

# 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 in various phases of a project – from the initial concept idea to the operation of a plant.

**They reduce planning uncertainty and create a reliable basis for decisions regarding technical, economic and infrastructural measures.**

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

The system architecture is thus aligned with current **European frameworks for critical infrastructures** , 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 **traceable documentation of infrastructure measures** and thus 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 just a few inputs, you can calculate, among other things:

- Number of modules required
- Retention volume of the system
- Required components (base plates, side plates, cover plates)
- Material requirements
- Plant layout

The tool serves as a basis for an **initial technical project assessment** .

## **JUMBO BLOCK® Hydro**

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

Based on:

- Rainfall intensities
- catchment areas
- Return times

can be calculated:

- required retention volume
- Number of JUMBO BLOCK® modules required
- potential plant capacities.

The Hydro Tool thus complements geometric planning with **hydrological dimensioning** .

# JUMBO BLOCK® Dashboard

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

Connected **IoT sensors** can be used to monitor, for example:

- Water levels
- System states
- Operating data of the plant

The data can also be documented via **verifiable log systems and distributed ledger technology (IOTA)** .

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

## One system – four tools

Together, the three digital tools provide comprehensive support for modern infrastructure projects.

<b>phase</b>	<b>Tool</b>
Concept & Preliminary Planning	<b>JUMBO BLOCK® Plan</b>
Hydrological dimensioning	<b>JUMBO BLOCK® Hydro</b>
Economic considerations	<b>JUMBO BLOCK® Budget</b>
Operation & Monitoring	<b>JUMBO BLOCK® Dashboard</b>

Together they form the **digital planning and operational level 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 under traffic areas** .

The system consists of standardized **JUMBO BLOCK® hollow modules** , which are installed below the surface and supplemented by **base plates, side plates and cover plates** .

The modules are installed **block by block on one level** and together form a large-volume underground storage reservoir.

The system can be used, for example, in:

- streets
- Parking areas
- places
- industrial areas

Depending on the system design, the stored rainwater can be:

- **temporarily retained (retention facility)**
- **controlled seepage (infiltration system)**
- **be derived with a time delay**

Thanks to its modular design, the size of a system can be **scaled virtually without limit** , as it depends solely on the **number of modules used** .

# 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 areas, rainfall volumes and the resulting storage requirements for modular JUMBO BLOCK® systems.

The tool helps municipalities, planning offices, infrastructure operators and project managers to assess the scale of potential retention requirements early on and to translate the required retention volume into an initial modular plant logic.

JUMBO BLOCK® Hydro **does not replace detailed hydrological, hydraulic, static, structural, or permitting planning** .

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

In conjunction with **JUMBO BLOCK® Plan**, the initial hydrological assessment can then be directly transferred into an initial technical plant design.

Furthermore, the entire system can optionally be digitally extended via the **JUMBO BLOCK® Dashboard** . This allows physical containment structures to be linked with digital status displays, monitoring, audit logging, and traceable infrastructure transparency. This architecture is aligned with the current requirements of modern infrastructure systems and the objectives of **KRITIS** , **NIS-2** , and **CRA** .

### Purpose of the tool

JUMBO BLOCK® Hydro is designed to

- to determine the **hydrologically effective area of a project**,
- to document the **site-specific design rainfall as a specialist value**,
- to calculate the resulting **rainwater or retention volume** ,
- the **module requirements** of a JUMBO BLOCK® system,
- typical **heavy rain and extreme rain scenarios** ,
- to vividly illustrate the potential impact on typical **urban street surfaces** .

The tool thus provides a comprehensible initial assessment of the order of magnitude of retention space that may be required for a project.

## **Important note regarding the professional classification**

The calculation in JUMBO BLOCK® Hydro is designed as a **preliminary hydrological estimate** .

It serves as a guide and does not replace:

- Site-specific expert reports,
- Detailed hydraulic calculations,
- Flood evidence,
- Drainage or emergency drainage concepts,
- static design,
- structural engineering detailed planning,
- Planning for approval and execution.

In each specific project, the responsibility for selecting suitable design values, boundary conditions and safety requirements always lies with the relevant specialist planners, engineering offices and approval authorities.

# Using the tool

## 1. Project data

The first section documents the basic project data.

The following must be entered:

- **Project name**
- **Postcode**
- **Location**
- **Date**

This information serves to clearly document the assessment and also appears in the printed or PDF version.

## 2. Area analysis

The hydrologically effective area of the project is determined in the **area analysis** section .

The following must be entered:

- **Total area (m<sup>2</sup>)**
- **Sealing level (%)**
- **surface**

The tool automatically calculates the **effective area (m<sup>2</sup>) from the total area and the degree of sealing** .

Additionally, a typical runoff coefficient can be prepared by selecting the surface type. The following options are available:

- **asphalt**
- **concrete**
- **Pavement**
- **green space**
- **User-defined**

Depending on the selected surface, the runoff coefficient is automatically preset. If necessary, this value can be adjusted for specific projects.

### 3. Design rainfall

In the section "**Design rainfall**" , the site-specific technical value for the rainfall event is entered.

The following must be documented:

- **Annuality (T)**
- **Duration level (min)**
- **KOSTRA rainfall depth (mm)**
- **Location factor**
- **Runoff coefficient**
- **Source of the rainfall value**

#### Technical principle

JUMBO BLOCK® Hydro deliberately **does not use automatic site assignment based on KOSTRA grid values** .

Rainfall depth is entered **manually** as a site-specific parameter.

