

# Digital Stormwater Management – PANDa & Water Folder

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# Our motto

Water is one of the most valuable resources.

पानी तो सबसे क़ीमती संसाधनों में से एक है ।

Pani to sabse kīmtī sāmsāadhanō ek hai.



We believe that today no one can afford to waste it.

हमको विश्वास है कि आजकल इसे बर्बाद करने का जोखिम कोई नहीं उठा सकता ।

Hamko visvās hai ki ājkal use barbād karne kā jokhim koī nahī uṭhā saktā.

Think different about rain, think different about stormwater, go digital and enjoy the water!





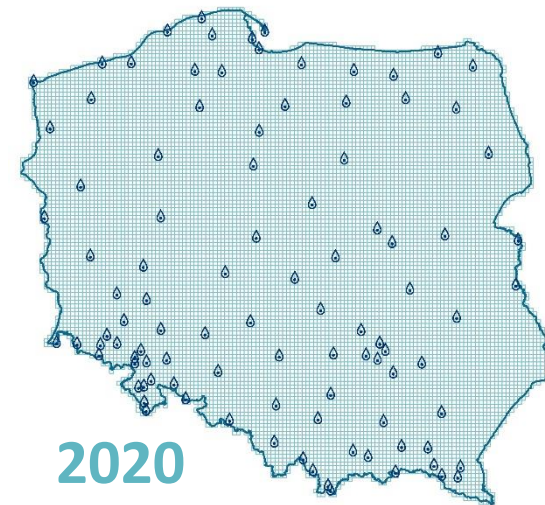
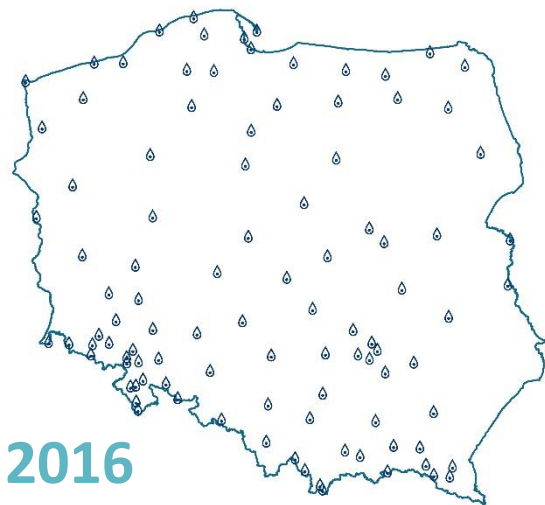
# First step into digital stormwater management



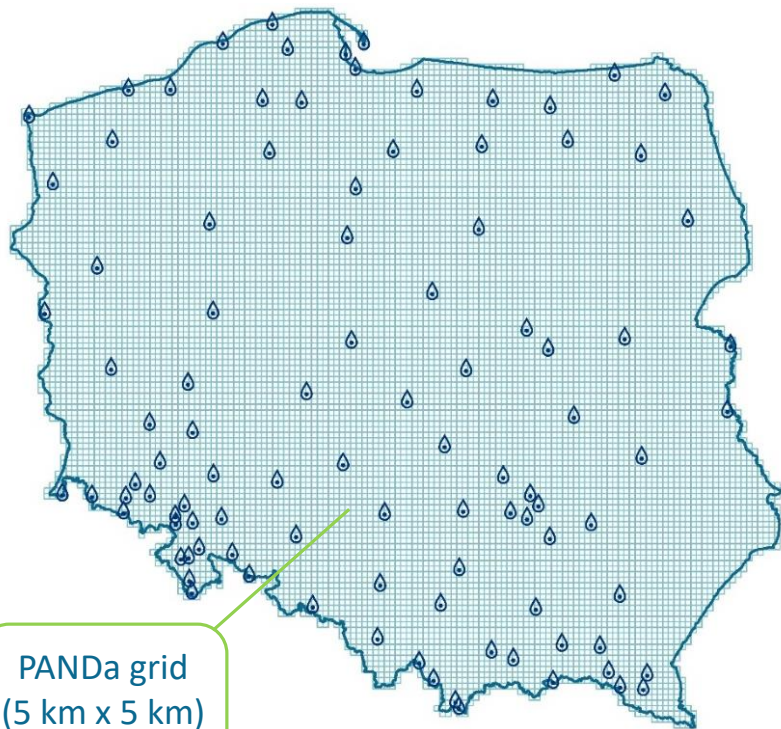
## Development and introduction of the Polish Atlas of Rainfall Intensities (PARIs - PANDa)



