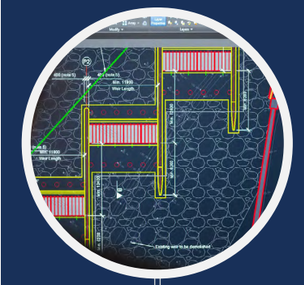







bluefield RESEARCH

AUTODESK



Contents

Executive Summary 1

A Global Need for Improved Drainage and Stormwater Solutions 3

Digital Tools Are Essential to Drainage Design 6

InfoDrainage Use Cases and Interview Takeaways 8

What Is Next for Drainage Design? 10

Sources 11

About Bluefield Research 11

About Autodesk 11

1 Executive Summary

Stormwater is far more than a drainage problem—it represents a multibillion-dollar liability that threatens municipalities, hinders new development, and creates a compliance crisis that is reshaping infrastructure spending. This change is underpinned by shifting climatic patterns that are resulting in more severe rainfall, intense flooding, combined sewer overflows, and increased pollutant runoff. At the same time, population growth and urban development are amplifying the crisis. Every new building, parking lot, and road replaces absorbent land with impervious surfaces, which accelerates runoff and overwhelms aging systems designed for a different era. According to the European Commission Joint Research Centre, human-built areas are projected to double by the end of the century.1 For these reasons, engineers are now tasked with designing more resilient stormwater and drainage solutions to mitigate the mounting challenges.

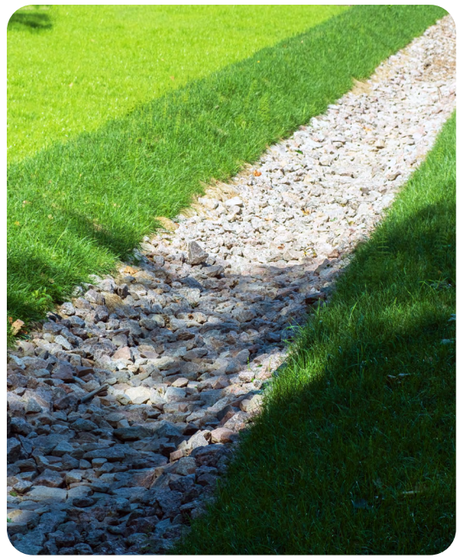
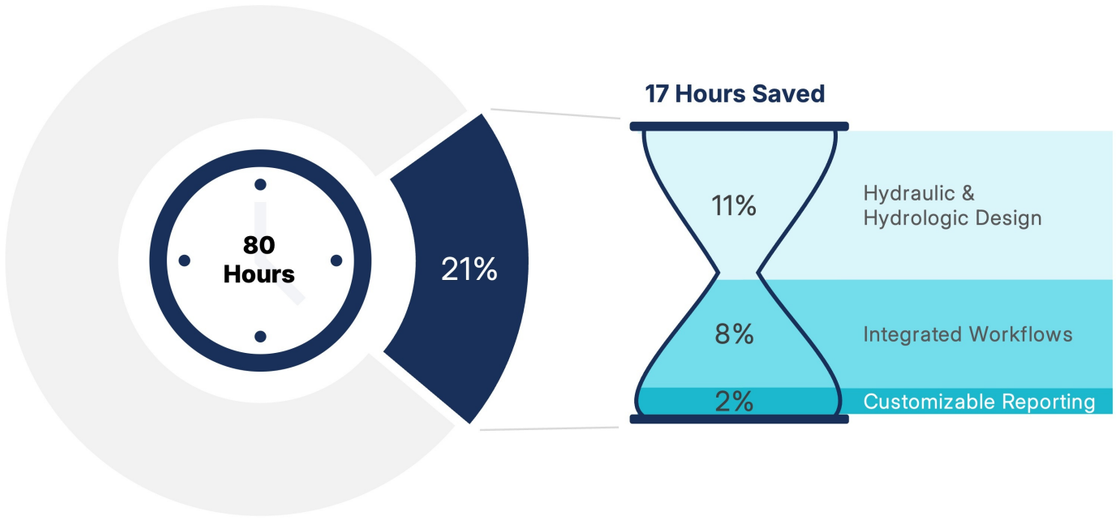


Image Source: Autodesk

As software becomes increasingly connected and data driven, stormwater infrastructure design is shifting from a static calculation exercise to an iterative, data-rich design discipline. Previously, engineers relied on spreadsheets or outdated software to size drainage features. After being sized in this format, the hydraulic designs would then be manually translated and exported into a larger site design. This process was both labor intensive and prone to errors. Newer workflow platforms and connected software enable engineers to reduce handoffs and iterate in real time between hydraulic design and site design.

Autodesk, a leading global software solution provider, offers an array of software solutions to support the planning, design, construction, and operation of all types of water infrastructure assets. This paper focuses on site- and development-scale drainage design workflows, for which Autodesk's solution consists of Civil 3D and InfoDrainage. This integrated workspace embeds drainage design directly into the 3D building information modeling (BIM) environment, where site decisions are made. The solution features visualization tools, compliance and reporting capabilities, and built-in hydrologic and hydraulic analysis of green infrastructure elements like ponds and swales.

Bluefield Research interviewed Autodesk customers using InfoDrainage to better understand how they incorporate the tool into their day-to-day projects.



InfoDrainage Surveyed Customer Time Savings for an 80-Hour Drainage Project Benchmark

Source: InfoDrainage customer interviews conducted by Bluefield Research
Image Source: Autodesk

In a benchmark 80-hour drainage design project, users saved approximately **17 hours** per project. That translates to **an average time reduction of 21% versus their prior hydraulic and hydrologic workflows** (e.g., Excel, legacy drainage design software). The time savings were distributed among the following components:

