



INGENIEURBÜRO

LOPP

Hydraulic engineering /  
environmental planning

Water engineering

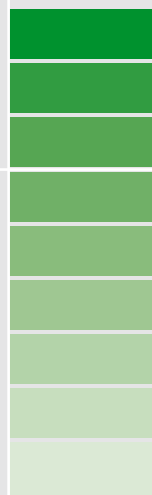
Flood control measures

Dams

Hydroelectric power plants

Fish ladders

Landscaping



# Water engineering

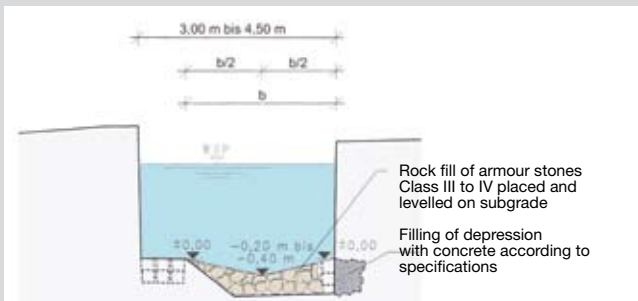
## Shoreline stabilization



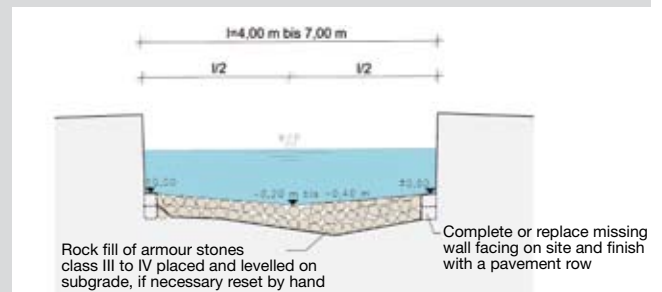
### Elimination of flood damage along the Seidewitz River at Liebstadt / Erzgebirge

Construction costs: EUR 0.45 million  
 Planning/construction: 2002 – 2003

- Stabilization / restoration of riverbed (rock fill, cross-bar)
- Improvement of bank walls (retaining walls, rock sediment, facing formwork)
- Renewal of bank slopes
- Calculation of shear stress



Planning details



Planning details



Shoreline stabilization Raba close to Zeitz

### Water body restoration of the Weiße Elster close to Zeitz at several sections (Raba, Ostrau, Am Utmich)

Construction costs: EUR 0.3 million  
 Planning/construction: 2003 – 2004

- Building up of new bank slopes using armour stones with block base
- Total length 1,200 m
- Restoration of rock terraces
- Construction of new channel to 15 m
- Planting of vegetation, topsoil fill



Shoreline stabilization and channel „Am Utmich“



Site plan for bank slope, area of outlet „Am Utmich“



## Water body restoration

### Restoration of water to the Batschke in the area of the Zwenkau opencast mine

Construction costs: EUR 0.2 million  
 Planning: 2004 – 2005

- Shaping of stream course, length 3 km
- Branch off of the Weiße Elster River as undercurrent gate valve
- Improvement of mill weir with conversion as rock ramp
- Installation of outlets, bridges, ford
- Calculation of flood plains for bringing water back to the oak woodland



New outlet in course of the Batschke



Layout plan with course of Batschke

### Diverting excess water from the abandoned opencast mine complex Nachterstedt/Königsau

Construction costs: EUR 3.2 million  
 Planning: 2003 – 2007

- Shaping / sealing of trench systems L = 8 km
- Improvement of bridges and water crossing
- Construction of new pump station, 15 m³/min
- Abandoned opencast mine connection, DN 600, L = 900 m, including siphon system and floating intake
- Construction of 2 new intake structures
- Inlet level stabilization on opencast embankment, length 25 m



Layout plan of abandoned opencast mine complex

### Reinforcement of intake structure at the Dam Mandelholz in Königshütte/Harz (Kalte Bode)

Construction costs: EUR 0.2 million  
 Planning: 2004 – 2005

- Concrete repair, injections, structural sealing airside and waterside
- Renewal of grating and cross-overs
- Technical data of reservoir dam:  
 Length of dam crest 213 m, dam height max. 23.7 m,  
 Width of foot of dam max. 108 m, max. top water level 21.0 m