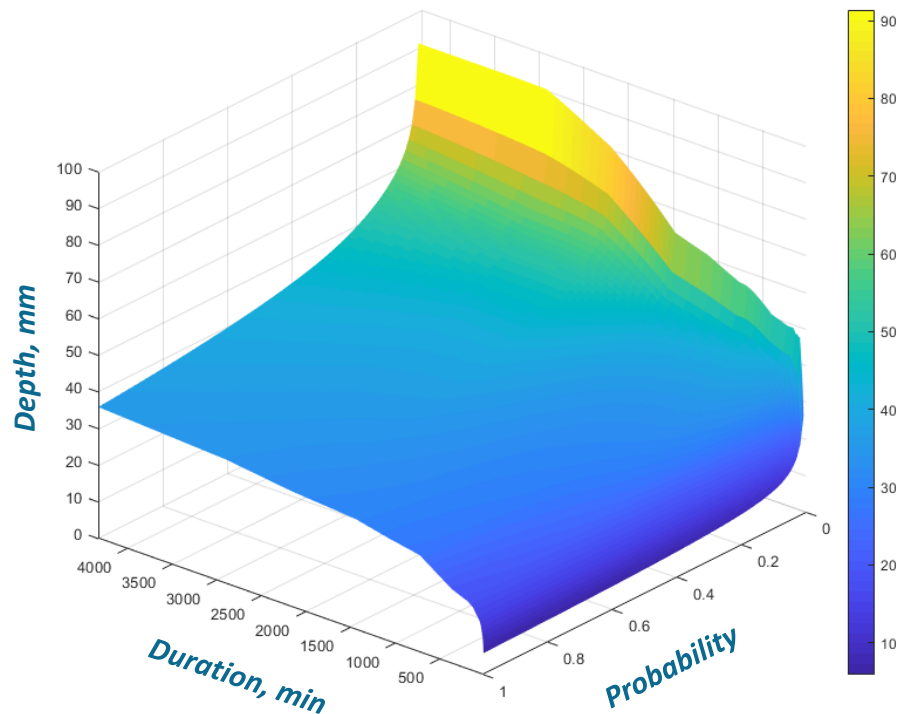
- 1) Rainfall digital database - 100 gauges (1986-2015)
- 2) Selection of maximum precipitation depths and best fitting distributions for DDF models
- 3) Geostatistical simulations and digital platform on web



# Plethora of precipitation models and what next?



PANDa grid  
(5 km x 5 km)  
**12885 pixels**



DDF models based on generalized Pareto distribution (GPD) for time durations from 5 to 4320 min

# People need tools - digital tools - not models



## Comfort of choosing appropriate devices in few steps

WaterFolder is the first platform for designers that allows to choose appropriate devices from many manufacturers within the water and sewage industry. It binds knowledge and experience of many engineers. Designing has never been easier!

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1

2

3



Products choice

Precise calculations



Files to download



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Select an appropriate tool for making your choice



Concrete tanks  
dimensioned in accordance  
with DWA-A-117 guidelines



Linear drainage channels  
dimensioned following  
the Manning-Strickler formula



Infiltration systems  
dimensioned in accordance  
with DWA-A-117 guidelines



Pipe tanks  
dimensioned in accordance  
with DWA-A-117 guidelines



# Let's see how it works?

## Case study:

Underground infiltration system under parking lot by the Mumbai International Airport  
मुंबई इंटरनॅशनल एयरपोर्ट



### Selecting infiltrating systems

Dimensioning in accordance with DWA-A-138  
for a catchment area with sewage system  $\leq 200$ ha or systems with flow time  $\leq 15$ min

#### Investment details

The details we ask for will help you to keep a list of generated calculations in our application. The details will also be featured in the PDF file generated in the last step. The generated file may form an appendix to project documentation.

