# CIVIL DESIGNER Storm

**The surface drainage (stormwater) module is a comprehensive runoff calculation, drainage infrastructure design and analysis software program. It calculates catchment runoff, culvert flows, overflows, routing and detention storage through user-defined ponds. It also calculates culvert sizes, invert levels and slopes; and supports the Illudus, Rational, Greenfields (IH124, FEH 1999 and 2013), Wallingford and SWMM 5.1 runoff models.**

**The program models a network consisting of both existing and new culverts. Any culverts that do not have a size, invert level and/or slope are automatically designed according to the design parameters. The module gives you control to tailor the design to your own requirements, or to those of the local authorities or councils. It supports interactive drawing functionality, allowing you to create and edit networks efficiently.**

## Supports Illudas, Rational, Greenfields & EPA SWMM 5.1 Runoff Models

The Illudas Time-Area method is used for the estimation of runoff from a uniformly distributed design storm. The results correspond satisfactorily with observed runoff events, so the method can be used as an accurate and useful design tool.

The Rational Method is implemented as described in the National Transport Commission Road Drainage Manual, with an additional option to specify specific point rainfall for each subcatchment.

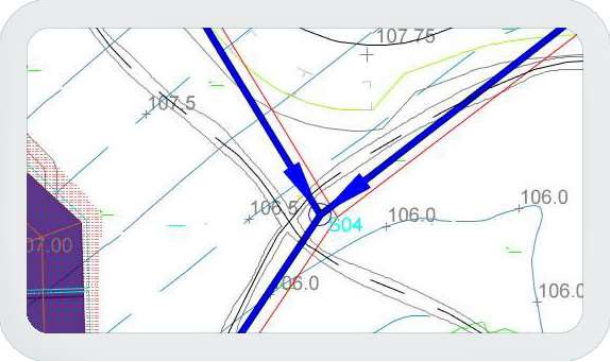
In Civil Designer, Greenfields runoff calculations are implemented according to UK National SuDS standards. The user has the option to use either the IH124 or FEH (1999 or 2013) methods for the runoff calculations. BRE365 Soakaway design is also included for UK clients.

The EPA Storm Water Management Model (SWMM) is a dynamic rainfall-runoff simulation model, used for single event or long-term (continuous) simulation of runoff quantity and quality from primarily urban areas.

The runoff component of SWMM operates on a collection of subcatchment areas that receive precipitation and generate runoff and pollutant loads.

The routing portion of SWMM transports this runoff through a system of pipes, channels, storage/treatment devices, pumps, and regulators.

SWMM tracks the quantity and quality of runoff generated within each subcatchment, as well as the flow rate, flow depth and quality of water in each pipe and channel during a simulation period comprised of multiple time steps.




## Simulate Dual Runoffs with Partial Flow Capture & Overflows

The dual runoff facility can be used to simulate the typical major and minor drainage system in the urban environment i.e. stormwater flowing in a road (major system) with only partial capture into the culvert (minor system) during large storms.

## Hydraulic Routing by Continuity Equation or Time Shift Method

Use one of two routing methods for modelling the passage of flow hydrographs through the links, i.e. Continuity or Time Shift routing. During the routing process, a volumetric check is performed on the flow to ensure a high level of accuracy. The results of this check are displayed with the other analysis results.

## Provision for Detention Storage at Inlets

If the incoming flow exceeds the capacity of the link and an overflow node is not specified, the excess flow is taken into local or detention storage. As soon as the link is capable of conveying the overflow that is held in detention storage, it is taken into the link and added onto the flow hydrograph.

The detention storage facility can be applied in two ways. Firstly, it can calculate the required storage volume and keep all the excess flow in detention storage and secondly, the designer can specify the volume of available detention storage at a node. Should the calculated storage requirement be more than the available volume, the excess flow is diverted to an overflow node.

## Attenuate Runoff by Means of Detailed Reservoir Routing

Attenuate runoffs by means of reservoir routing with full performance reporting. Reservoir results include a table of the water depth, inflow, outflow and storage for the duration of the runoff event, as well as a graph of depth verse time indicating the full storage level.