# Flood control measures

## Dike construction



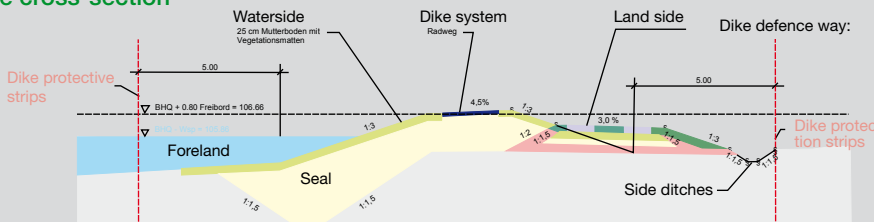
Repair, 1st phase of construction

### Repair of embankment along the Neue Luppe in Leipzig, 9th phase of construction

Construction costs: EUR 1.2 million  
 Planning period: 2003 – 2007

- Repairs as three-zone dike, Height: max. 2.5 m, length 1 km, incl. Dike defence way
- Consideration of dike penetrations, Special structures (Elster weir)
- Safeguarding of crossing track formation using sheet pile systems
- Stability calculations

### Neue Luppe right-hand dike, thorough restoration Dike cross-section



Dike defence way:  
 20 cm Grass grid, track plates, backfill of berm and gaps with crush stone/grass mixture  
 3 cm grit bedding 2/5  
 20 cm Gravel base 0/45,  $E_{v2} \geq 150 \text{ MN/m}^2$   
 22 cm Frost blanket of broken mineral aggregate 0/45,  $E_{v2} \geq 120 \text{ MN/m}^2$   
 min. 20 cm Drainage layer, broken gravel 0/32,  $E_{v2} \geq 100 \text{ MN/m}^2$  Subgrade  $E_{v2} \geq 45 \text{ MN/m}^2$



Construction work on dike break

### Restoration of Raba flood control dike along the Weiße Elster (near Zeitz)

Construction costs: EUR 0.2 million  
 Planning/construction: 2003

- Repair of a break in dike foot and depressions,  $L = 200 \text{ m}$
- Structure: Block base, rock fill, Topsoil fill, vegetation, Restoration of rock terraces
- Terrain control: Construction of dike crossing, access control



### Dike refurbishment Göbitz, Weiße Elster (near Zeitz)

Construction costs: EUR 0.5 million  
 Planning/construction: 2003

- Dike heightening,  $L = 400 \text{ m}$ , Dike height 1.5 m, with dike defence way
- Refurbishment of sluice structure and bank walls
- Set-up of flood control walls made of stainless steel



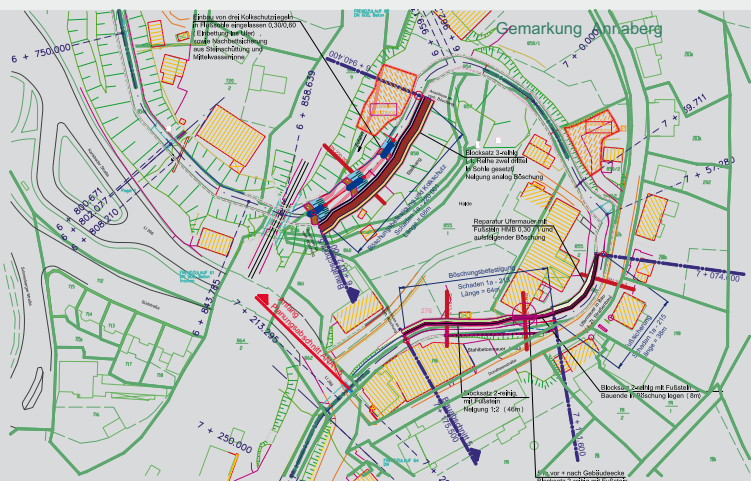
## Bank reinforcement



### Elimination of damages caused by the floods of 2002, along the Seidewitz River

Construction costs: EUR 0.45 million  
 Planning period: 2002 – 2003

- Restoration of riverbed
- Improvement of bank walls, facing formwork
- Renewal of sections of slopes
- Surveying and hydraulic calculation (shear stress)