Name of the investment\*  
Infiltration facility

Investment location\*  
Naypada, Vile Parle East, Vile Parle, Bombay, Mah

Geographic coordinates\*  
19.099450, 72.875185

Street and No\*  
Vile Parle East

Postal Code

City\*  
Bombay

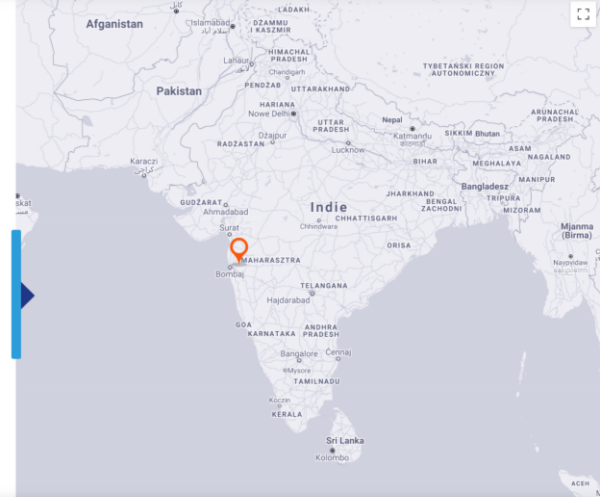
Stage of the investment\*  
Concept

#### Detailed description

Additional information about the investment e.g. full name of the investment, the investor, planned construction year, etc.

#### Impervious areas

Type of area / development	Runoff coefficient $\psi$	Area [ha]	Area [m <sup>2</sup> ]	Impervious area $F_i$ [ha]
Roofs	0.9	1	10000	0.9
Ordinary pavements	0.55	0.5	5000	0.275
Watertight pavements	0.72	0.2	2000	0.144
Parks and gardens	0.12	0.25	2500	0.03
Enter	Enter	Enter	Enter	0
Clear				
Total	0.69	1.95	19500	1.349



#### Investment details

1 / 3

Next

**Step 1** Location on Google Map  
**Step 2** Introduction of boundary design parameters, eg. infiltration coeff., surface outflow areas, runoff coeff., rainfall probab./freq., precipitation model:

Ram Babu Tejwani, K. K., Agarwal, M. C., and Bhushan, L. S. (1979), Rainfall intensity-duration-return period equations and nomographs of India. CS&WCRII, Indian Council for Agri. Res., (ICAR), Dehradun, India

**Step 3** Calculation results and target solution selection →

### Selecting infiltrating systems

Dimensioning in accordance with DWA-A-138  
for a catchment area with sewage system  $\leq 200$ ha or systems with flow time  $\leq 15$ min

#### Choosing parameters

Investment type\*  
Roads and car parks in urban area

Development length [m]\*  
100

Development width [m]\*  
60

Slope type\*  
Traffic load area LKW 30

Infiltration coefficient [m/s]  
0.00012

Reduced (impervious) area  $F_i$  [ha]\*  
1.349

Groundwater level [m]\*  
5

Ground cover  $H_g$  [m]\*  
1

Precipitation model\*  
Ram Babu

Probability\*  
20

The rainfall return period  
5

Back

Choosing parameters  
2 / 3

Calculate

# Calculation results and target solution selection



## Selecting infiltrating systems

Dimensioning in accordance with DWA-A-138  
for a catchment area with sewage system  $\leq 200$ ha or systems with flow time  $\leq 15$ min

