

# Doruchów Municipality

Industrial Wastewater Treatment with innovative filter media for Phosphorous recovery

GMINA DORUCHÓW / DORUCHOW MUNICIPALITY

KĘPIŃSKA 13 , 63 – 505 Doruchów , Poland -Project Partner No. 6

JÓZEF WILKOSZ – MAYOR

Prepared by Andrzej Erwinski - Consultant - Doruchow Municipality

***Project BEST – Better Efficiency for Industrial Sewage Treatment  
#R054 BEST***

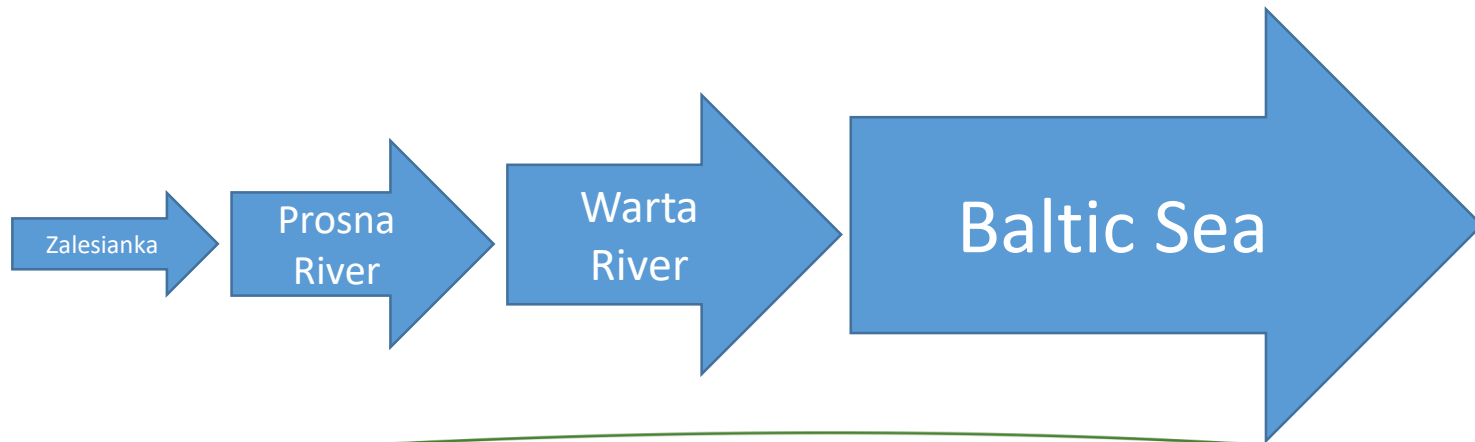
# Treated Industrial water flow to Baltic Sea



# Current Situation

## existing conditions

- The Doruchów municipality is currently the operator of its biological wastewater treatment plant built in 2003 (WWTP)
- The WWTP is treating mixed industrial and municipal waste waters
- After treatment, the wastewater is released to a nearby Zalesianka creek that leads to the Prosna river, later to the Warta river and eventually to the Odra river with a delta flowing into the the Baltic Sea



## Current Situation

### phosphorous levels

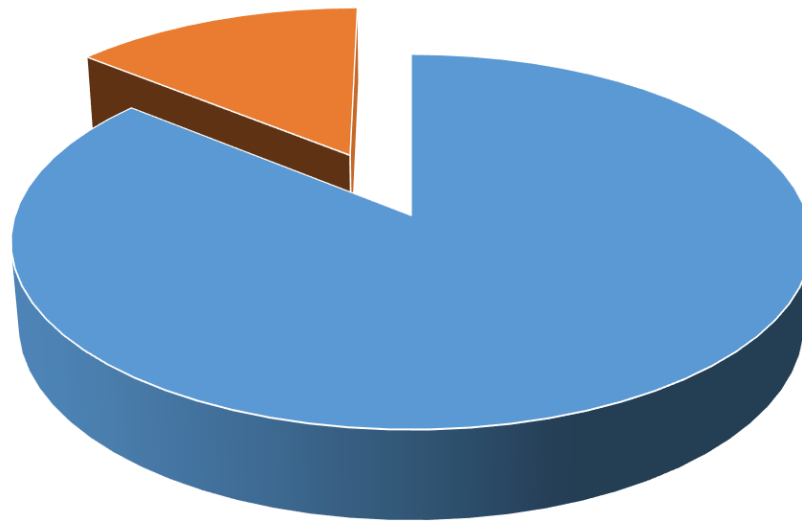
- Phosphorous level in Municipal wastewater as on the inlet to WWTP is 7-15 mg/l
- The industrial wastewater sources and levels of total phosphorus are:

Source	Q (m3/d)	P <sub>tot</sub> (mg/l)
Poultry Slaughterhouse	11	38
Cattle Slaughterhouse	6	41
Meat Processing Plant	48	40
<b>TOTAL</b>	<b>65</b>	<b>40</b>