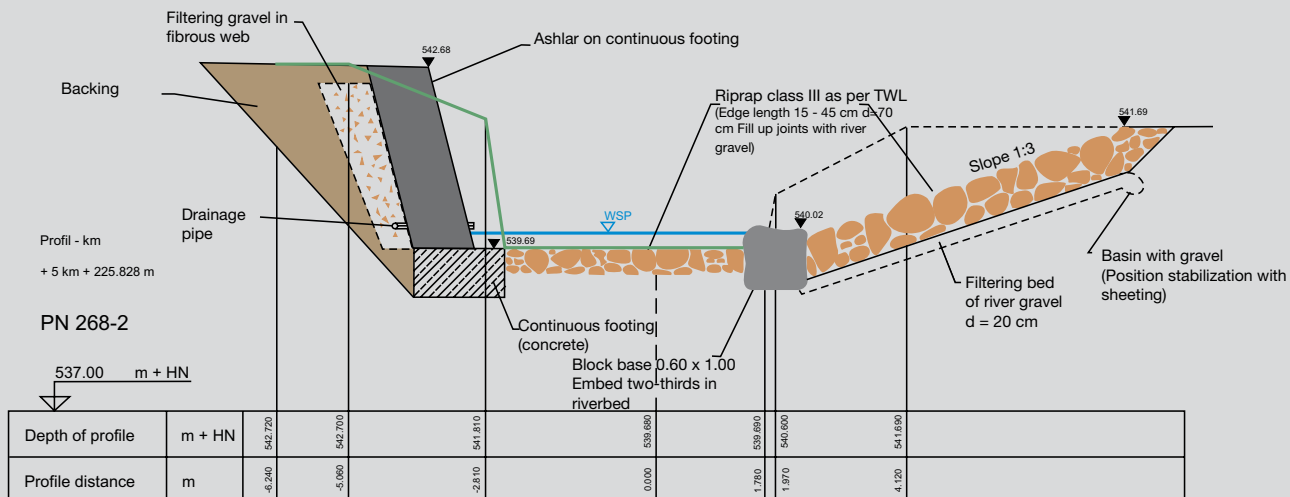
Layout plan view

### Elimination of flood damages on the banks of the Sehma River (tributary of Zschopau)

Construction costs: EUR 0.45 million  
 Planning period: 2003 – 2007

- Stabilization and restoration of bank slopes
- Elimination of damages in the riverbed
- Improvement of bank walls (Stone packing, walls, gabion baskets)

### Lateral section of Sehma River



# Special topics

## Dams / hydroelectric power plants



### Elimination of flood damage at the Neidamühle weir, Pleiße

Construction costs: EUR 0.05 million  
Planning/construction: 2004

- Improvement of the weir with lock gate sill and stilling basin
- Construction of bank reinforcement
- Construction of new steel bridge



### Hydroelectric power plant „Muldenwehr Penig“ as run-of-river power plant

Construction costs: EUR 3.0 million  
Planning period: 2002 – 2005

- Inlet made of reinforced concrete ashlar facing
- Turbine hall, draft tube
- Fish ladder system as channel-basin pass
- Weir replacement-construction as lever weir
- Redesigning the shutter weir to weir wicket