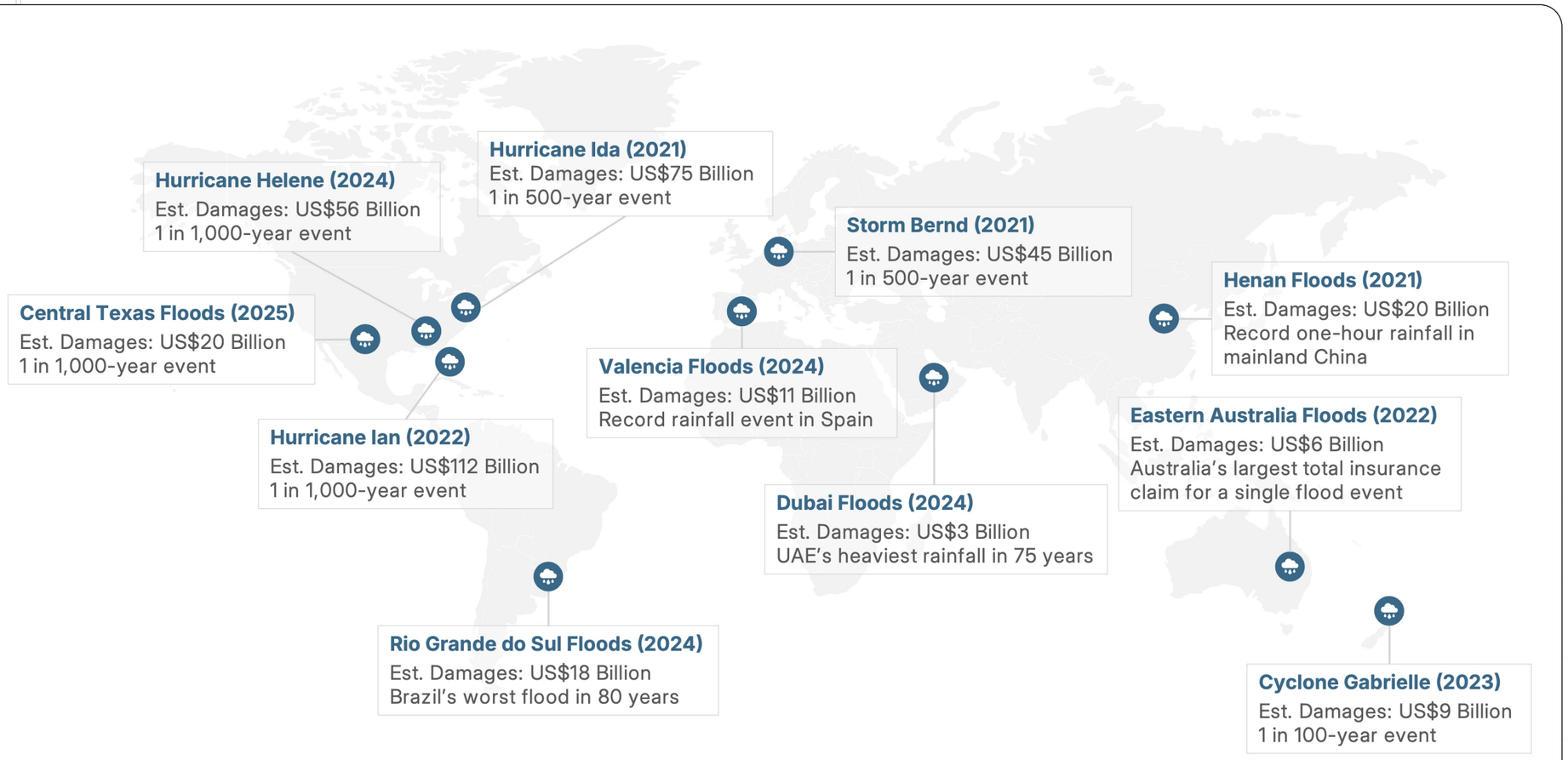
- Hydraulic and hydrologic design: 11% saved
- Integrated workflows: 8% saved
- Customizable reporting: 2% saved

This efficiency gain can shorten project review cycles for both clients and regulators.

2 A Global Need for Improved Drainage and Stormwater Solutions

The stormwater challenge is accelerating on two fronts: intensified precipitation from changing climate patterns and the rapid expansion of impervious surfaces due to urban development. Together, these forces are overwhelming the drainage infrastructure that was designed for conditions that are no longer applicable. As a result, once-manageable storms have now become recurring threats to lives, property, and municipal budgets.

Stormwater is a chronic crisis, not just an occasional disaster.



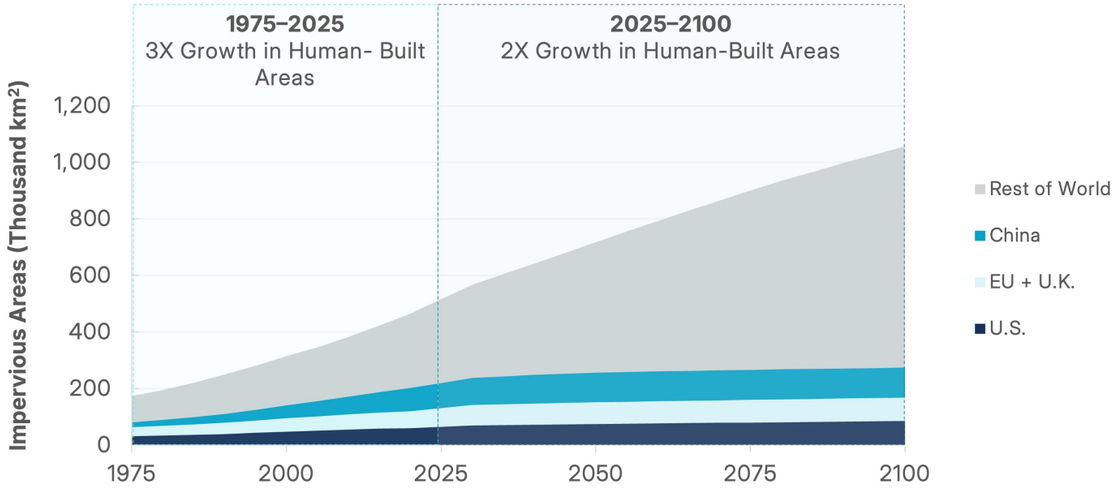
Major Stormwater & Flood Events (2020–2025)

Source: Bluefield Research

Canadian hydrologist James P. Bruce famously stated, "If climate change is the shark, water is the teeth."[2] This decade alone has seen a concerning number of highly consequential stormwater and flooding events. From Hurricane Ida's flooding of New York City's subway system in 2021 to the extreme rainfall in Dubai in 2024, severe stormwater events continue to remind society of the staggering consequences associated with "the teeth."

