

# Risk Assessment off-aerodrome with special consideration of gravel mining

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Knowledge for Tomorrow

## Risk Assessment of wildlife and areas

- On-aerodrome: bird species (counts, spatial & seasonal distribution, strike rates, damages), relevant habitats: water bodies, buildings, food sources
- Off-aerodrome (13 km): water bodies, conservation areas, golf courses & race courses, urban parks, wastewater treatments & waste dumps

→ How to assess flight safety relevance?

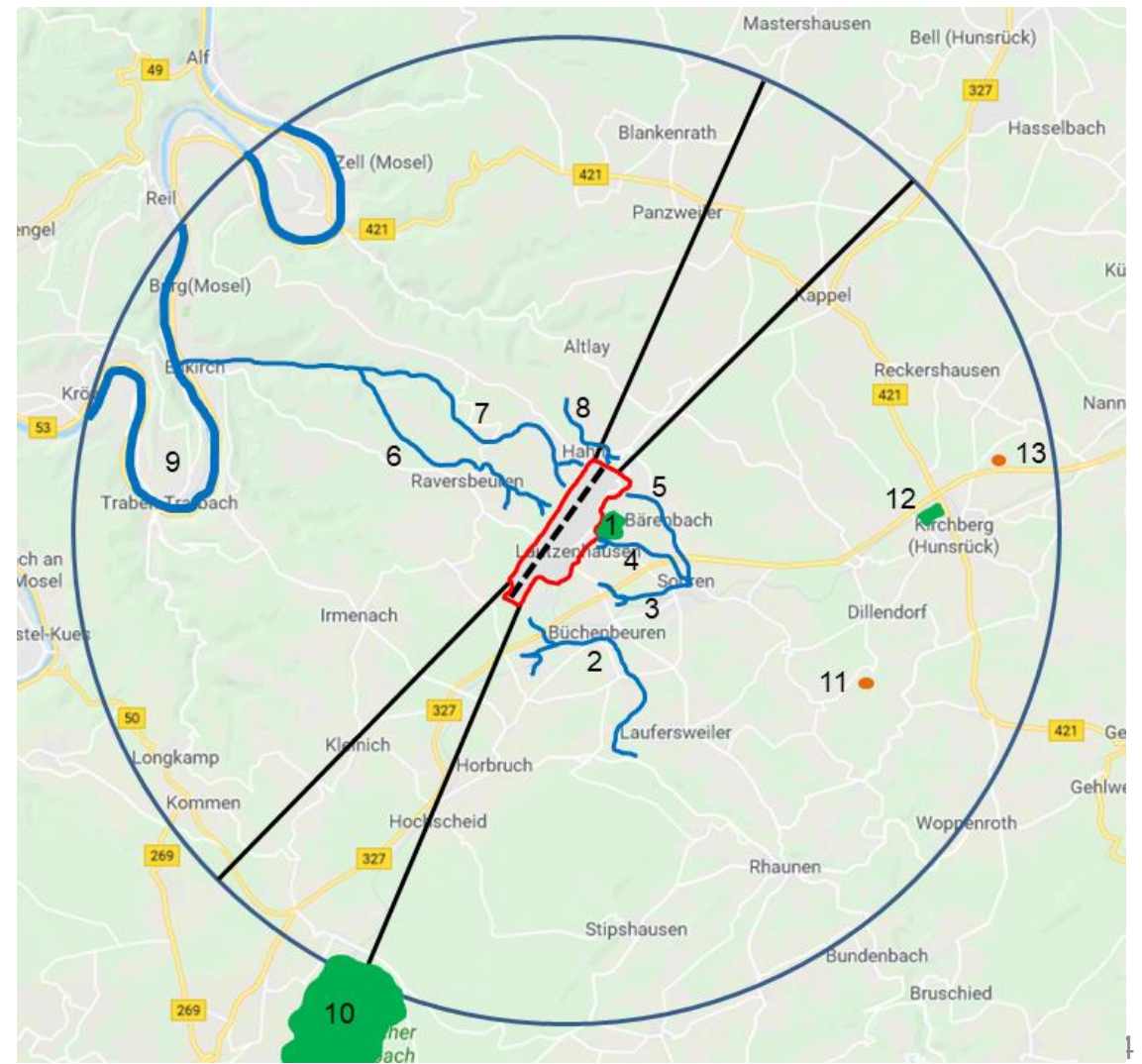
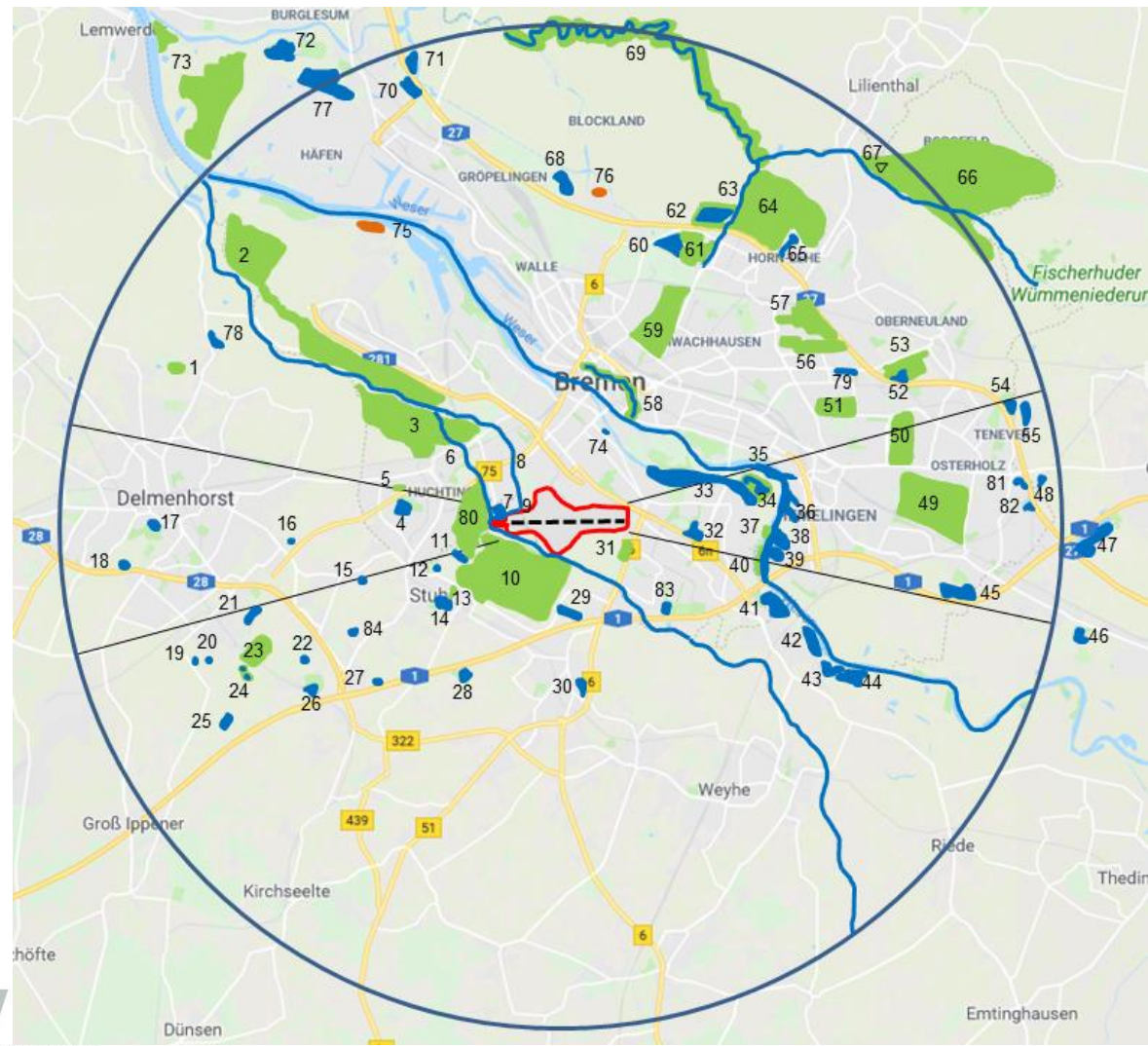