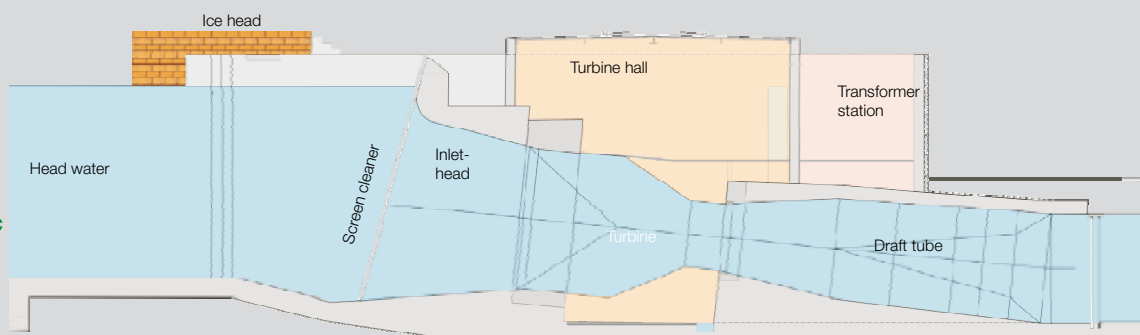


### Recommissioning of the hydroelectric power plant Mittweida on the Zschopau

Construction costs: EUR 1.75 million  
Planning/construction: 2004 – 2006

- Improvement/redesign of inlet and Turbine hall
- Restoration of the channel
- Construction of new steel bridge
- Weir refurbishment with weir wickets
- Fish ladder system

### Section: Hydroelectric power plant Zwickauer Mulde



## Fish ladder / Landscaping

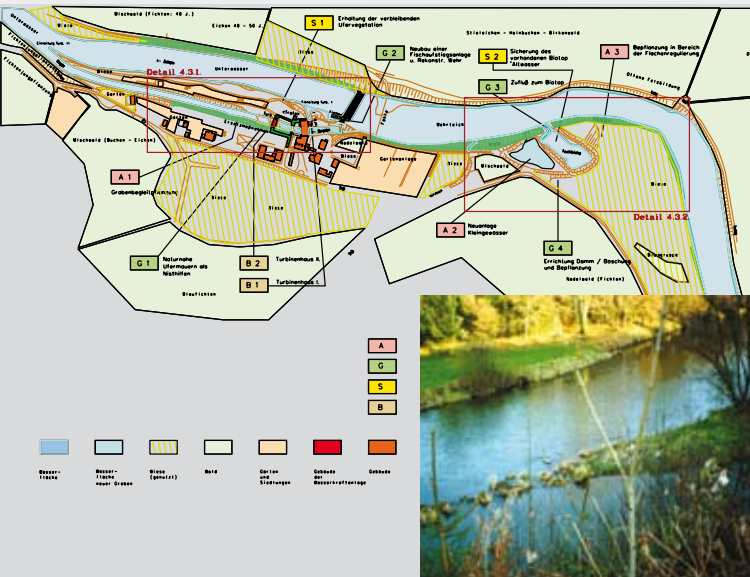


Fish ladder system

### Fish ladder system at the Weißthal weir

Construction costs: EUR 2.8 million  
 Planning/construction: 2001 – 2004

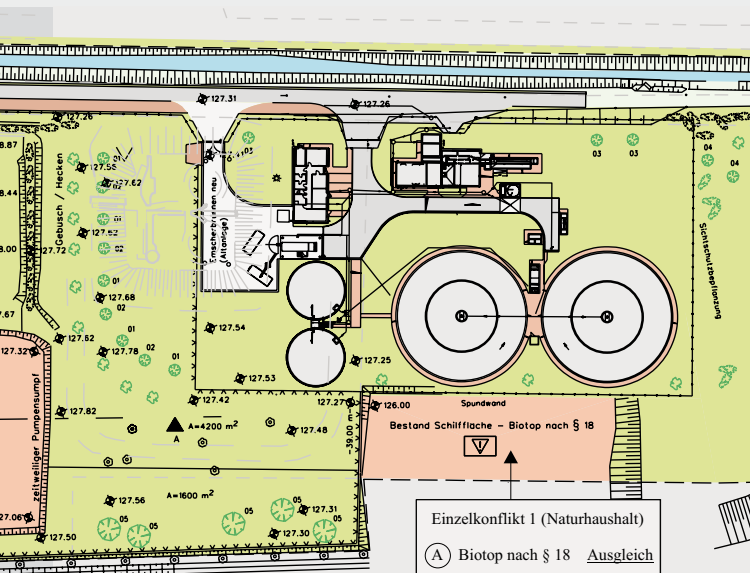
- Construction of inflatable weir, W = 66 m
- Construction of new side weir of near-natural design, W = 14 m
- Fish ladder system as channel, W = 10 m