Global precipitation trends are shifting due to climate change and natural climate variability (e.g., El Niño, La Niña). Some areas are experiencing insufficient rainfall, while others are facing higher-intensity rainfall. In the U.S., average precipitation has increased by roughly 0.2 inches per decade since 1967, with some regions (e.g., Northeast, Midwest) seeing even greater increases of about 0.4 inches per decade.[3]

Meanwhile, urban development is expanding at an unprecedented rate, driven by population growth and industrialization. The rise of impervious surfaces—such as roads, roofs, and parking lots—exacerbates flooding by increasing runoff volume and velocity, which overwhelms drainage systems that were not designed for this scale. Over the last 50 years, human-built areas have tripled globally, and they are projected to double again by the end of the century.[1]



Growth in Human-Built Areas, Globally

Source: Global Human Settlement Layer - World Urbanisation Prospect 2025 data, Bluefield Research

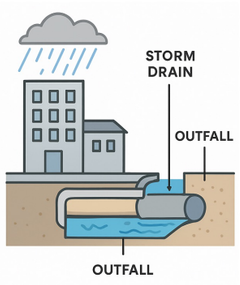
The implications of this increased development and rainfall volatility are significant. Traditional stormwater infrastructure, such as storm drains, pipes, and culverts, was designed based on historical precipitation levels and is now increasingly inadequate for handling more frequent and severe storms.

As such, a paradigm shift is underway. City managers, urban planners, and regulators are being compelled to implement stricter stormwater design standards. This includes employing nature-based solutions (i.e., green infrastructure) to supplement gray infrastructure. This approach is especially important in areas with a higher percentage of impervious surfaces, which face exacerbated flooding challenges. In different geographies, green infrastructure solutions are referred to as Low-Impact Designs (LIDs), Sustainable Drainage Systems (SuDS), Best Management Practices (BMPs), or Water Sensitive Urban Design (WSUD).

Gray (Conventional)

Traditional, engineered systems designed to collect, convey, and discharge stormwater.

Examples: Storm drains, pipes, culverts, combined sewers, basins

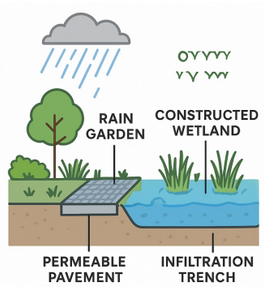


Increasing adoption of hybrid designs

Green (Nature-Based Solutions)

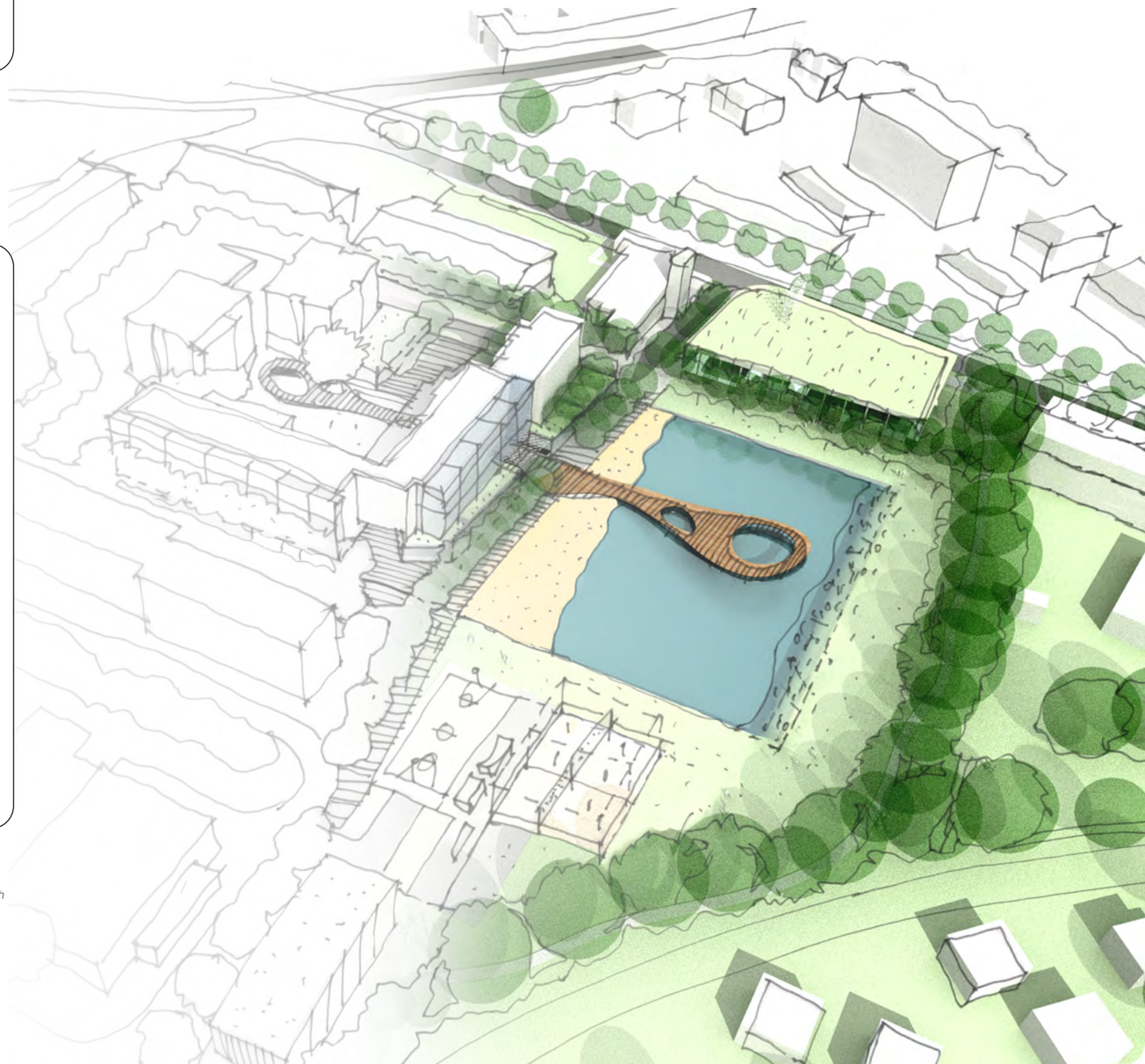
Nature-based systems that capture, infiltrate, and treat stormwater using natural water processes.