## DAVVL (German Birdstrike Committee) reports for airports

- Scientific reports for members (every 7-10 years): wildlife strikes, climate, vegetation & management, birds at airport (incl. RA), assessment of buildings, mammals, wildlife control, off-aerodrome risks
- Evaluation of habitats: vicinity to airport, size, birds, layout features → more impartial and repeatable → recommendations for monitoring frequency
- (a) Determination of habitats, (b) monitoring (bird counts & habitat features, DAVVL & airport), (c) risk assessment of birds, (d) risk assessment of habitats



(a) Determination of habitats



## (c) Risk assessment of birds

Species	Consequences of a strike						Probability of a strike				Result flight safety
	Mean weight [g]	P	FB	FIB	P	Consequences	Frequency	Further factors	BS 2010-2020	Probabi - lity	
Blackbird	80-115	4	1	1	4	low	low		v. low	low	v. low
Magpie	200-250	8	1	1	8	medium	low		low	low	low
Pheasant	900-1400	16	1	1	16	high	low	On the ground (-)	v. low	low	medium
Greylag goose	2200-3200	16	2	1	32	v. high	high	Increasing numbers (+)	v. low	medium	high
Grey heron	1000-2100	16	1	1	16	high	high		medium	medium	medium
Great crested grebe	700-1300	16	2	1	32	v. high	high		high	high	high
Mute swan	9500-15000	32	2	1	64	extreme	high	Increasing numbers (+)	v. low	medium	v. high
Canada goose	3200-6200	16	2	1	32	v. high	low		v. low	low	medium
Northern Lapwing	170-280	8	2	1	16	high	medium	Increasing numbers (+)	v. high	high	high
Swift	30-50	2	2	2	8	medium	low		high	medium	low
Common buzzard	550-1200	8	1	2	16	high	low	Damage (+)	v. high	high	high
House martin	15-23	1	2	2	4	low	low	No confirmed strike (-)	medium	low	v. low
Carrion crow	400-680	8	2	1	16	high	medium		v. high	high	high
Tufted duck	550-950	8	2	1	16	high	high		medium	medium	medium
Common wood pigeon	440-590	8	2	2	32	v. high	low	Only pairwise (-)	medium	low	medium
Starling	70-95	4	2	2	16	high	low		v. high	medium	medium
Mallard	950-1400	16	2	1	32	v. high	high		high	high	high
White stork	2700-4200	16	2	1	32	v. high	low	Only 2020 (-)	low	low	medium

P: Points, FB: Flocking Behavior, FIB: Flight Behavior

### (d) Risk assessment of habitats

- 1. **Size:** < 5 ha, 5 – 15 ha, > 15 ha / < 8 km, 8-20 km, > 20 km 1-3 points
- 2. **Vicinity** (RWY, ILS): < 1 km, 1 – 3 km, > 3 km 2-6 points
- 3. **Relevant bird species:** 1- 4 species, 4-7 species, > 7 species 0-3 points
- 3. **Relevant individuals:** 1-10 birds, 11 – 30 birds, > 30 birds 0-3 points
- 4. **Layout features:** water bodies, grassland, waste management 2-6 points

<b>Layout</b> <i>Water bodies</i>	<b>Layout</b> <i>Grassland</i>	<b>Layout</b> <i>Waste Management</i>
Trophic level/stream velocity <sup>1</sup>	Water bodies <sup>2</sup>	Clarifier/open waste container <sup>4</sup>
Slope, vegetation, islands	Rate of open grassland <sup>3</sup>	Open grassland & flat roofs <sup>4</sup>

<sup>1</sup> river

<sup>2</sup> < 1ha, 1-2ha, >2ha

<sup>4</sup> low, medium, high

<sup>3</sup> < 40%, 40-70%, > 70%

**Total result: 5 – 21 points**

## (d) Risk assessment of habitats

### Layout features water bodies

- Trophy level: oligotrophic - polytrophic
- Banks: slope, shallow water areas, islands



