

JUMBO BLOCK® Digital Planning & Infrastructure Suite

The **JUMBO BLOCK® Digital Planning & Infrastructure Suite** combines planning, simulation, and infrastructure monitoring in an integrated digital toolset.

The digital tools support planners, municipalities, and infrastructure operators during different phases of a project – from the initial concept idea to the operation of a system.

The suite has been designed to address both the **physical requirements of modern infrastructure planning** and the **digital requirements for traceability, documentation, and system security**.

The system architecture therefore aligns with current European frameworks for critical infrastructure, in particular:

- **KRITIS** – Protection of critical infrastructures
- **NIS-2 Directive** – Cybersecurity and traceability of digital systems
- **CRA (Cyber Resilience Act)** – Security requirements for digital products and systems

The combination of planning tools and digital monitoring enables **transparent documentation of infrastructure measures** and supports modern requirements for **resilient and verifiable infrastructure**.

JUMBO BLOCK® Plan

The **JUMBO BLOCK® Plan Tool** enables the geometric and structural pre-planning of modular JUMBO BLOCK® systems.

With only a few inputs it is possible to calculate:

- number of required modules
- total retention volume of the system
- required components (base plates, side plates, cover plates)
- material requirements
- system layout

The tool provides the basis for an **initial technical project assessment**.

JUMBO BLOCK® Hydro

The **JUMBO BLOCK® Hydro Tool** supports the **hydrological pre-planning** of rainfall events and retention systems.

Based on:

- rainfall intensities
- catchment areas
- return periods

it can determine:

- required retention volume
- number of required JUMBO BLOCK® modules
- possible system capacities

The Hydro Tool therefore complements geometric planning with **hydrological system dimensioning**.

JUMBO BLOCK® Dashboard

The **JUMBO BLOCK® Dashboard** represents the digital layer of the infrastructure.

By connecting **IoT sensors**, the system can monitor for example:

- water levels
- system status
- operational data of the installation

Data can additionally be documented using **verifiable logging systems and distributed-ledger technology (IOTA)**.

This enables **transparent and traceable infrastructure monitoring**.

One System – Three Tools

The three digital tools together provide continuous support for modern infrastructure projects.

Phase	Tool
Concept & preliminary planning	JUMBO BLOCK® Plan
Hydrological dimensioning	JUMBO BLOCK® Hydro
Operation & monitoring	JUMBO BLOCK® Dashboard

Together they form the **digital planning and operational layer for JUMBO BLOCK® retention infrastructure**.

System Principle of the JUMBO BLOCK® System

The JUMBO BLOCK® system is a modular underground storage system for **rainwater retention beneath traffic areas**.

The installation consists of standardized **JUMBO BLOCK® hollow modules**, installed underground and complemented by **base plates, side plates, and cover plates**.

The modules are installed **block-to-block on a single level**, forming a large underground storage reservoir.

The system can be installed beneath:

- roads
- parking areas
- public squares
- industrial surfaces

Depending on the system concept, the stored rainwater can:

- be **temporarily retained (retention system)**
- **infiltrate into the surrounding soil (infiltration system)**
- be **released with a time delay**

Due to the modular structure, the overall system size can be **virtually unlimited**, as it depends solely on the **number of installed modules**.

User Manual

JUMBO BLOCK® Hydro

Initial hydrological assessment for urban rainwater retention

JUMBO BLOCK® Hydro is a digital planning tool for the initial hydrological assessment of heavy rainfall events, effective surface areas, rainwater volume and the resulting storage demand for modular JUMBO BLOCK® systems.

The tool supports municipalities, planning offices, infrastructure operators and project stakeholders in identifying the likely scale of retention requirements at an early stage and translating the required storage volume into an initial modular system logic.

JUMBO BLOCK® Hydro does **not** replace detailed hydrological, hydraulic, structural, construction-related or permitting-based planning.

However, it enables a sound **preliminary hydrological assessment** as a reliable basis for further project development.

In combination with **JUMBO BLOCK® Plan**, the initial hydrological assessment can then be transferred directly into an initial technical system layout.

In addition, the overall system can optionally be extended digitally via the **JUMBO BLOCK® Dashboard**. This makes it possible to connect physical retention structures with digital status visibility, monitoring, audit logging and traceable infrastructure transparency. This architecture is aligned with the current direction of modern infrastructure systems and with the objectives of **KRITIS**, **NIS-2** and the **CRA**.

