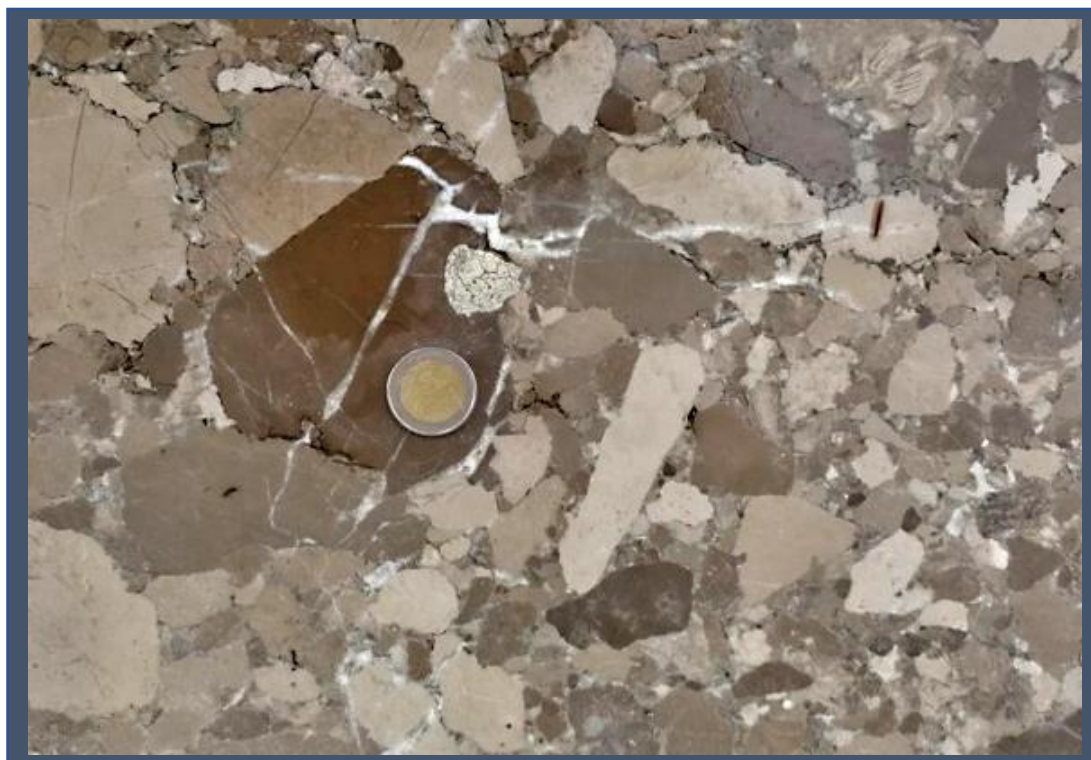


Breča Želebej

Želebej Breccia

Želebejska breča

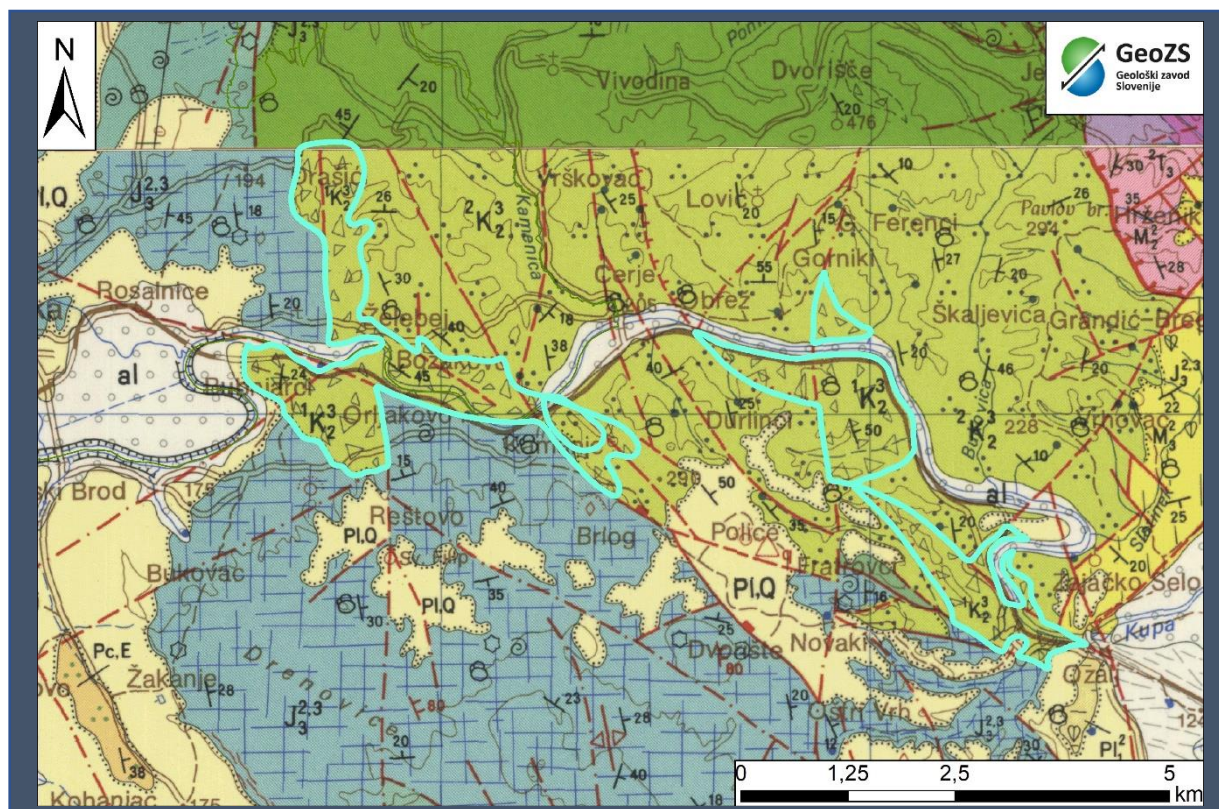


5 cm

Short description: Light grey to olive grey coarse grained calcareous breccia. The image displays a polished surface.

Commodity (vocabulary)	Lithology (vocabulary)	Typical colour (code list)	Place of origin			
			Country	County / District / Province	Municipality / Community	Place/town / Village
sandstone	Calcareous breccia	grey	Slovenia	Bela Krajina province/Dolenjska (traditional province)	Metlika	Želebej pri Metliki