### Calculation results

The minimum retention basin volume based on  
precipitation model Ram Babu

590.5 m<sup>3</sup>

Graph

Total inflow into the retention basin

917.5 m<sup>3</sup>

Graph

Total outflow from the retention basin

327 m<sup>3</sup>

Graph

Retention tank emptying time

2h 28min

### Solutions proposed according to the calculations

#### Infiltration system Wavin Q-Bic/BB

1449

Number of boxes



#### Sizes

Length	96.6 m
Width	10.8 m
Height	0.6 m

System Q-Bic Plus

System AquaCell

System Q-Bic

System Q-Bic/BB

Chosen

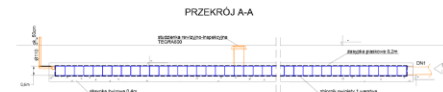
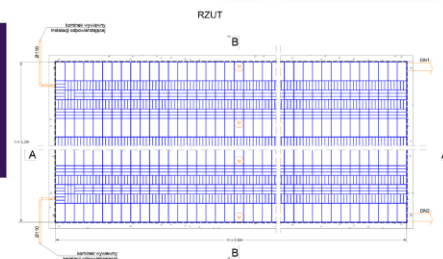
☆ Add to favourites!

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ZIP batch

Send a question

Partner of the solution

Wavin



Yes, it is easy!

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# Let's design channel drainage

Case study: Centre for Science and Environment सेंटर फॉर साइंस एंड एनवायरमेंट



## Choosing channel drainage systems

Dimensioning using the Manning-Strickler formula and laboratory measured values of corrective coefficients for maximum drainage length of 100 m.

### Choosing parameters

Investment type \*  
Car park

Drainage channel length [m] \*  
50

Maximum load class \*  
C 250 class

Outflow type  
free outflow

Precipitation model\*  
Ram Babu Tejwani et al. (1979)

Probability\*  
50

Rainfall duration [min] \*  
15

The rainfall return period  
2



### Calculation results

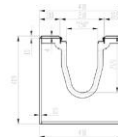
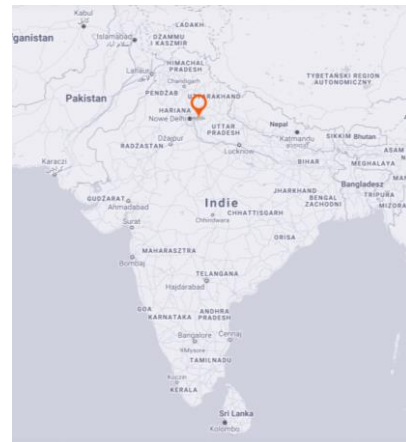
Calculated flow

12.3 l/s

Dependence of proportional filling of the channel from the flow

Graph

Set the maximum height and filling percentage for a channel drainage list



Schemat poglądowy rusztu





# Let's design stormwater retention tank

## Case study:

Underground retention tank under parking lot by  
the Mumbai International Airport मुंबई इंटरनॅशनल एयरपोर्ट



### Choosing a concrete tanks

dimensioned in accordance with DWA-A-117 guidelines  
for a catchment area with sewage system  $\leq 200$ ha or systems with flow time  $\leq 30$ min

#### Choosing parameters

Precipitation model\*  
Ram Babu Tejwani et al. (1979)

Probability\*  
20

The rainfall return period  
5

Flow time through the channel [5-30 min] \*  
25

Acceptable discharge limit [dm<sup>3</sup>/s] \*  
50

Reduced (impervious) area  $F_2$  [ha] \*  
1.349

Unit flow rate of the throttled outflow [dm<sup>3</sup>/[s·ha]]  
37.06

Risk coefficient\*  
moderate



### Choosing a concrete tanks

dimensioned in accordance with DWA-A-117 guidelines  
for a catchment area with sewage system  $\leq 200$ ha or systems with flow time  $\leq 30$ min

#### Calculation results

The minimum retention basin volume based on  
precipitation model Ram Babu Tejwani et al. (1979)

619.7 m<sup>3</sup> [Graph](#)

Total inflow into the retention basin

906 m<sup>3</sup> [Graph](#)

Total outflow from the retention basin

286.3 m<sup>3</sup> [Graph](#)

