



From grey to green

Improving sustainable drainage design for water

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01 Let nature be your guide

Since the beginning of time, water has been flowing through nature moving between the land, rivers, and oceans recycling itself, and most importantly giving life to the earth. And although we see this natural water cycle still in existence today, it now has to adapt to the challenges of urban development and contrasting weather seasons disrupting its flow.

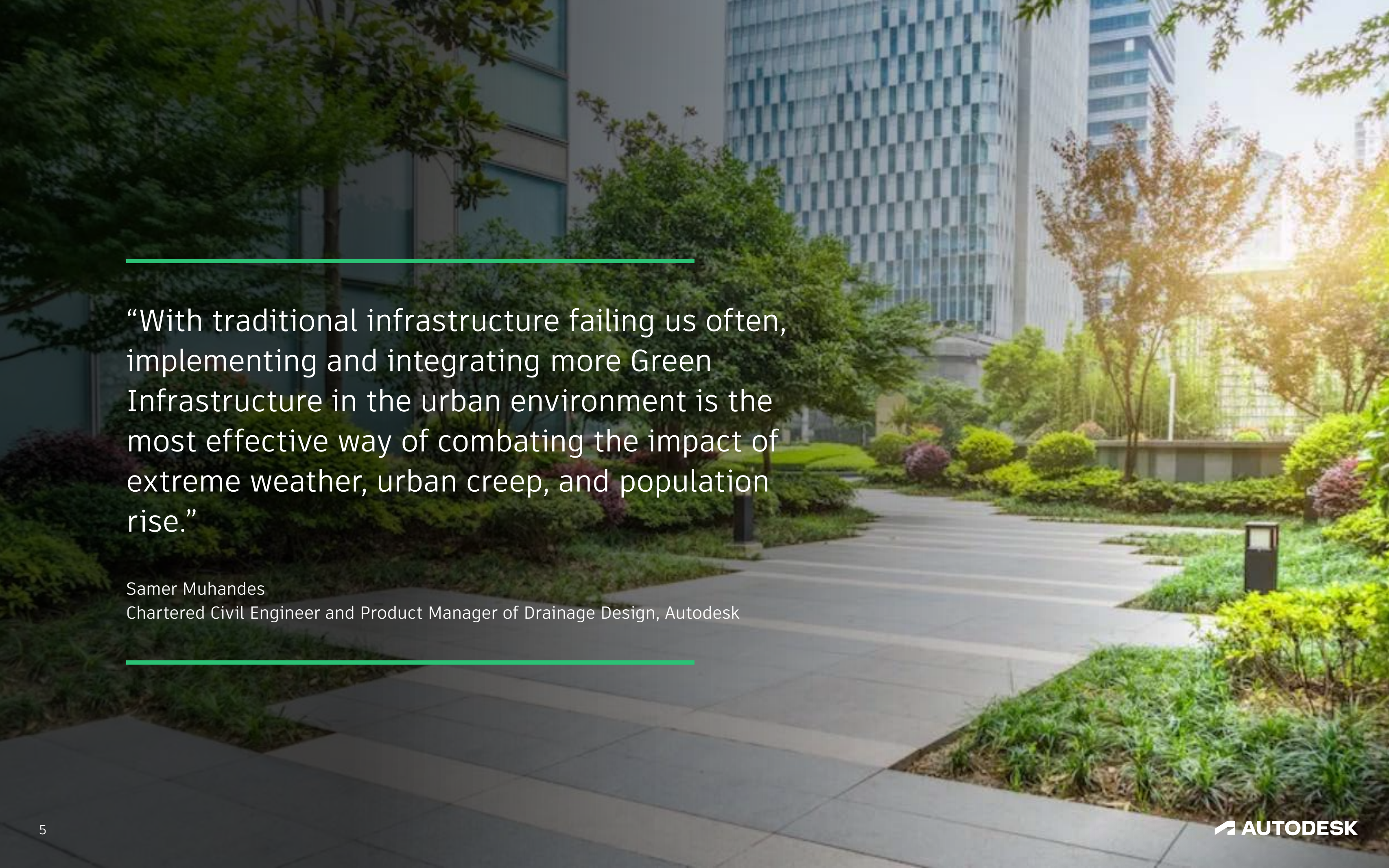
Along with these emerging challenges, drainage designers, engineers, planners, project managers, developers, and consultants are faced with the challenges of regulation, compliance, budget, timelines, design approval, and creating sustainable outcomes. Urban development might not be slowing down, but the way we design and build can hugely impact the amount of disruption occurring to our environment by using the example that nature has shown for centuries.