## Current Situation

### wastewater discharge quantities

m<sup>3</sup>/d



- 400 m<sup>3</sup>/d municipal
- 65 m<sup>3</sup>/d industrial

■ municipal ■ industrial

# Modernization Needs targets

- Problem: High levels of Phosphorus in industrial water
- Approach: Separating the treatment of the industrial and municipal wastewater
- Exception: Reconstruction of a new municipal WWTP for domestic wastewater will not be discussed at this point

# Stakeholders

## summary

### Government

- The Doruchów Municipality
- The County district office Ostrzeszów
- Regional Directorate for Environmental Protection in Poznań
- District Sanitary Inspector in Ostrzeszów

### Subject Matter Experts

- Supplier of filter media and system set-up know how
- KTH Royal Institute of Technology
- Wrocław University of Science and Technology.

### Local Industry

- Meat Processing Plant – Tadeusz Krawiec
- Cattle Slaughterhouse – P.P.U.H. Kozica Jerzy
- Poultry Slaughterhouse – Grzegorz TUZ

# Preliminary project description

## overall scope

- Design and build a completely new system for industrial wastewater treatment (IWWTP) including:
  - P-removal up to 3mg/l with innovative filter media without using chemicals
  - using unique filter media, the P-removal process will take place at the effluent of the industrial wastewater biological treatment process



# Preliminary Project Description

## Approach, authorship and assumptions

- The project is based on previous tests and studies made by the municipality and Dr. Emil Kamenov, a wastewater treatment technology specialist with more 20 years experience, contracted by the municipality
- The original approach assumed that a pre-treatment of the industrial wastewater shall be initiated at the source, i.e. at the premises of the food processing plants
- Subsequently, the Meat Processing Plant (responsible for about 75% of total industrial wastewater) has since installed a pre-treatment system changing the pre-treatment assumptions

# Preliminary Project Description

## overall assumption

Plant	Pre-treatment	Wastewater Connection to WWTP	% of total waste
Meat Processing Plant	Installed and Operational	Delivered by tank truck	74%
Cattle Slaughterhouse	None	Delivered by tank truck	9%
Poultry Slaughterhouse	None	Connected to central sewer	17%

# Preliminary Project Description

## industrial wastewater train

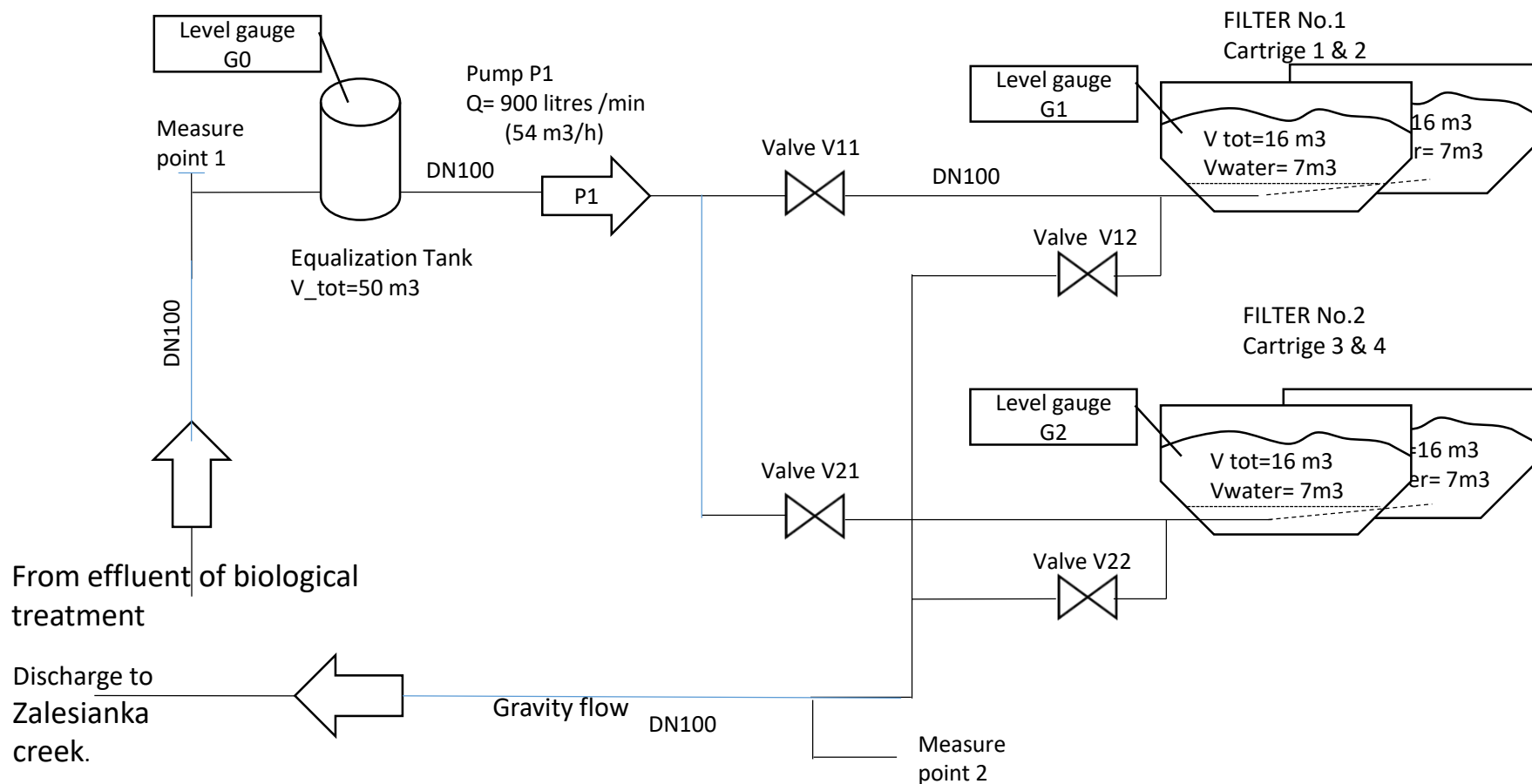
- Wastewater receiving station
- Grit removal and rotary screen
- Pumping station/ retention tank with capacity around 60 m<sup>3</sup> with aeration system
- Biological treatment system:
  - primary separation tank
  - dephosphorization chamber with mixer
  - denitrification chamber with mixer
  - aeration tank
  - clarifier