- Stream velocity: low - high



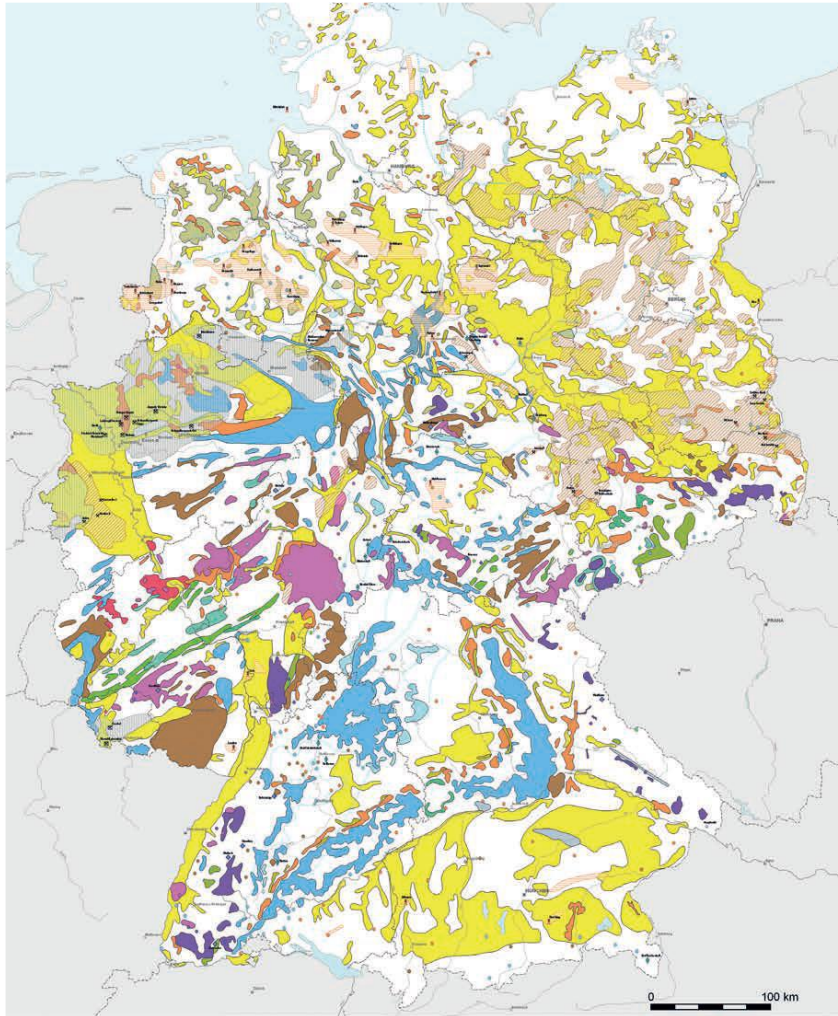
## (d) Risk assessment for habitats

### Flight safety relevance (fsr) of habitats

- No fsr (5-7 P): 1 control every 3 years
- Low fsr (7,5-10 P): 1 control / year
- Low-medium fsr (10,5-13 P): 2 controls / year
- Medium fsr (13,5-16 P): 4 controls / year
- Medium-high fsr (16,5-18,5 P): 6 controls / year
- High fsr (18,5-21 P): 1 control / month



## Relevance of gravel mining



- 2021: 309 t gravel & sand in Germany
- Dry mining: no problem, development of water bodies → habitat for birds (breeding, feeding, resting, sleeping)
- Reuse: conservation habitat, fishing pond, swimming lake