A greater focus on sustainability from towns and cities of all sizes means drainage designs need to offer biodiversity, amenity, water quantity, and water quality improvements and ensure confidence that these systems will perform during extreme weather events. This requires creative designs that include a variation of green infrastructure. These natural details could save a town from flooding, a wastewater pipe from spilling over, or pollutants from running into a nearby river.

In this e-book, we look at the importance of moving from traditional drainage designs to greener, more sustainable systems.



“With traditional infrastructure failing us often, implementing and integrating more Green Infrastructure in the urban environment is the most effective way of combating the impact of extreme weather, urban creep, and population rise.”

Samer Muhandes
Chartered Civil Engineer and Product Manager of Drainage Design, Autodesk

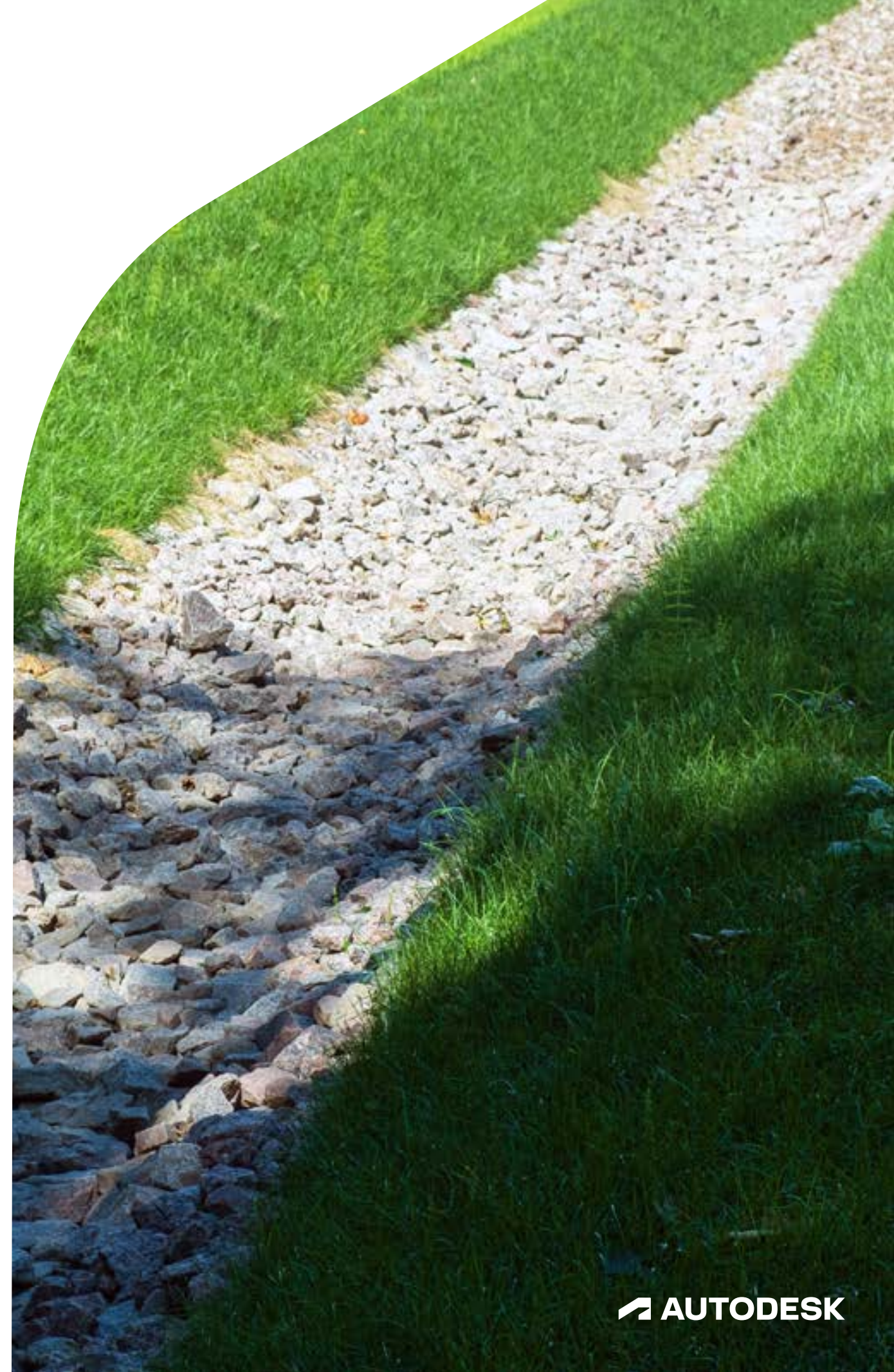
02 The appeal of green infrastructure in design

What is traditional drainage design?