Examples: Rain gardens, bioswales, wetlands, permeable materials, plants



Increasing Role of Green (Nature-Based) Infrastructure Solutions

Source: Bluefield Research



While green infrastructure cannot prevent once-in-a-generation weather events, it can reduce the impact of surface water flooding. It enables communities to adapt to changing weather patterns by enhancing the resiliency of stormwater management and drainage systems. Additionally, green infrastructure aids in treating stormwater, improving water quality, and achieving stormwater permits (e.g., U.S. Municipal Separate Storm Sewer System permits). Several countries have required or encouraged the use of green infrastructure through strategic plans, permitting, and design standards.

Engineers, regulations, and workforce challenges influence the adoption of green infrastructure.

A key barrier to the adoption of green infrastructure is not the buy-in, but rather the challenge of navigating the complex, site-specific design standards that vary between jurisdictions and require specialized hydrological expertise. For example, following severe flooding events in 2010, the U.K. established Lead Local Flood Authorities and mandated the creation of national and local flood strategies as part of the landmark Flood and Water Management Act. This act promoted the use of SuDS (i.e., green infrastructure), encouraging developers to implement features like permeable paving, rain gardens, and green roofs in new developments to reduce strain on an already overloaded Victorian-era sewage system. Wales began requiring SuDS approval in 2019, while Scotland has required SuDS in most developments since the mid-2000s. England released updated non-statutory national design standards for SuDS.

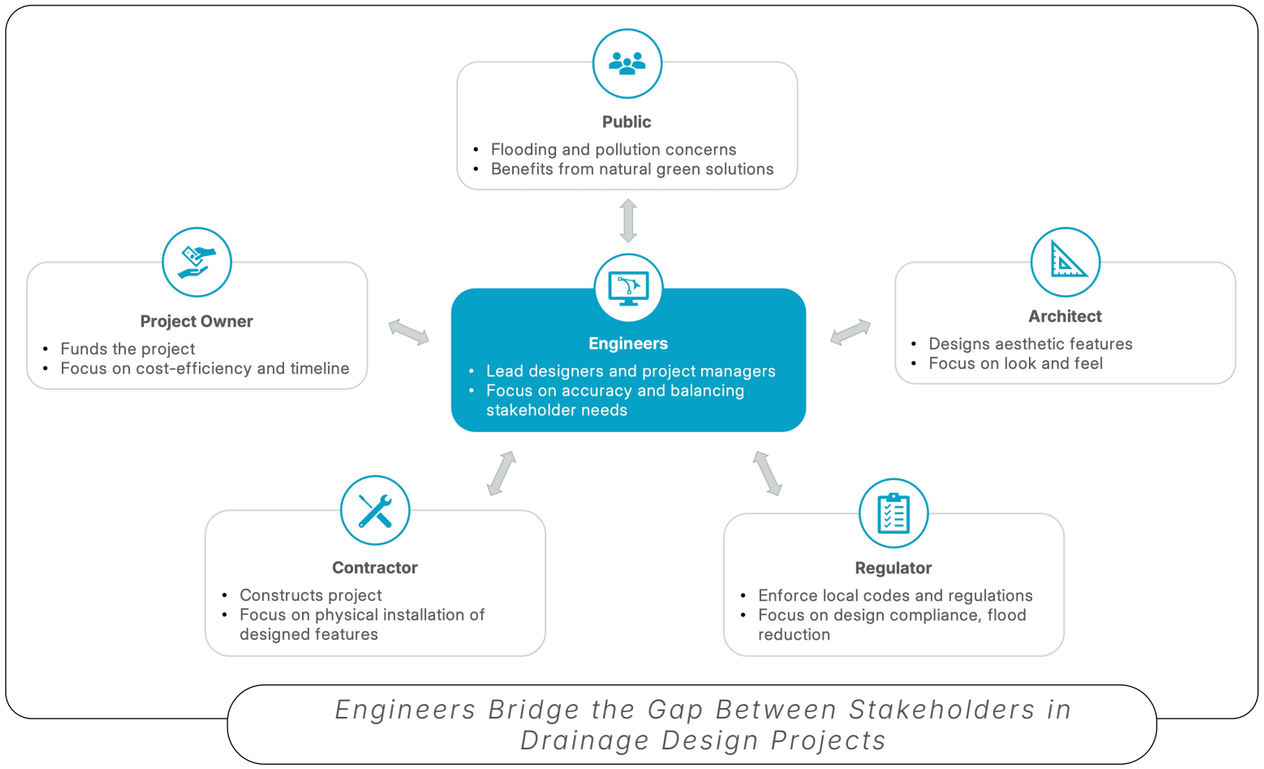
This shift toward green infrastructure is placing greater responsibility on engineers, who are tasked with ensuring that new developments comply with regulatory design standards. Ultimately, engineers must bridge the information gap among multiple stakeholders, including project owners, architects, construction firms, and regulators. Due to variations in regulatory standards and the design review process across local authorities, many design iterations may be required before approval is granted. Improved modeling and standardized reporting tools aim to reduce these iterations and enhance approval times.

Currently, many engineering firms are reaching their capacity limits, as highlighted by industry surveys conducted by organizations such as the Associated Builders and Contractors and the American Council of Engineering Companies Research Institute.[4, 5] These organizations report that the average backlog for U.S. engineering firms typically ranges from 8 to 12 months. Further, infrastructure projects, which include water, represent the largest share of this backlog. As infrastructure demand surges and the skilled workforce declines, time-saving design software becomes essential for maintaining delivery schedules and service quality.