Geological setting



Geology: The geological unit represents the basal coarse-grained breccia horizon of Upper Cretaceous flysch, deposited in the deep-marine Slovenian Basin.

Production: No. Abandoned quarry at Želebej near Metlika.

Geological age: Late Cretaceous, Coniacian–Maastrichtian (89.3–65.5 million years)

Geological unit: Upper Cretaceous flysch of Internal Dinarides

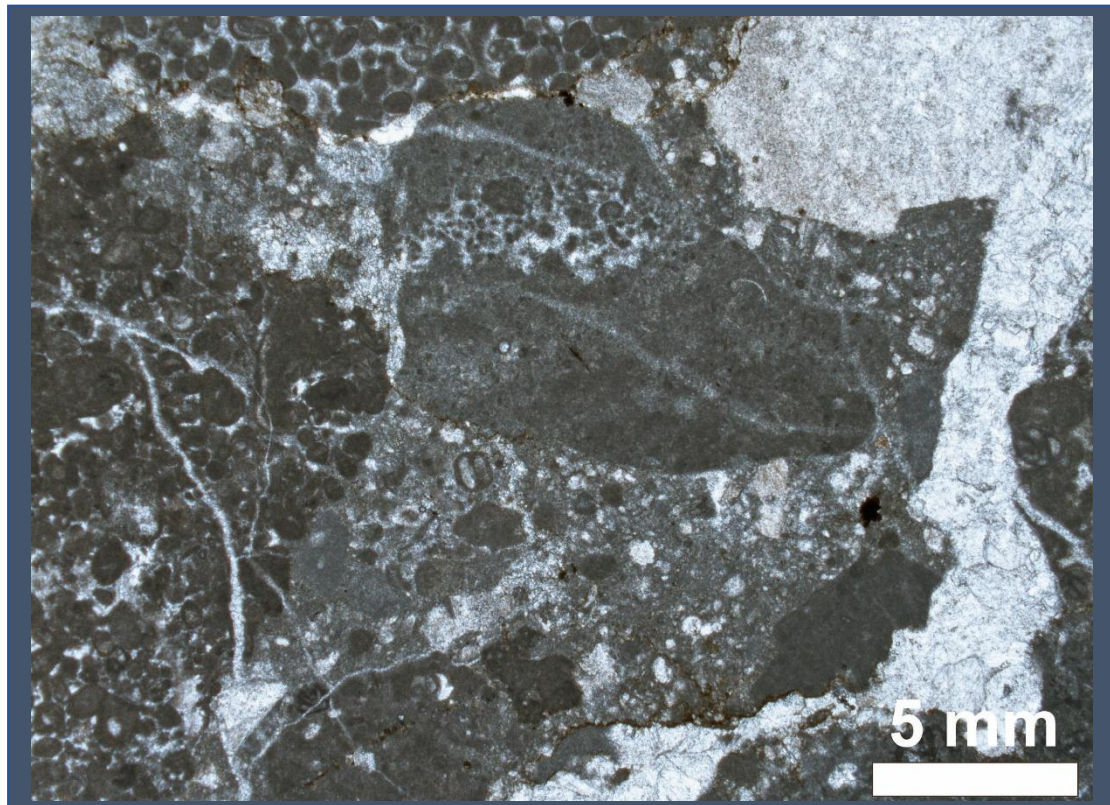
Application, use and heritage

Description: Internal (parts with clay matrix) and external use. Fasade and wall cladding, indoor floors, stairs and pavements.