Historically, traditional drainage systems were developed to drain excess surface water through underground pipes. Their intention was to carry excess water away and avoid flooding or spilling, especially during big rounds of rainfall. With water running so quickly and extreme rainfall putting pressure on the systems, this often leads to overflows that push pollution into the water—which could find its ways into rivers and streams.

How does sustainable drainage differ?

Simply enough, sustainable drainage takes its approach from nature itself. Its purpose is to reduce the amount of surface water that floods and improve overall water quality by replacing roads, concrete pipes, and traditional grey infrastructure with green infrastructure such as permeable parking lots, swales, green roofs, rain gardens, and ponds.



03 The industry shift from grey (traditional) to green (sustainable) designs

Some common language is popping up in the water industry such as green infrastructure or blue-green infrastructure along with SuDS, LID, and WSUD. Either way, sustainability is in demand when it comes to stormwater design.

This industry shift is presenting unique challenges as drainage designers, who are typically engineers, are tasked with demonstrating compliance with more complex standards needing to design green infrastructure that provides multiple benefits, all while representing what happens in their models in more detail—to encompass the filtration mechanism of vegetated drainage systems, for example.

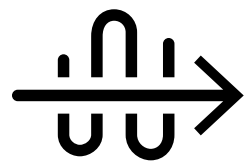
Advances in technology are creating simpler ways to include natural elements to ensure drainage is moved in the same way that nature would do—with a little touch of innovation ensuring flood impact reduces and pollution isn't finding itself where it shouldn't.

Set up with reliable tools and technology, drainage design professionals can confidently lead the way to ensure:

- Different aspects of drainage design can be tracked across design, construction, and operation
- Compliance meets local standards
- Designs are optimized
- Easy interoperability between data sources



04 Outcomes achieved with advanced design technology



Systems run efficiently



Flooding is reduced



Drainage systems run reliably



Water quality is improved



Wastewater spill risk is reduced



Environmental, financial, and regulatory targets are met



Designs are accurate



Communication is clear



Sustainability is front of mind always

05 Better designs, better communities, better environment

Creative sustainable drainage designs allow you to view structures as true to scale as possible, which improves your ability to model and ensure systems can stand up to increasing pressures from heavy rainfall or additional use from rapid development.

Are you still creating traditional designs? Or using older technology that devalues your potential? If you were given tools that could elevate your designs, meet compliance and regulation, and keep you in line with your project timelines and budget, what could it do for your business right now and in the future?

A full design and analysis solution can provide you with the capabilities you need to deliver green drainage designs—quickly and accurately.



Connectivity and accuracy

Building Information Modeling (BIM) is the holistic process of creating and managing information for a built asset. To improve connectivity, teams need to be able to accurately exchange design data across its lifecycle, from planning to design to construction and operations.

Having advanced design technology allows easy interoperability between design systems, allowing you to implement changes, resolve conflicts faster, and provide wide access visibility. With intelligent data exchanges and polygonised green infrastructure features with advanced parameters to result in a better reflection of the physical reality you can expect more accurate results that move beyond simple linework representations.

Reviewing and approval

Customizable report builders allow users to create template reports for easy reuse to define report specifics and layouts, which provides flexibility if regional areas have individual review specifications. Being able to clearly communicate your design ensures reviewers understand your designs and can confidently approve them—for example, demonstrating where the water enters a structure, what type of outlet structures are being used, as well as the detailed dimensions of these structures.

Validation and failure review forms allow you to quickly find where improvements are needed in the design to ensure approval is granted quickly with suggestions recommending values to guide a user. As soon as changes are made, you can quickly revalidate and then run a further design audit. Flexibility to share data across a range of formats for consumption by a wide-reaching group of stakeholders will get designs approved more quickly and help progress projects.





Sustainability

Balancing tight timeframes, project budgets, and changing requirements means engineers are under more pressure than ever before to deliver high-quality sustainable schemes. Identifying overland flood flow routes helps support better spatial planning. This can be done easily by leveraging the existing topography available for a design. Deluge functionality helps to identify blue-green corridors across a site and allows analysis of overland flows from the outset.

There are a wide range of different data formats that can be seamlessly imported to help create designs more quickly and efficiently. This allows engineers to better leverage existing data available for a site and remove some manual workload.

One key task is definition of catchment areas and the assignment of these areas to the structures that are going to drain the water. Graphical feedback from the results—such as a pipe capacity being exceeded or flood risk level warnings—can be shown both on the long section as well as on the plan view directly, helping to inform the user that specific areas of the design may need further optimization for some storm durations.