## Rainfall Settings

Rainfall settings can be added for SA and UK installations. Storm analysis options include the ability to choose between storm types or profiles, and preview storm files. Rainfall data is stored offline, inside Civil Designer, for both South Africa and the UK and can be retrieved by means of either street address (Internet required), or by Lat long coordinates.

## Analyses Flow, Overflow, Capacity, Velocity and Flow Depth

The program simulates a complex system of detention storage, overflows and dual runoff, thereby enabling you to model the intricate networks that are typical of modern cities. Each model can have multiple sub-networks and outfalls. You can specify the outfall levels if you want to connect to existing systems. Alternatively, the program determines the best possible outfall level in accordance with the design parameters.

## Graphical Functions

Storm catchment areas, manholes and culverts can be defined and modified graphically and accurately offset from Cadastral Boundaries. These functions allow you to easily insert nodes and links, make changes to an existing layout by moving a node, change the flow direction or query a node or link with a click of the mouse. Pipes can be drawn using parallel offsets to CAD entities with manholes automatically inserted according to user-defined lengths. These manholes can be represented with user-defined symbols, will allow for multiple inlet levels and will be sized accordingly.

## Catchment Areas with Attributes from DTM

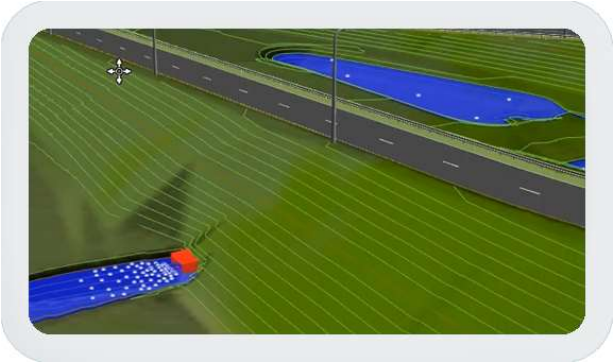
Create catchment areas easily by graphically defining a polygon and assigning an identifying name. The program saves all the vertex coordinates together with the subcatchment name. The subcatchment can then be linked to a specific node, of which the runoff area will be updated to the calculated size of the subcatchment. The drainage path can be indicated graphically, from this information drainage length as well as the weighted average slope is calculated and entered into the runoff time calculation.

## Calculates Optimal Culvert Size, Slope, Inlet and Outlet Levels

The Stormwater analysis calculates the optimal network by designing according to the specified minimum cover, minimum and maximum flow velocities, minimum and maximum allowable link slopes and the available link sizes from the link tables.

## Standard and User Defined Culverts

The Link Tables allow the designer to define up to 40 different link types or culverts between nodes. These links can be circular (pipes), rectangular (box culverts), portal/skew haunch, or custom link types. Custom link types allow you to input the depth to proportional flow and depth to proportional area curves, thus enabling the use of non-standard culvert shapes such as egg-shaped pipes, portal culverts or even parabolic channels



## SABS 1200 Quantities with Bedding Material/Selected Backfill

Culvert trench quantities are calculated with user-defined depth increments, according to SABS 1200. Quantities include excavation lengths, excavation volumes with extra over for intermediate and hard material, culvert lengths, bedding material volume and selected backfill volume. This ground profile information is automatically extracted from the shared, supporting digital terrain model.

## Generates Layout Plan with Pipe Schedule and Long Sections

Production drawings, such as plans with pipe schedules and long sections with title blocks and company logos etc, can be created with no or little CAD editing. The layout of production drawings is completely customisable according to your specific company standards. Crossing services from the other modules can also be displayed automatically on long sections and cross-sections.

## Drawing Title Block Templates (Sheet Files)

Our powerful drawing templates (sheet files) allow you to define exactly what the final production drawings should look like saving you hours of postproduction CAD editing. Use our sheet files to generate production drawings with detailed title blocks, north signs, grids, company logos, annotations, data lists, scale bars and more, so your plotting requires little, if any, CAD editing. Sheet files allow the precise placement of all the design elements in your title block with customisable settings so you no longer have to cut and paste your design into your title block.