This ensures that the responsibility for selecting the technically correct value remains consciously with the user or the responsible specialist planner. This reduces misunderstandings and increases the technical traceability of the input.

#### Typical sources for rainfall values

The recorded value can, for example, originate from:

- **KOSTRA-DWD-2020**
- DWD Viewer or expert information
- municipal or regional drainage plans
- Hydrological expert report
- project-specific design specifications

The tool also documents the **active basis of the rainfall amount** , i.e. the combination of annuality, duration level, location factor and registered source.

## 4. JUMBO BLOCK® Plant Calculation

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

The following fields are available for this purpose:

- **Planned JUMBO BLOCK® modules**
- **Volume per module (m<sup>3</sup>)**
- **Required modules**
- **Planned storage volume (m<sup>3</sup>)**

### How it works

The tool automatically determines the following from the calculated rainfall volume:

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

The calculated number of required modules can be directly transferred into the planning using the "**Import required modules**" button.

## 5. Results

The results section summarizes the most important key figures of the calculation.

The following will be displayed:

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

In addition, a qualitative assessment is carried out:

- **sufficient**
- **meager**
- **exceeded**

In addition, a progress bar shows the calculated **storage capacity** of the planned system.

## Result logic

- If sufficient reserves are available, the event is considered **manageable** .
- If the capacity is almost completely utilized, the tool indicates a **tight sizing** .
- If the storage capacity is exceeded, the need for an **emergency water route** or a supplementary drainage solution is indicated.

## 6. Project Overview

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

The following are depicted:

- **Retention volume**
- **installed modules**
- **Total storage volume**
- **cover**

This results in a compact summary of the hydrological assessment and the initial plant design derived from it.

## 7. Heavy Rain Simulation

In the area of **heavy rain simulation** , the tool automatically compares typical precipitation 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 storage comparison,
- as well as a qualitative assessment.

This section primarily serves to quickly illustrate the impact of the planned facility under varying event intensities.

## 8. City street model

The **city street model** illustrates the effect of JUMBO BLOCK® on typical urban traffic areas.

The following must be entered:

- **Street length**
- **Street width**
- **Sealing level**
- **Rain event**

The tool uses this information to calculate:

- the road surface,
- the volume of rain that falls,
- the required number of JUMBO BLOCK® modules,
- as well as a brief statement on the protective effect.

This area is particularly suitable for roughly assessing municipal street spaces or linear traffic areas.

## 9. Project planning

JUMBO BLOCK® Hydro provides an initial hydrological overview.

The actual project planning then takes place on a project-specific basis.

This includes in particular:

- Plant layout
- hydraulic design
- Integration into existing infrastructure
- structural integration
- Approval planning
- Operating concepts
- Emergency overflow paths and safety reserves

**JUMBO BLOCK® team provides project-specific support for further development .**

**Contact:** [mail@jumboblock.de](mailto:mail@jumboblock.de)

## 10. Emergency planning

**emergency water route should** be considered in further planning .

The tool therefore explicitly points out the importance of robust emergency planning.

Even if there is a calculated reserve, an additional emergency drain or emergency waterway is useful in many projects to be able 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 under sealed surfaces and other infrastructure areas.

### **Rainwater retention**

Large amounts of precipitation can be temporarily stored directly under traffic areas 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 the wording**

The information provided in the tool describes **suitability, architectural goals, and orientation** .

It **does not constitute a formal certification or legal commitment** .

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

JUMBO BLOCK® is architecturally designed to combine physical infrastructure with digital transparency and verification functions. However, the specific regulatory assessment always remains project-, role-, and application-specific.

## 12. Dashboard Integration

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

This allows, for example, the following to be displayed:

- **Fill levels**
- **Sensor values**
- **Status data**
- **Event logs**
- **Monitoring and audit information**

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

**Demo:** [jumboblock.net](http://jumboblock.net)

## 13. Print / PDF / Data exchange / Inquiry

At the end of the tool, additional project data can be added for a request or documentation:

- contact person
- e-mail
- Project inquiry / Notes

The current input can be output as printable documentation using the **"Print / PDF"** function .

The entered project data then appears automatically in the print or PDF view.

This makes it easier:

- the internal preliminary review,
- the transfer to planning participants,
- as well as the transmission to the JUMBO BLOCK® team.

### Data exchange within the JUMBO BLOCK® toolchain

In addition to the printing function, the tool offers two data exchange functions:

#### Export for plan

This function exports the current Hydro project data as a JSON file. The file contains, in particular:

- Project data
- Area analysis
- Design rainfall
- calculated retention volume
- required JUMBO BLOCK® modules
- planned number of modules
- planned storage volume

The exported data can then be further processed in **JUMBO BLOCK® Plan** .

#### Hydro Import

This function allows you to import a previously exported Hydro JSON file. This enables you to reload, check, or further edit existing Hydro calculations.

JUMBO BLOCK® Hydro thus supports both documentation and further processing within the JUMBO BLOCK® Toolchain.

## Systems thinking

The export function from JUMBO BLOCK® Hydro is deliberately designed to enable seamless further processing within the JUMBO BLOCK® Suite.

This creates a seamless **workflow** :

- **Hydro** → hydrological assessment
- **Plan** → technical plant design and component identification
- **Budget** → rough budget and cost overview
- **Dashboard** (optional) → Operation and Monitoring

The Budget function draws on the results from Hydro and Plan.

Hydro provides the hydrological basis,

Plan adds the technical plant and component logic,

and Budget combines these results into an initial economic overview.

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