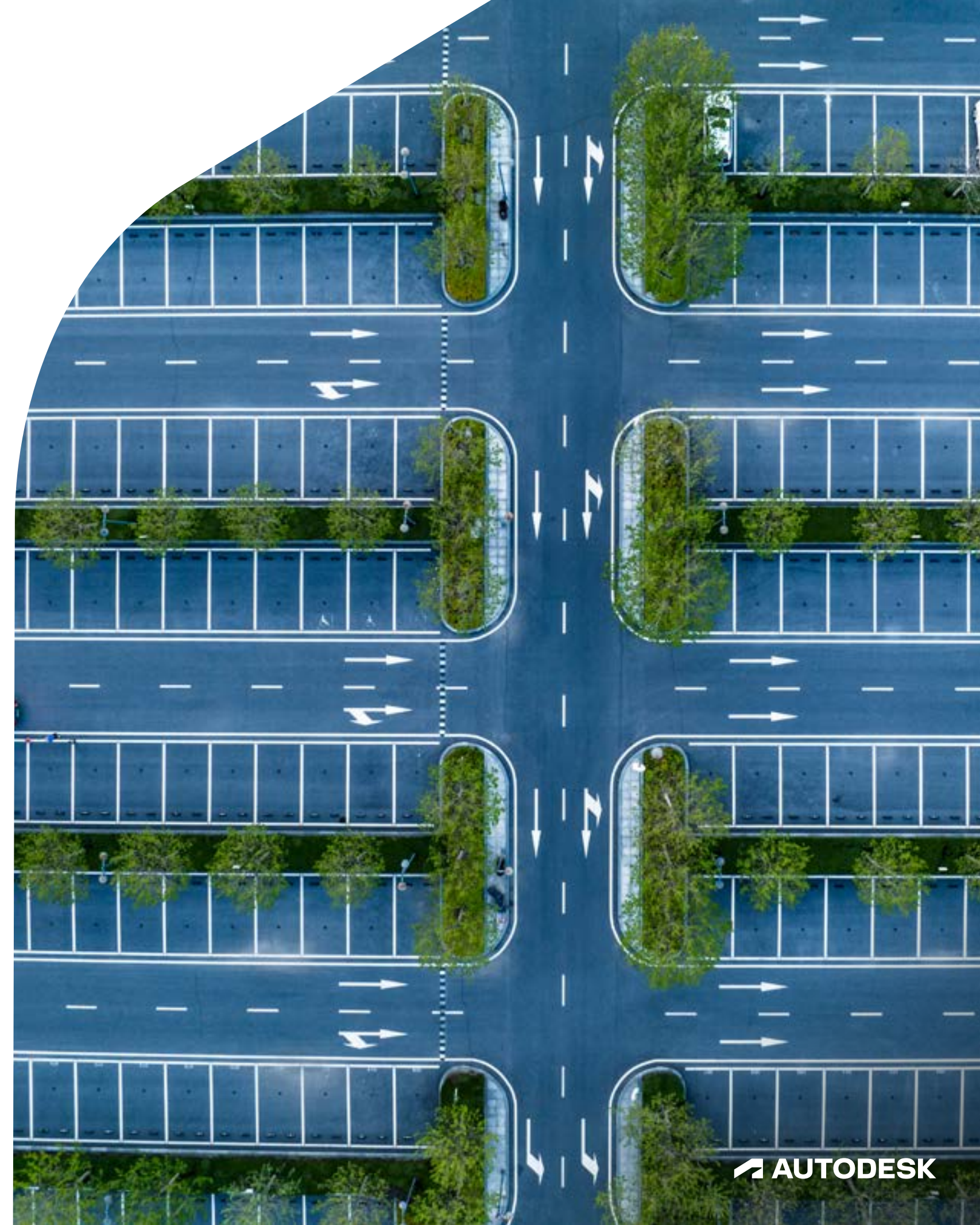
The ability to quickly duplicate an existing phase allows iterative design to be approached with ease and gives engineers the freedom to explore design options without incurring unnecessary rework.

06 **Benefits of sustainable drainage design**

Advanced design technology for stormwater and wastewater design ensures systems can withstand the pressures of urban development and extreme weather events.

Innovative drainage design and analysis technology gives you the platform to:

- Reduce environmental impact
- Reduce errors and rework
- Meet or exceed design requirements
- Reduce overall design time



07 Getting started

For designers, developers, landscape architects, engineers, consultants, and planners, InfoDrainage is the next generation drainage design platform that takes you from initial concept to detailed designs using both traditional and sustainable elements that can be optimized for land use, performance and cost, with customizable reports for local regulatory compliance.

Built-in integration with Civil 3D and data exchange with other CAD and GIS platforms shortens design time, allowing teams to optimize workflows and obtain faster approvals.

Ready to get started?

To learn more about getting started with sustainable drainage design technology, visit our solution center.

→ [Learn more](#)





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