	U.S.	UK	EU	China	Singapore	Australia
Term	Low Impact Development (LIDs)	Sustainable Drainage Systems (SuDS)	Blue-Green Infrastructure (BGI)	Sponge City	Active, Beautiful, Clean Waters (ABC)	Water Sensitive Urban Design (WSUD)
Policy Goal	Manage runoff and reduce pollution at the source	Drainage design standards covering water quality, flows, biodiversity	EU promotes the use of green and blue infrastructure in urban planning	80% of urban cities to harvest and reuse 70% of rainwater with green infrastructure by 2030	Transform stormwater infrastructure into green infrastructure spaces	Integrated landscape-water design framework
Expected Impervious Surface Area Change (2025–2050)	+15%	+34%	+15%	+18%	+67%	+20%
Goals	Reduce peak runoff, pollutant removal, improved flooding outcomes					

Nature-Based Solutions Around the World

Source: Global Human Settlement Layer - World Urbanisation Prospect 2025 data, Bluefield Research



Engineers Bridge the Gap Between Stakeholders in Drainage Design Projects

Source: Bluefield Research



Image Source: Autodesk

3 Digital Tools Are Essential to Drainage Design

Stormwater design is evolving beyond traditional workflows. Tightening regulations, capacity-constrained firms, and compressed timelines mean that effective software now determines whether projects are successfully delivered or stalled.

The right software is critical for effective stormwater design.

Drainage designs typically involve several key steps. First, engineers must gather rainfall and site data. Next, they lay out a drainage network that is sized using hydrologic and hydraulic analysis. Different features such as pipes, channels, inlets, swales, and ponds must be appropriately sized to handle stormwater flows. Each feature must have the correct diameters, slopes, and capacities while also complying with local stormwater and environmental regulations.

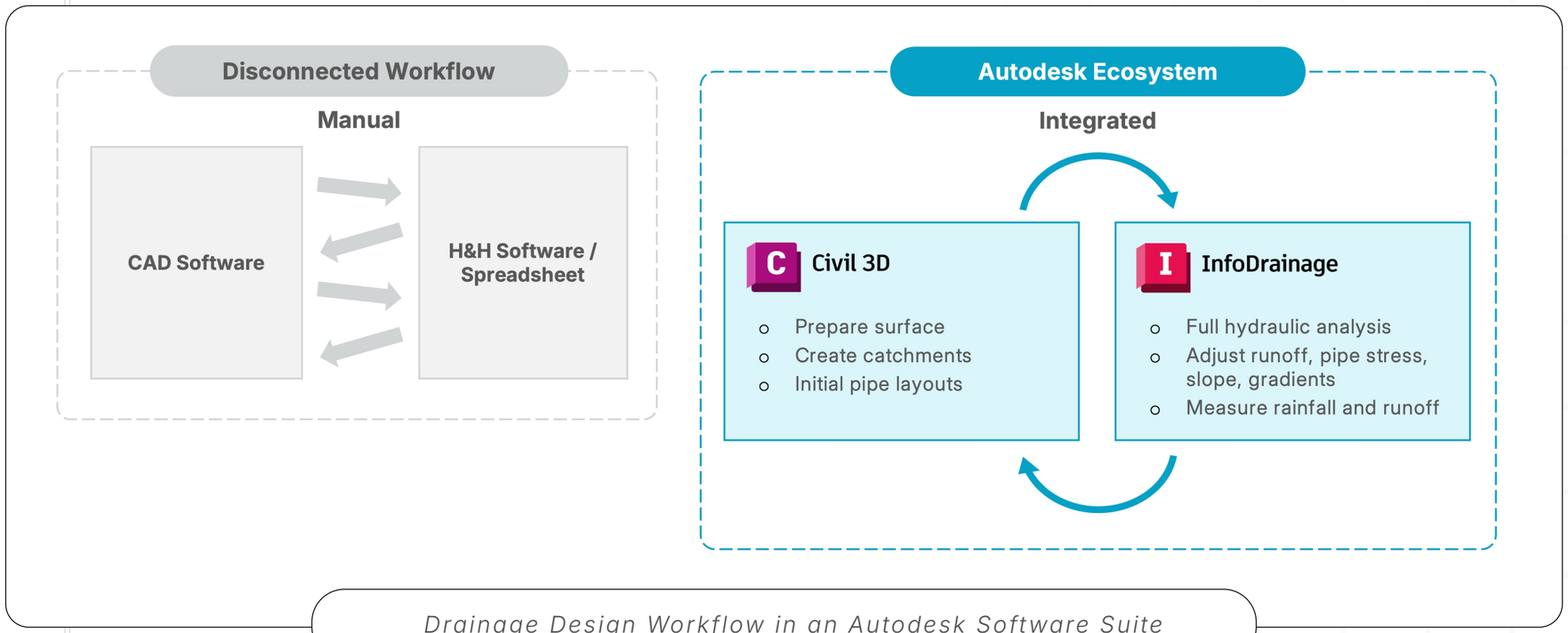
Engineers generally use two types of software for stormwater and drainage designs: **computer-aided design (CAD) tools and hydrologic and hydraulic (H&H) analysis tools.**

CAD software is used to draft the physical layout of pipes, manholes, and grading in site designs, functioning as a 3D model to help designers visualize entire systems.

CAD is critical for drafting construction documents and figures for design reports. Conversely, H&H tools are used to analyze stormwater flows and size drainage features based on rainfall data. The U.S. Environmental Protection Agency (EPA) offers the open-source Storm Water Management Model (SWMM), which allows for the simulation and analysis of rainfall-runoff quality and quantity. Some engineers still rely on spreadsheets with manual formulas and site data inputs to support design decisions.

A drawback of utilizing these traditional tools is the lack of integration, which causes engineers to endure a labor-intensive cycle of manually transferring data between CAD and H&H tools. Every design iteration repeats this process, multiplying errors and burning hours that capacity-constrained firms cannot afford.