# Preliminary project description

## Industrial wastewater train

- At the clarifier effluent, tanks filled with filter media will be installed for phosphorous and partially nitrogen removal
- The volume of the tank will be calculated to fit enough filter media for 3 to 12 months switching period (The switching period and the size of the filter will be finally decided during the design stage of the Project)
- The filter media will be in a form of highly porous calcium silicate material

# Process Diagram –P<sub>tot.</sub> Removal Filter System



# Work Cycles

Cartridge	Step	Sequence	Sequence	Sequence	Sequence	Sequence
1	Fill	10 min				10min
	Rest		40 min			40 min
	Empty				10 min	
2	Fill		10 min			10 min
	Rest			40 min		
	Empty					10 min

# Work Cycles

Cartridge	Step	Sequence	Sequence	Sequence	Sequence	Sequence		
11	open	10 min				10 min		
	closed		40 min			40 min		
	closed				10 min			
12	closed		10 min			10 min		
	closed			40 min				
	open					10 min		
21	open				10 min			
	closed					40 min		
	closed							10 min
22	closed	10 min				10 min		
	closed		40 min				40 min	
	open					10 min		

# Preliminary Project Description

## industrial wastewater train

- All components of the filtering system are a unique and completely innovative approach to P removal and recycling without using chemicals
- The used (saturated) filter media use possibilities:
  - stored in one of the ponds
  - used as fertilizer (pending necessary approvals)
- Additional tank filled with bark to raise pH may be installed after the filtering system



# Preliminary Project Description

## industrial wastewater train

- Two tanks for waste sludge oxygen stabilization will be installed:
  1. domestic waste sludge
  2. industrial waste sludge
- Sludge dewatering will take place at the site of domestic wastewater WWTP

# Budget

## funding sources

- PROJECT BEST has granted funds for partial cost of industrial wastewater train and for innovative filter system design, equipment delivery and construction
- Doruchow Municipality will finance partial cost of the Industrial wastewater train (mechanical and biological)

# Installation Costs

## overall budget

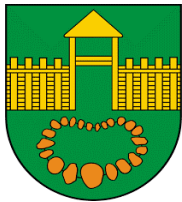
	Assumption	Estimated Cost (Euro)
Gross staff costs including of personnel employed by project partner - Coordination and management of the project	600 Euro/month for 36 months	21 600
Office and administrative expenditure including rent, utilities etc.	15% of personnel budget	3 240
Travel costs of personnel employed by project partner	6 trips for 2 persons at 800 Euro per person per trip	9 600
External expertise and service costs including translations and consultancy for design and legal council		21 000
Equipment costs - Equipment for filter media process		140 000
Infrastructure and works - New Wasterwater treatment facilities/constructions, like pools ,tanks, etc.		20 000
<b>TOTAL</b>		<b>215 440</b>

# Equipment and Installation Cost estimate breakdown

Description	Estimated Cost (Euro)
Installation of sludge disinfection (Filter Media\Powder)	12 000
Storage for dewatered sludge (for treatment with filter media as polymer replacement) and Start-up of the system as described	5 000
Storage tank for transported industrial wastewater	30 000
Denitrification chamber	30 000
Aeration chamber	30 000
Retention tank and clarifier	10 000
Compressor/ Blowers station	15 000
Automation & Control	7 000
Poultry slaughterhouse automated sampling point	6 000
Pond cleaning and preparation for storage of used Filter Media	14 000
Filter system installation & Automation	47 000
Filter Media volume material 10t/3 months	5 000

## **DORUCHOW MUNICIPALITY , POLAND**

Project Best – Better efficiency for Industrial Sewage treatment at local level.



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