Purpose of the tool

JUMBO BLOCK® Hydro is designed to:

- determine the **hydrologically effective area** of a project,
- document the **site-specific design rainfall** as a professional input value,
- calculate the resulting **rainwater / retention volume**,
- estimate the **module demand** of a JUMBO BLOCK® system,
- compare typical **heavy-rain and extreme-rain scenarios**,
- and illustrate the potential effect on typical **urban road surfaces**.

The tool therefore provides a transparent first estimate of the scale of retention space that may be required for a project.

Important note on professional use

The calculation in JUMBO BLOCK® Hydro is intended as an **initial hydrological assessment**.

It serves as a preliminary orientation tool and does not replace:

- site-specific expert studies,
- detailed hydraulic calculations,
- flood verification,
- drainage or emergency overflow concepts,
- structural design,
- detailed engineering,
- permitting and execution planning.

Responsibility for selecting appropriate design values, framework conditions and safety requirements always remains with the responsible planners, engineering offices and permitting authorities in the specific project.

How to use the tool

1. Project Information

In the first section, the basic project data is documented.

The following fields are available:

- **Project name**
- **Postal code**
- **Location**
- **Date**

These details serve the clear documentation of the assessment and also appear in the print and PDF output.

2. Surface Analysis

In the **Surface Analysis** section, the hydrologically effective area of the project is determined.

The following values are entered:

- **Total area (m²)**
- **Sealing rate (%)**

- **Surface type**

Based on total area and sealing rate, the tool automatically calculates the **effective area (m²)**.

In addition, the selected surface type can be used to prefill a typical runoff coefficient. The available options are:

- Asphalt
- Concrete
- Paving
- Green area
- Custom

Depending on the selected surface, the runoff coefficient is automatically suggested. If required, this value can be adjusted on a project-specific basis.

3. Design Rainfall

In the **Design Rainfall** section, the site-specific professional rainfall input value is entered.

The following parameters are documented:

- **Return period (T)**
- **Duration (min)**
- **KOSTRA rainfall depth (mm)**
- **Site factor**
- **Runoff coefficient**
- **Source of rainfall value**

Professional principle

JUMBO BLOCK® Hydro deliberately does **not** use automatic location-to-grid mapping for KOSTRA raster values.

The rainfall depth is entered **manually** as a site-specific professional value.

This ensures that responsibility for selecting the technically correct value remains explicitly with the user or the responsible planning professional. This reduces misunderstandings and improves the traceability of the input.

Typical sources for the rainfall value

The entered value may, for example, come from:

- **KOSTRA-DWD-2020**

- DWD viewer or professional data source
- municipal or regional drainage planning
- hydrological expert studies
- project-specific design specifications

The tool also documents the **active rainfall basis**, meaning the combination of return period, duration, site factor and entered source.

4. JUMBO BLOCK® System Calculation

In the next step, the required retention volume is translated into an initial modular JUMBO BLOCK® system logic.

The following fields are available:

- **Planned JUMBO BLOCK® modules**
- **Volume per module (m³)**
- **Required modules**
- **Planned storage capacity (m³)**

Functional logic

Based on the calculated rainwater volume, the tool automatically determines:

- the required number of JUMBO BLOCK® modules,
- the storage volume available with the planned number of modules,
- and the calculated reserve or shortfall.

Using the “**Apply required modules**” button, the calculated necessary number of modules can be transferred directly into the planning field.

5. Results

The results section summarizes the most important calculation values.

The following are displayed:

- **Effective area**
- **Rainwater volume**
- **Required modules**
- **Storage reserve**

In addition, the tool provides a qualitative assessment:

- **sufficient**
- **tight**
- **exceeded**

A fill bar also shows the calculated **storage fill level** of the planned system.

Result logic

- If sufficient reserve is available, the event is considered **covered**.
- If capacity is almost fully used, the tool indicates a **tight dimensioning**.
- If storage capacity is exceeded, the tool points to the need for an **emergency overflow path** or an additional discharge concept.

6. Project Summary

The project summary condenses the most important results into a quick overall assessment.