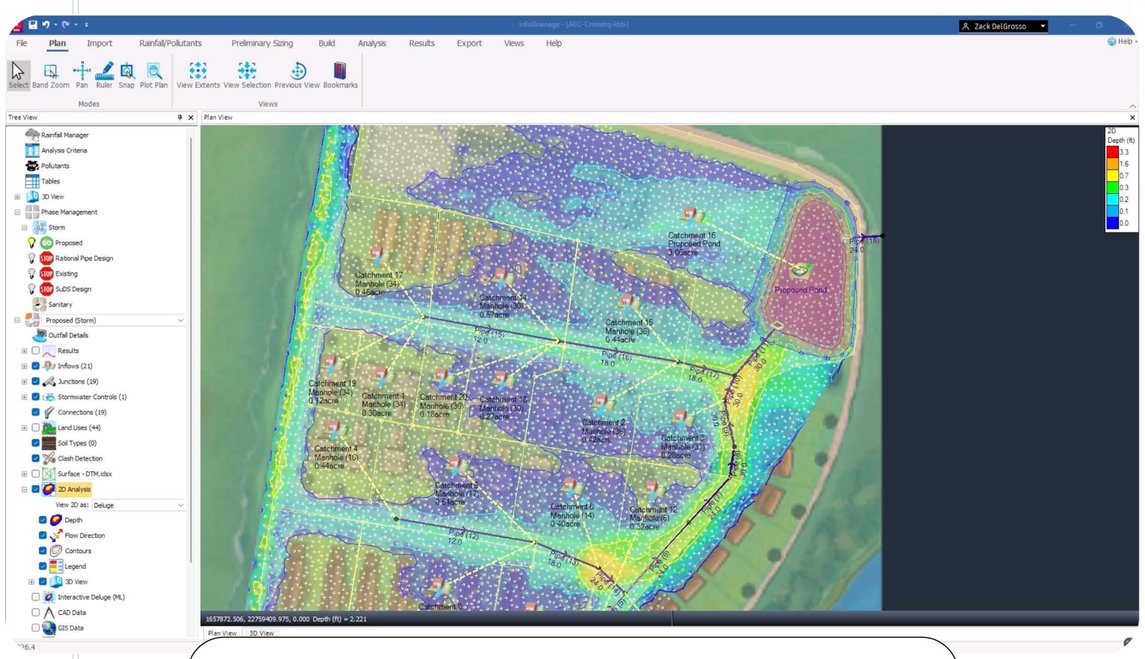
Integrated software platforms are designed to address this challenge. Autodesk's Civil 3D and InfoDrainage create an interoperable ecosystem where CAD and H&H tools can share data seamlessly. This integration reduces the need for manual re-entry and minimizes errors, improving consistency between the site model and the hydraulic model while also accelerating iteration cycles.



Drainage Design Workflow in an Autodesk Software Suite

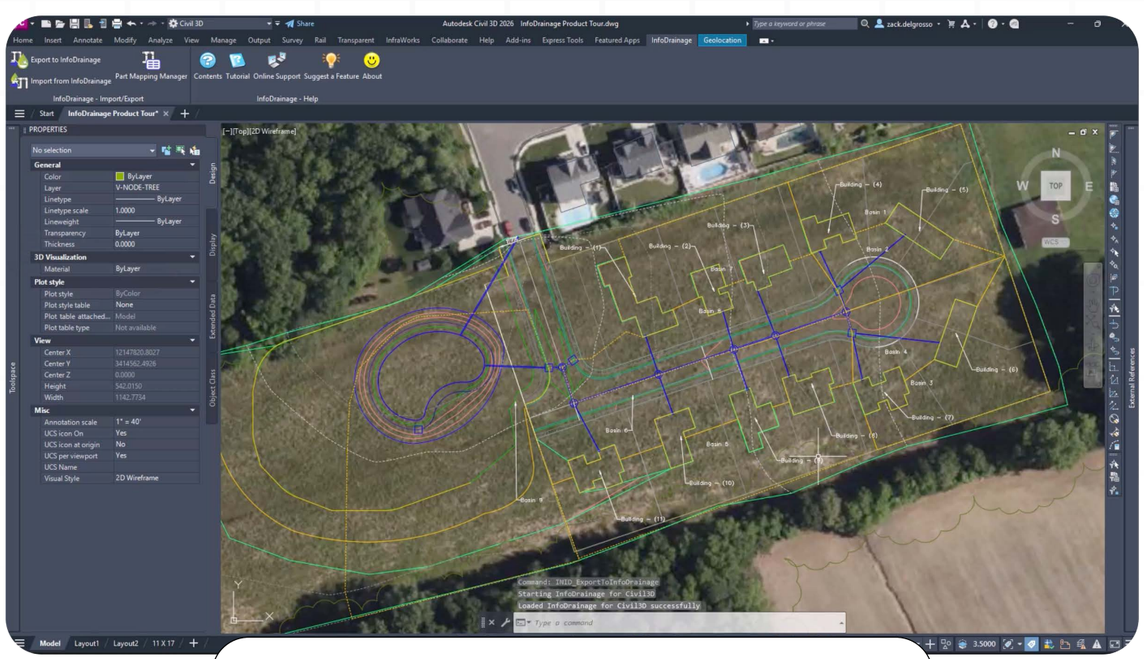
Source: Autodesk

This integration significantly reduces engineering effort and helps eliminate bottlenecks that often appear during hydraulic iteration. InfoDrainage adds critical capabilities: combined gray and green infrastructure modeling, faster scenario testing and flood visualization, machine learning (ML)-powered flood mapping, and automated, fully customized regulatory-ready reporting to streamline the permitting and review process.



Autodesk's InfoDrainage Software Environment

Source: Autodesk



Autodesk's Civil 3D Software Environment

Source: Autodesk

4 InfoDrainage Use Cases and Interview Takeaways

To gain insights beyond just the features and understand real-world impacts, Bluefield Research conducted interviews with InfoDrainage users across diverse project types: residential developments, commercial sites, industrial facilities, and public infrastructure. The purpose of these interviews was to quantify actual time savings and identify which workflow improvements deliver the greatest value to capacity-constrained engineering firms.

Users of Autodesk's InfoDrainage reported an average time savings of 21% per project.

In the interviews, Bluefield Research gathered insights from Autodesk InfoDrainage users across residential, commercial, industrial, and public works projects to quantify workflow time impacts in real-world applications. On average, users reported saving 21% of their project time versus their prior tech stacks (e.g., Excel-based methods, SWMM-based workflows, or other legacy H&H software). For a representative 80-hour drainage design effort, this equates to a savings of 17 hours, attributed to reductions in hydrologic and hydraulic design and iteration (11% of total baseline time), integrated workflows and reduced handoffs (8%), and automated reporting (2%).