## Age of gravel pits

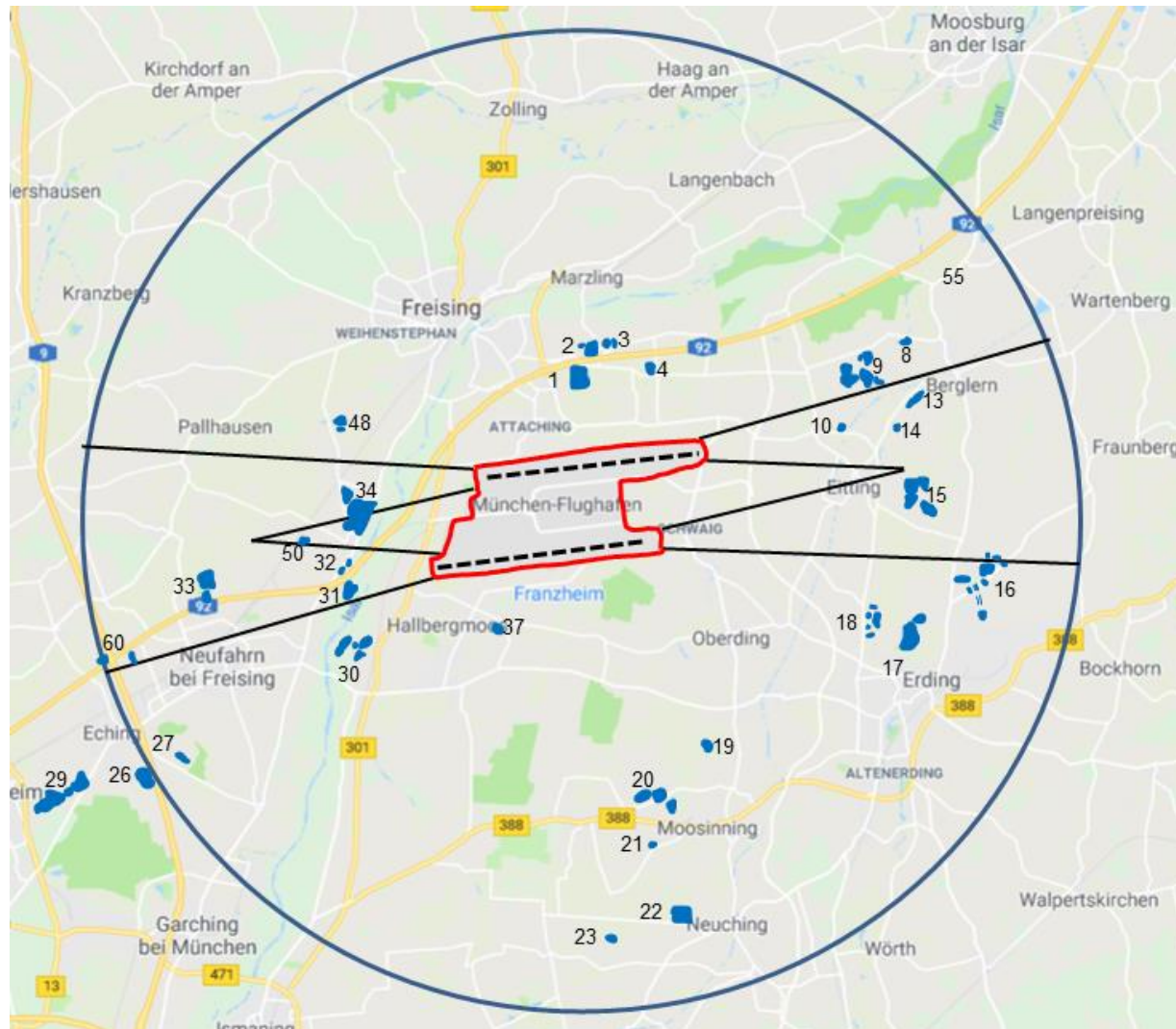


- Low food abundance, low suitability as breeding ground, useful for resting/roosting  
→ low – medium fsr