Retention tank emptying time

3h 27min

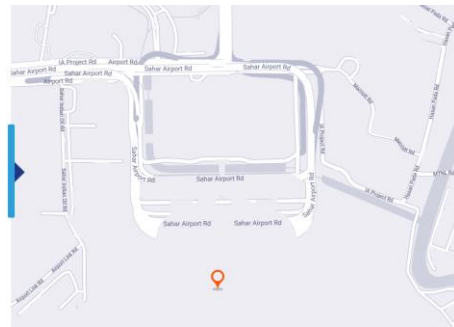


Retention tank internal height

3 m

Retention tank use height

2 m

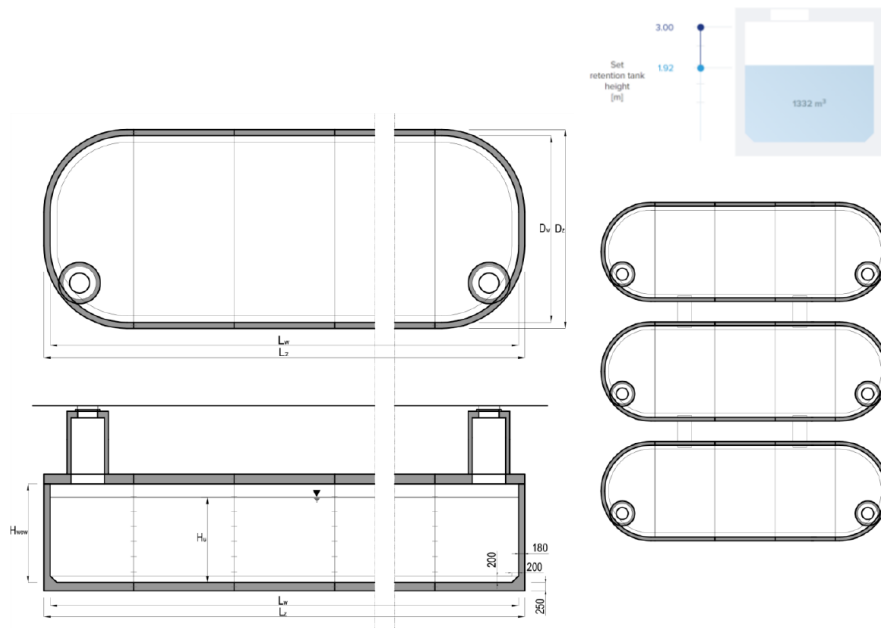


# Flexible retention solutions



## Choosing a concrete tanks

dimensioned in accordance with DWA-A-117 guidelines  
for a catchment area with sewage system  $\leq 200$ ha or systems with flow time  $\leq 30$ min