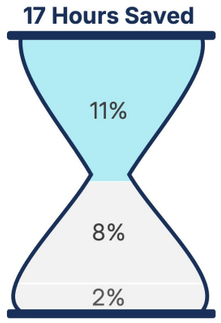
Drainage Steps	Respondents 1	2	3	4	5	6	7	8	Surveyed Average
Delineate Existing/Proposed Drainage Basins	●	●●	●●●		●●	●●	●	●●●	●●
Passing Data between Civil 3D and InfoDrainage	●●●	●	●	●●	●	●●●	●●	●●	●●
Calculate Hydrology	●●	●●●	●	●●●		●●●	●●●	●●	●●●
Calculate Hydraulics	●●	●●●	●●●	●●●	●	●●●	●●●	●	●●●
Revisions and Iterations	●	●●	●	●●	●●	●●	●	●●●	●●
Finalizing Design and Publishing Results	●	●●	●●		●	●●	●●	●●	●●
Exporting Designs back to Civil 3D	●●	●	●		●●●	●●	●●●	●●●	●●
Total Time Savings* (Hours)	**13**	**18**	**13**	**15**	**10**	**25**	**20**	**23**	**17**

●●● Significant (4+ hours) ●● Moderate (1–4 hours) ● None/Limited (0–1 hours) □ Not Applicable

Time Savings in Drainage Design Steps with InfoDrainage

User experiences varied significantly based on workflow maturity and project complexity. While some firms captured immediate 20%+ productivity gains, others were still learning the platform's full capabilities. Importantly, certain benefits resist quantification. Users emphasized that InfoDrainage enabled the integration of design elements that were previously impossible or impractical. These features include client-ready visual presentations, combined 1D/2D flood modeling, analysis of site-specific green infrastructure (e.g., swales, ponds), and graphical outputs that accelerate regulatory approval. The following interview takeaways illustrate a range of user experiences.

*Note: Interviews were conducted from November 2025 to February 2026. Users were asked to benchmark their time savings in each phase against their previous H&H tool option, which either involved different software or drainage spreadsheets. *Total time savings were summed with responses N/A and 0.0–1.0 hour as 0.0 hours, 1.0–4.0 hours as 2.5 hours, and 4.0+ hours as 5.0 hours. Summed responses were rounded up to the nearest hour. Two interviews were excluded from the time savings estimates due to insufficient experience with InfoDrainage software, as the participants were newer users*
Source: InfoDrainage customer interviews conducted by Bluefield Research

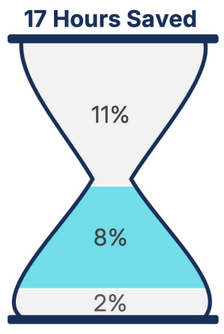


11% Average Surveyed Time Savings in Hydraulic & Hydrologic Analysis

Delineate Existing/Proposed Drainage Basins | Calculate Hydrology | Calculate Hydraulics

KEY INFODRAINAGE INTERVIEW INSIGHTS

- "InfoDrainage is a powerful tool that accounts for many local intricacies captured in our drainage basins, hydrology, and detailed hydraulic analyses. We have found that simulations in the software execute faster than alternatives, and its use of a customized SWMM5 engine gives us confidence that our drainage designs are both rigorous and highly competitive with other solutions." Jess Ewing, PE, Project Manager & Jenna Woyner, EIT, Project Designer at VHB (U.S.)
- "The software facilitates adherence to local regulatory requirements by enabling users to segregate and design clear stormwater drainage networks and incorporate rainwater harvesting elements into site master plans." Vijayakarthy Balasubramanian, Senior Discipline Manager at L&T Technology Services (India)
- "The hydraulic design features in InfoDrainage are core to the software. This is especially helpful if users do not have experience building their own robust drainage calculation spreadsheets." Rob Forsyth, Technical Director and National Water Lead at Waterman Group (U.K.)
- "The UK's increasing adoption of sustainable features has made green infrastructure elements a key part of drainage design modeling. InfoDrainage provides a common platform that is interoperable between engineers." Anonymous Civil Engineer (U.K.)

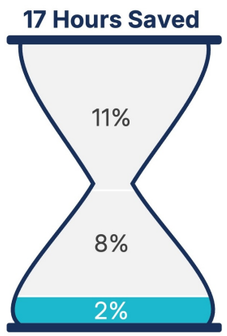


8% Average Surveyed Time Savings in Integrated Workflows

Passing Data between Civil 3D and InfoDrainage | Revisions & Iterations | Exporting Designs back to Civil 3D

KEY INFODRAINAGE INTERVIEW INSIGHTS

- "InfoDrainage's integration with Civil 3D allows us to pass data seamlessly between platforms. This connected workflow ensures that when revisions are required, we can iterate quickly, streamlining our process and supporting accurate, reliable land development designs. That combination of integration and speed has been a game changer for how we approach land development projects." Jess Ewing, PE, Project Manager & Jenna Woyner, EIT, Project Designer at VHB (U.S.)
- "Manual errors in translating data can be very costly – it can result in ordering the wrong materials and delays for project contractors. In past project plans that mismatched reality, it would take a significant amount of time going back into old project files to correct errors." Cole Schmidt, Project Engineer at CEI Engineering Associates, Inc. (U.S.)
- "InfoDrainage works well with Civil 3D, together they give users an accurate and powerful drainage design workflow. The bidirectional data flows are especially important during revisions and iterations." Kenneth Driscol, Implementation Specialist at Graitec (U.S.)