The following values are shown:

- **Retention volume**
- **Installed modules**
- **Total storage capacity**
- **Coverage**

This creates a compact summary of the hydrological assessment and the resulting first system dimensioning.

7. Heavy Rain Scenario Simulation

In the **Heavy Rain Scenario Simulation** section, the tool automatically compares typical rainfall scenarios.

By default, the following scenarios are considered:

- **100 mm**
- **200 mm**
- **300 mm**

For each scenario, the tool shows:

- the retention volume,

- the required number of blocks,
- the capacity check,
- and a qualitative assessment.

This section is particularly useful for quickly illustrating how the planned system performs under different event intensities.

8. Urban Street Model

The **Urban Street Model** illustrates the effect of JUMBO BLOCK® for typical urban traffic surfaces.

The following values are entered:

- **Road length**
- **Road width**
- **Sealing rate**
- **Rain event**

Based on these values, the tool calculates:

- the road surface area,
- the rainwater volume generated,
- the required number of JUMBO BLOCK® modules,
- and a short statement on the protection effect.

This section is especially suitable for rough assessments of municipal road corridors or other linear traffic areas.

9. Project Planning

JUMBO BLOCK® Hydro provides an initial hydrological orientation. Actual project planning is then carried out on a project-specific basis.

This includes in particular:

- system layout,
- hydraulic design,
- integration into existing infrastructure,
- structural integration,
- permitting preparation,
- operational concepts,

- emergency overflow paths and safety reserves.

The **JUMBO BLOCK® team** is available to support the further development of the project.

Contact: mail@jumboblock.de

10. Emergency Planning

If the calculated retention volume is exceeded or nearly exhausted, an **emergency overflow path** should be included in the further planning.

The tool therefore explicitly highlights the importance of robust emergency planning.

Even if there is still calculated reserve, an additional overflow path or emergency discharge concept is often advisable in order to safely manage exceptional load situations.

11. Infrastructure Readiness

JUMBO BLOCK® combines three levels of modern infrastructure development:

Resilient Infrastructure

The modular design enables robust retention systems beneath sealed surfaces and other infrastructure areas.

Urban Rainwater Retention

Large volumes of rainfall can be temporarily stored directly beneath roads or other urban surfaces.

Digital Monitoring and Audit Logging

Retention systems can optionally be digitally monitored, documented and transparently displayed via the JUMBO BLOCK® Dashboard.

Note on wording

The statements included in the tool describe **suitability, architectural intent and design orientation**.

They do **not** constitute formal certification or a legal guarantee.

Especially in the context of **KRITIS, NIS-2** and the **CRA**, this means:

JUMBO BLOCK® is architecturally aligned so that physical infrastructure can be connected with digital transparency and traceability functions. The specific regulatory assessment, however, always remains project-, role- and application-specific.

12. Dashboard Integration

JUMBO BLOCK® systems can optionally be connected to the **JUMBO BLOCK® Dashboard**.

This makes it possible to display, for example:

- fill levels,
- sensor values,
- status data,
- event logs,
- monitoring and audit information.

The dashboard architecture is designed to bring together physical infrastructure and digital traceability. This creates an infrastructure perspective that considers both technical resilience and digital transparency.

Demo: jumboblock.net

13. Print / PDF / Inquiry

At the end of the tool, additional project details can be entered for documentation or inquiry purposes:

- **Contact person**
- **Email**
- **Project inquiry / notes**

Using the “**Print / PDF**” function, the current input can be output as a printable project document. The entered project data automatically appears in the print and PDF view.

This facilitates internal pre-assessment, sharing with project stakeholders or sending the project basis to the JUMBO BLOCK® team.

Summary

JUMBO BLOCK® Hydro enables an initial hydrological assessment for urban rainwater retention and supports the translation of site-specific heavy rainfall events into an initial modular storage logic.

The tool is particularly suitable for:

- municipalities,
- urban planners,
- engineering and planning offices,

- infrastructure operators,
- project developers,
- decision-makers in early project phases.

In combination with **JUMBO BLOCK® Plan** and the **JUMBO BLOCK® Dashboard**, this creates an integrated approach consisting of:

- preliminary hydrological assessment,
- technical system planning,
- and optional digital transparency and status monitoring.

JUMBO BLOCK® therefore combines physical preparedness, modular rainwater retention and digital infrastructure perspective in one holistic system approach.

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