### Krumbach hydroelectric power plant Landscape conservation support plan

Planning: 1996 – 1997

- Construction of a fish route
- near-natural extension of channels
- Review of vegetation situation
- Mapping of types of fish
- Spawning grounds for amphibians
- Preservation of wetlands



### Reconstruction and extension of sewage treatment plant Bad Frankenhausen Landscape conservation support plan

Planning: 1998 – 1999

- Review of current situation
- Preservation of existing slickensides
- Plans for planting vegetation

## References

Water body restoration (GS), hydraulic engineering (WB), flood control measures (HS), weir construction (W), hydroelectric power plant (WKA), landscaping (LBP)

### Hydraulic engineering

• Leipzig	- Repair of dikes at the Neue Luppe in Leipzig up to the Motorway A9.	GS, WB, HS
• Zeitz	- Weiße Elster, shoreline stabilization of Ostrau, restoration of Göbitz dike and „Am Utmich“ channel	GS, WB, LBP
• Dorfhain-Klingenberg	- Restoration of Raba flood control dike including shoreline stabilization of Weiße Elster	GS, WB, HS
• Annaberg- Buchholz	- Elimination of flood damage at the Wilde Weißeritz	GS, WB, HS
• Liebstadt	- Elimination of flood damage along the banks of the Sehma River	WB, HS
• Nachterstedt	- Elimination of flood damage along the Seidewitz River	WB, HS
• Zwenkau	- Diverting of excess water, abandoned opencast mine complex at Königsau, Schadeleben	GS, WB
• Merseburg	- Restoration of water to the Batschke in the area of the Zwenkau opencast mine	GS, WB, W, LBP
• Gräfenhainichen	- Inlet and distributing station in Leiha for connecting to the lake Geiseltalsee	GS, WB
• Rathenow	- Construction of drain for Golpa-Nord opencast mine	GS, WB
• Saara	- Dam with integrated outlet in Vorderarche weir / Rathenow	GS, WB
• Bad Sulza	- Elimination of flood damage at the weir of Neidamühle Bornshain, Pleiße	HS, W
• Luisenthal	- Reopening and renaturation of the millstream An der Obermühle / Ilm	GS, WB, HS
	- Restoration, improvement, stabilization of the bed of the Ohra River downstream of water treatment facility	WB
• Königshütte (Harz)	- Reinforcement of intake structure of flood detention basin Kalte Bode	WB
• Markkleeberg, Böhlen	- Screening of options for lowering the post-mining groundwater table	GS, WB
• Göselaue	- Measures for preventing dangers in built-up areas with projected local groundwater levels of Göselaue area	GS, WB

### Hydroelectric power plants

• Hamburg	- Fuhlsbüttel hydroelectric power plant, output 120 kW	WKA
• Mittweida	- Recommissioning of Mittweida / Zschopau hydroelectric power plant, output 480 kW	GS, W, WKA, LBP
• Penig	- „Muldenwehr Penig“ hydroelectric power plant, output 500 kW	W, WKA, LBP
• Weißthal	- Recommissioning of Weißthal hydroelectric power plant, construction of machinery hall, 540 kW	GS, W, WKA
• Luisenthal	- Improvement of hydroelectric power plant on the Ohra Dam, output 340 kW	GS, WB, WKA
• Bad Sulza	- Hydroelectric power plant in Bad Sulza on the Ilm, Weimarer Land, output 85 kW	WKA
• Wickerstedt, Ilm	- Hydroelectric power plant in Wickerstedt on the Ilm, Weimarer Land, output 70 kW	WKA

### Landscaping

• Köllda	- Landscape conservation support plan, 0.5 hectare	LBP
• Krumbach	- Krumbach hydroelectric power plant, landscape conservation support plan and surveying	LBP
• Bad Frankenhausen	- Bad Frankenhausen sewage treatment plant, landscape conservation support plan, 0.5 hectare	LBP
• Weißensee	- Extension of „Industrial Park West“ landscape conservation support plan, 14.4 hectares	LBP
• Finsterwalde	- B 96 / L 60 bypass, screening of options for bypassing as per UVPG	LBP

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