2% Average Surveyed Time Savings in Customizable Reporting

Finalizing Design and Publishing Results

KEY INFODRAINAGE INTERVIEW INSIGHTS

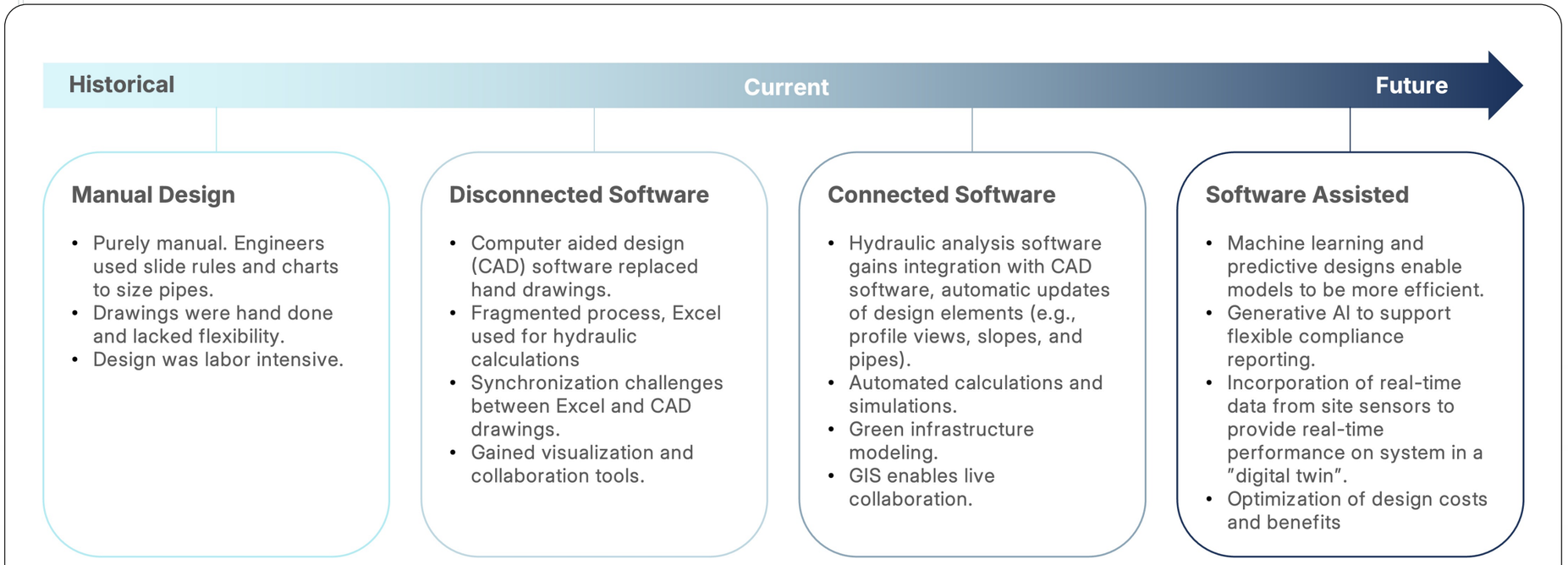
- "Stakeholders value the software's graphical representations, as they offer enhanced visualization and make drainage design features easier to understand than traditional, table-driven Excel calculations." Vijayakarthy Balasubramanian, Senior Discipline Manager at L&T Technology Services (India)
- "InfoDrainage's Visual demonstrations can help permitting authorities understand complex drainage designs, such as interconnected green and gray infrastructure features." Anonymous Civil Engineer (U.K.)
- "The reporting in InfoDrainage is feature rich and very customizable. For example, when working on a residential subdivision, you can address flooding concerns from current residents with visualizations of pre- and post-development visualizations." Cole Schmidt, Project Engineer at CEI Engineering Associates, Inc. (U.S.)

Source: Customer interviews conducted by Bluefield Research

5 What Is Next for Drainage Design?

Decades ago, drainage design relied on hand-drawn plans, slide rule calculations, and conservative oversizing to compensate for uncertainty. Without simulation capabilities, engineers built expensive gray infrastructure that performed unpredictably. Design iterations required hours of manual redrafting—making optimization economically impractical.

Today, modern drainage design integrates both green and gray infrastructure into optimized systems. This shift is enabled entirely by computational tools that can model hybrid performance. The resulting hydraulically efficient designs are better suited for today's climate realities, delivered through software-accelerated workflows that have replaced manual, time-intensive processes.



The Evolution of Drainage Design Software

Source: Bluefield Research

The impact on productivity is significant, with time savings compounding across dozens of annual projects, recovering capacity that firms desperately need. Workflows will continue to evolve, and exciting innovations are on the horizon. When prompted, interviewees shared many wish list features across various drainage steps. Future enhancements could further simplify reporting with generative artificial intelligence (AI), incorporate economic analysis directly into the software, reduce scale constraints to connect site designs to broader catchments, and even introduce features that are not yet on the industry's radar.

Looking ahead, Autodesk's vision for drainage design is centered on more connected, performance-aware workflows that sit naturally within a broader outcome-based approach. By strengthening integration with Autodesk Forma's data management capabilities, drainage information will move more fluidly between planning and detailed design, helping teams work from a consistent, shared data source. Modeling enhancements such as variable depth open channels, improved surface meshing and triangulation, and more intelligent network sizing are intended to improve hydraulic realism while reducing manual effort. At the same time, contextual AI assistance, clearer plan view controls, and modernized reporting will support more efficient coordination and regulatory submissions.

Together, these developments point toward a future in which drainage design is more integrated, data-driven, and aligned with life cycle performance goals from the outset.

6 Sources

1. Global Human Settlement Layer - World Urbanisation Prospect 2025 data. Pesaresi, M.; Schiavina, M.; Politis, P.; Freire, S.; Krasnodębska, K.; Uhl, J. H.; Kemper, T. (2024). Advances on the Global Human Settlement Layer by joint assessment of Earth Observation and population survey data. International Journal of Digital Earth, 17(1)
2. World Wildlife Fund. "If Change Is a Shark, Water Is Its Teeth. Here's Why." Published 23 March 2016. https://wwf.ca/stories/if-climate-change-is-a-shark-water-is-its-teeth-heres-why/
3. Bluefield Analysis of National Oceanic and Atmospheric Administration Precipitation Datasets. https://www.weather.gov/marfc/DailyPrecipitation
4. Associated Builders and Contractors backlog indicator. https://www.abc.org/News-Media/News-Releases/abcs-construction-backlog-indicator-inches-higher-in-december-fueled-by-data-center-momentum
5. American Council of Engineering Companies (ACEC) 2025 Q4 Engineering Business Sentiment. https://www.acec.org/resource/engineering-business-sentiment-q4-2025/

About Bluefield Research

We advance strategies for utilities, companies, and organizations addressing the challenges and opportunities in water.

Bluefield delivers robust, in-depth data and analysis not provided anywhere else in the water sector.

Boston
Barcelona
Chicago
New York
Paris
San Francisco

North America: +1 617 910 2540
Europe: +34 932 716 546

waterexperts@bluefieldresearch.com
www.bluefieldresearch.com

About Autodesk

Autodesk is changing how the world is designed and made. Our water infrastructure solutions help organizations plan, design, build, and operate resilient systems across the full asset lifecycle and water cycle. From sustainable drainage and collection to efficient treatment and distribution, Autodesk supports the systems that keep water safe, reliable, and cost-effective.

https://www.autodesk.com/infodrainage