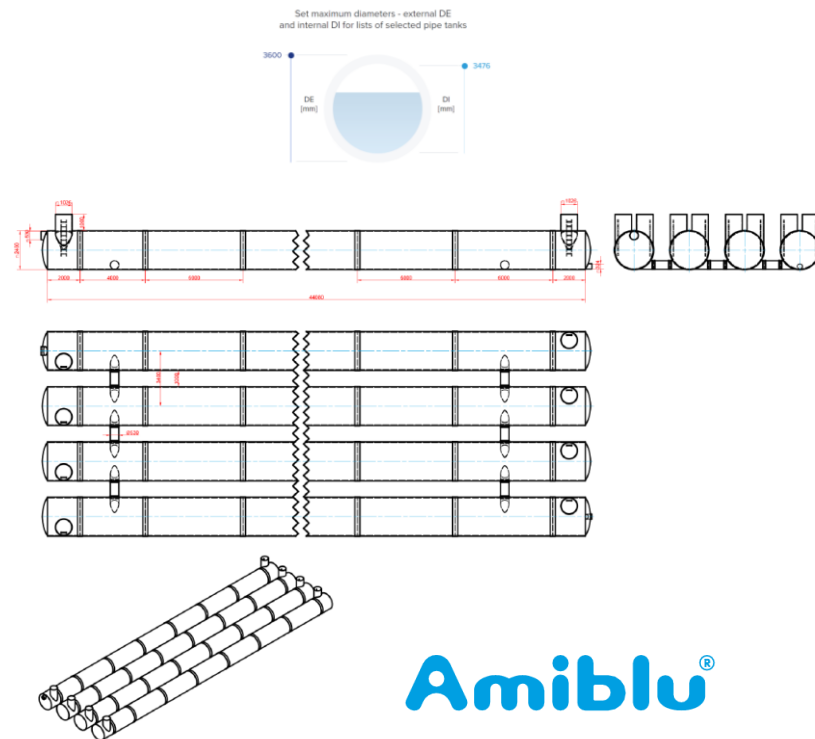


Hydrozone Basic



## Selecting pipe tanks

dimensioning in accordance with DWA-A-117 guidelines  
for a catchment area with sewage system  $\leq 200$ ha or systems with flow time  $\leq 30$ min



Amiblu®

# Summary



- 1) We need more tools, digital tools than advanced precipitation models
- 2) Tools should be available for free on the Internet
- 3) We need to combine knowledge about precipitation with calculation algorithms and the know-how of producers
- 4) You can't change the world alone...

Please give us your feedback  
about WaterFolder India!

LET'S TALK

[hello@waterfolder.com](mailto:hello@waterfolder.com)

+ 48 730 037 309



See you in Poland...

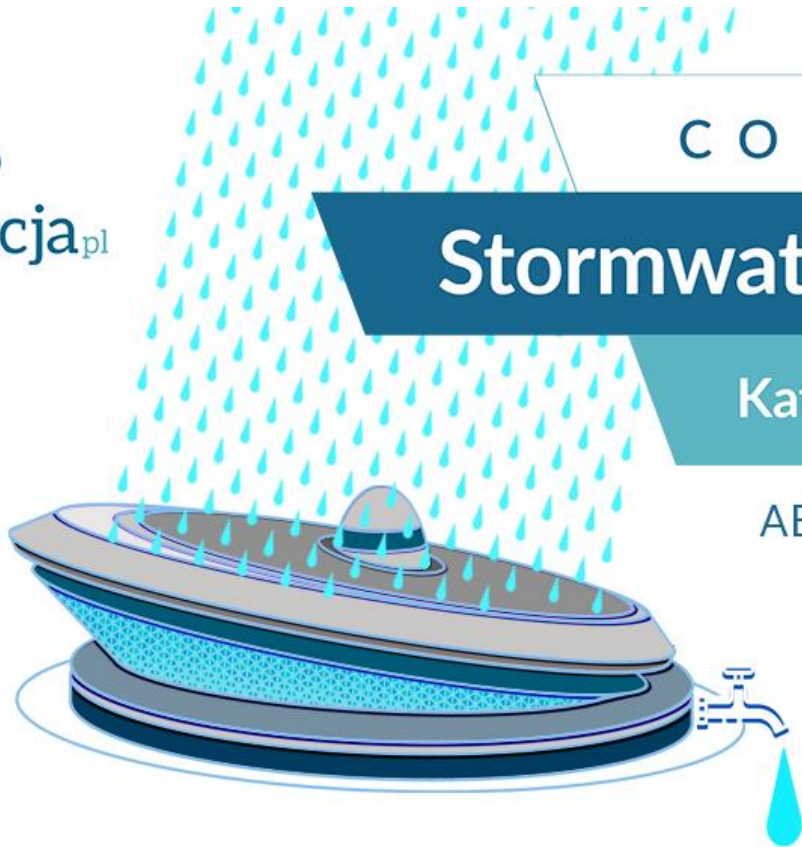


C O N F E R E N C E

# Stormwater Poland 2021

Katowice, 21-23 June 2021

ABOUT RAIN IN GOOD CLIMATE



Ministry of Climate  
and Environment



honorary patronage

strategic partner



An aerial photograph of a city, likely Vienna, with a large, dark, stormy cloud mass hanging over the urban landscape. The foreground shows green trees and a grassy field. The sky is blue with scattered white clouds. A semi-transparent teal box is overlaid on the right side of the image, containing the text "Thank you for your attention".

**Thank you for your  
attention**