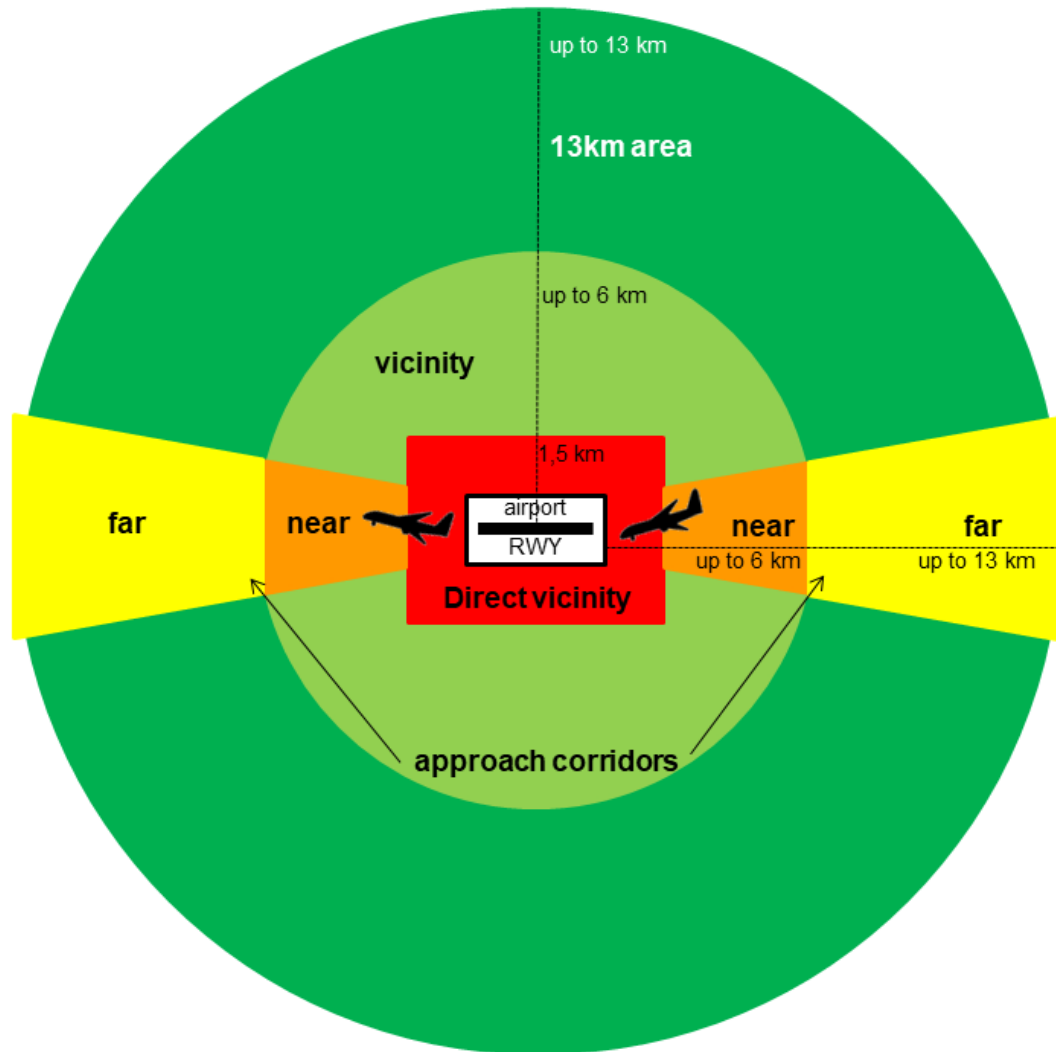
- High food availability, suitable breeding/resting/roosting ground  
→ medium - high fsr

## Relevance of gravel pits: Munich airport



- Strong increase of water bodies for 50 years → increase of waterbirds
- Many waters near the airport, below approach areas → increased numbers of birdstrikes in the surroundings
- How to deal with the problem?

## Different zones of relevance: all airports



- 1: Direct vicinity (1,5 km behind the fence)
- 2: Approach areas (near & far)
- 3: Wider vicinity (6 km around airport reference point)
- 4: Rest of 13 km area

## Different zones of relevance: recommendations for government

	Direct vicinity	Approach corridors		Vicinity	Rest of 13 km area
		near	far		
Max. size of total water body	<b>NO PERMISSION</b>	1 ha	2 ha	4 ha	4 ha
Max. open water during depletion		0,2 ha	0,4 ha	0,5 ha	4 ha
Development / year		≥ 25%	≥ 20%	≥ 10%	no specification
Backfill		yes	yes	Yes, if water body > 2.500m <sup>2</sup>	no
Finish recultivation		1 year after backfill	2 years after backfill	2 years after backfill	2 years after backfill
Distance to other water bodies		1000 m	1000 m	1500 m	1500 m
Recultivation for conservation		not acceptable	not acceptable	not acceptable	acceptable
Use for fishing		no	no	for water bodies ≤ 500 m <sup>2</sup>	for water bodies ≤ 500 m <sup>2</sup>
Other requirements		no	no	narrow planting & steep slope of banks, no shallow zones & islands	narrow planting & steep slope of banks, no shallow zones & islands
Deposit of costs for backfill		yes	yes	yes, for water bodies > 2500 m <sup>2</sup>	no backfill

**Thank you for your attention!**



**DAVVL e.V.**