## Proximity & Collision Clash Analysis between any design or existing elements

Check for clashes between any two services, such as sewer, storm, water, road layers or other existing services defined in the crossing services. Problem areas display on the layout drawing and you can display a long section of the chosen branch, as well as the crossing services, in the longitudinal section window. You can then adjust the invert levels and slopes of the affected culverts.

## Hec-Ras Water Elevation Data Import/ Export

HEC-RAS water elevation profile data can be imported and exported and applied, for example, to a road layer as a horizontal line, optionally intersecting with existing ground layer cross-sections.

## Pump Stations with Up to 4 Pumps with Various Controls

Pump stations can contain up to four pumps with different characteristics and separate sets of control levels. The pump control levels work in combination with the pump station sump, for which a depth-storage curve and initial depth must be defined.

## Full Compatibility with DWG And Other Formats

As a founding member of the Open Design Alliance, our inside knowledge of the DWG drawing structure ensures high compatibility when loading and saving DWG and DXF drawing formats. We also support the loading of Caddie CEX, Arcview SHP, Microstation DGN and Ultimate CAD UCX files, which gives you unprecedented flexibility to move between drawings without worrying about incompatibilities and data exchange problems.

## Crossing Services Displayed on Plan, Long and Cross-Sections

Existing services databases (sewer pipes, storm water culverts, water networks, electrical layouts and telecommunication cables, etc) can be imported or added into Civil Designer to indicate crossing positions of the pipes/cables on road, sewer, storm and water services.

## Bitmaps and Cadastral Backdrops

View the network with a bitmap or cadastral data backdrop. Alternatively, display the site contours and slope shading to decide on an optimum network layout.

## Modelling existing networks from GIS

Import and convert GIS data into a stormwater drainage model.

## Vertical Alignment Editor Design Options

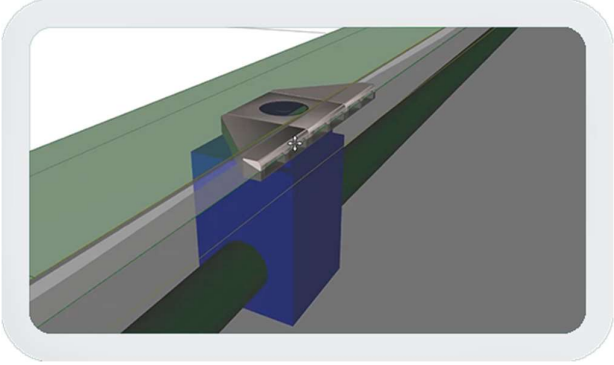
Use the Vertical Alignment Editor to change pipe type and sizes, move, delete and insert (including multiple nodes with even spacing) nodes, and indicate incoming pipes. It is also possible to measure the distance (in chainage) between two indicated points.

## BIM IFC File Export

Our Industry Foundation Classes (IFC) support allows geometric and attribute information to be customised according to the requirements of the recipient, thereby improving efficiency in any BIM workflow. Prior to export, you can set up custom IFC files, assign the appropriate northern or southern coordinate system and specify the extents of the shared data. Data can be allocated to one or more IFC files and can incorporate all or selected portions of the proposed infrastructure services associated with a project.

## 3D Rendering of Node Structures.

Render node structures accurately, using the properties bar to graphically set the node angle from the angle of an indicated entity.



## Dynamic Updating of Production Drawings

Production drawings are dynamically updated as you change your design. If you want to create archive copies, simply use the Publish function.
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- We have a library of FAQ support videos for your reference: [www.civildesigner.com/videos/](www.civildesigner.com/videos/)
- You can book online Civil Designer training: [www.civildesigner.com/training-centre/](www.civildesigner.com/training-centre/)
- We provide introductory self-learning videos: [www.civildesigner.com/training-centre/](www.civildesigner.com/training-centre/)

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