Renovated staircase of the Church of the Holy Spirit (1487) in Črnomelj is made of Želebej breccia.

Petrography



Description: Medium to coarse grained calcareous breccia composed of clasts of different kinds of limestones and fossil remains (rudists, foraminifera, algae, ostracods, echinoderms) in calcareous matrix.

Source of information: Geological Survey of Slovenia, Mirtič et al., 1999.

Mineral composition

If no accurate number, use MM=main minerals, SM = Subordinate minerals, AM=accessory minerals

Calcite (%)	Clay minerals (%)	Pyrite (%)	Quartz (%)	Limonite minerals (%)	Organic matter (%)
94-98	up to few %	up to few %	up to few %	up to few %	up to few %

Source of information: Mirtič et al., 1999.

Physical properties

Apparent density (EN 1936) kg/m ³	Open porosity (EN 1936) % vol	Water absorption at atmospheric pressure (EN 13755) % wt	Uniaxial Compressive strength (EN 1926) MPa	Flexural strength under concentrated load (EN 12372) MPa

Real density (EN 1936) kg/m ³	Total porosity (EN 1936) % vol	Water absorption coefficient by capillary (EN 1925) (g/m ² x s ^{0,5})	Flexural strength under constant moment (EN 13161) MPa

Frost resistance (EN 12371)				
Technological Test (Test A)				Identification Test (Test B): Number of cycles completed prior to stone failure
Flexural strength (EN 12372) after freeze-thaw cycling, MPa	Number of cycles	Uniaxial compressive strength (EN 1926) after freeze-thaw cycling, MPa	Number of cycles	

Resistance to ageing by thermal shock (EN 14066)			
Change in dynamic modulus of elasticity (increase: +; decrease: -) %	Change in open porosity (increase: +; decrease: -) %	Change in ultrasound pulse velocity (increase: +; decrease: -) %	Change in flexural strength under conc. load (increase: +; decrease: -) %

Abrasion resistance (EN 14157)			Resistance to salt crystallisation (EN 12370)	Breaking load at dowel hole (EN 13364)	
Method A - Wide Wheel Abrasion Test, mm	Method B - Böhme Abrasion Test, cm ³ / 50cm ²	Method C - Amsler Abrasion Test, mm	Change in mass (increase: +; decrease: -), %	Breaking load, N	Thickness of the test specimens, mm

Slip resistance by means of the pendulum tester (EN 14231 / CEN/TS 16165)			Rupture energy (EN 14158), Joule	Thermal Conductivity (EN 1745), W/m·K
Tested surface finish	Slip Resistance Value — SRV			
	Dry test condition	Wet test condition		

Methods applied and source of information:

Chemical properties

Main elements

SiO ₂ (%)	Al ₂ O ₃ (%)	Fe ₂ O ₃ (%)	TiO ₂ (%)	MgO (%)	CaO (%)	Na ₂ O (%)	K ₂ O (%)	MnO (%)	P ₂ O ₅ (%)	SO ₃ (%)	LOI (%)

Trace elements

V (ppm)	Cr (ppm)	Mn (ppm)	Co (ppm)	Ni (ppm)	Cu (ppm)	Zn (ppm)	As (ppm)
Sr (ppm)	Cd (ppm)	Ba (ppm)	Pb (ppm)	Be (ppm)	Rb (ppm)	Bi (ppm)	U (ppm)
Sc (ppm)	Y (ppm)	Th (ppm)	Sb (ppm)	Ta (ppm)	Nb (ppm)	Zr (ppm)	Sn (ppm)
Ag (ppm)	B (ppm)	Mo (ppm)	W (ppm)	Ga (ppm)	Ge (ppm)	Se (ppm)	Cs (ppm)
Tl (ppm)							

REE

La (ppm)	Ce (ppm)	Pr (ppm)	Nd (ppm)	Sm (ppm)	Eu (ppm)	Gd (ppm)	Tb (ppm)
Dy (ppm)	Ho (ppm)	Er (ppm)	Tm (ppm)	Yb (ppm)	Lu (ppm)		

Methods applied and source of information:

Sources of more information

Type of information	Name of provider	URL
This data sheet		
Non-commercial directory	Geological Survey of Slovenia: Mining book	https://ms.geo-zs.si/Nahajalisce/Podrobnosti/2237?culture=en-GB
Commercial directory		
Scientific publication	MIRTIČ, B., MLADENVIČ, A., RAMOVŠ, A., SENEGAČNIK, A., VESEL, J., & VIŽINTIN, N. 1999. Slovenski naravni kamen. Ljubljana, Geological Survey of Slovenia, Slovenian National Building and Civil Engineering Institute, University of Ljubljana Geology department. 131 pg.	
Other publication		

Compiled by:	Geological Survey of Slovenia (GeoZS) www.geo-zs.si	Logo  GeoZS Geološki zavod Slovenije
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