

Glacial Lake Grindelwald



At regular intervals since 2005 a lake with no over-ground drainage has formed on the Lower Grindelwald Glacier. The water therefore makes its own way through the glacial ice leading to the very abrupt emptying of the lake. As the lake continues to grow from one year to the next, there is an ever increasing danger of flooding. For this reason, in 2009 an artificial drainage gallery is being built which will allow the water level of the lake to be kept low and hence avert the danger of flooding. The building of the gallery necessitates several explosions daily.

We thank you for your understanding!

Process



Remains of the «Schlossplatte» rock-fall at the closure of the lower end of the glacial lake

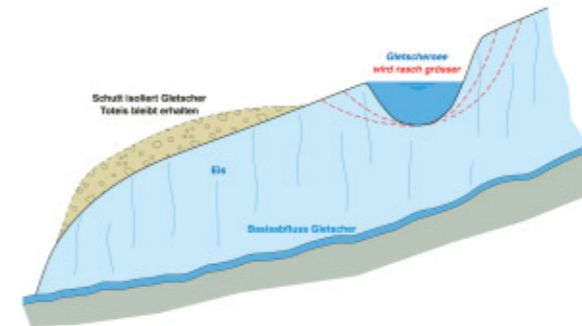


The formation of the lake

The formation of the glacial lake is a result of global warming in the Alps. Higher temperatures over the last few decades have caused the Lower Grindelwald Glacier to recede dramatically. This process has been accelerated since 2000. Today the surface of the glacier in the area around the lake lies approximately 200 metres lower than in the years around 1860. Without the supporting pressure of the glacier, the sides of the mountain become unstable resulting in landslides and falling rock.

Falling rock has covered the end of the glacier with debris. The glacial ice below is hence protected from the sun and melting. Higher up, the glacier continues to recede leaving a reservoir that has no means of over-ground drainage. A glacial lake was formed here in 2005 for the first time. When the snow melts in spring the meltwater collects in this reservoir. It then

finds its own way through the glacial ice to the glacier's underground drainage canal which lies between the ice and the rock beneath and drains the entire glacier into the Glacier Gorge and the Lütchine River.



Schematic longitudinal section of the reservoir and the closure with debris at the lower end

Diagram: Geotest AG

Hazardous situation



The future

The volume of the lake is increasing dramatically from year to year because the basin left by the receding glacier is rapidly growing. Between 2014 and 2020, should the Lower Grindelwald Glacier continue to melt at the same rate, the volume of the lake could rise to 9 million m³.

Development of the volume of the lake from 2005 to 2009 and prognosis for 2013

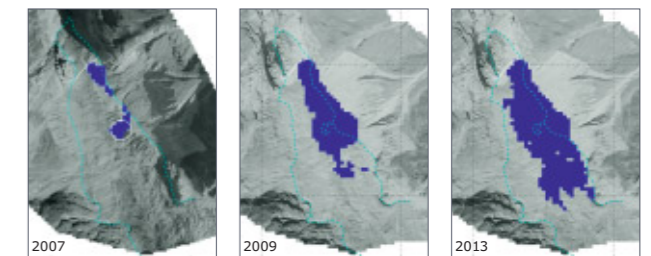


Diagram: VAW ETH Zurich

Hazardous situation



Mesures



Drainage funnel of the lake after the outburst of 30 May 2008

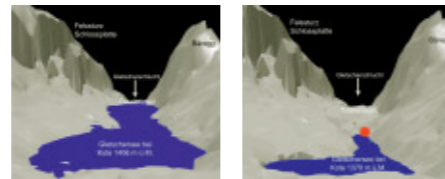
The problem

During the summer months the glacial lake can break out spontaneously at any time as soon as the water has found a way of draining through the frozen bed of the lake. The greater the volume of the water, the higher the level of the Lütschine River rises. In future these sudden outbursts are expected to cause extensive flooding causing severe damage extending as far as the Interlaken area.

The lake is under permanent surveillance. Should there be signs of an outburst, alarm will be raised and emergency procedures will be taken for the protection of the population. Furthermore, reliable protective constructions are also necessary to prevent extensive damage. Since summer 2008 numerous measures have been tested. The most effective remaining solution is the building of a drainage gallery.

The diagonal gallery

You can imagine the glacial lake being like a bath without a plughole. The aim of the diagonal gallery is to create an artificial plughole for the bath as close to the bottom of the lake as possible. The water level can no longer rise beyond this point and reach such a great volume. A spontaneous outburst would hardly be able to cause any damage.



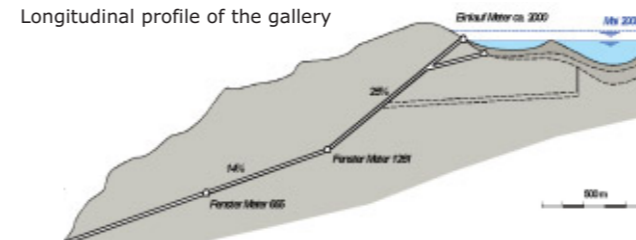
The effect of the gallery: on the left the lake without gallery; on the right the lake with gallery

The project

The gallery begins at the entrance to the Glacier Gorge and ascends over a distance of 2 km in the flank of the Mättenberg mountain to the glacial lake. Should

Diagram: Mätzener & Wyss AG

the water level reach the upper entrance of the gallery, the water is lead through the gallery over a distance of 700 metres before plummeting over a waterfall into the Glacier Gorge. The lower 1.3 km of the gallery are merely for reasons of access.



The responsible authority is Grindelwald Community's Corporation of Riverbed Constructions. The cost of the project is around CHF 15 million and is subsidised by the Confederation and the Canton of Berne.

Diagram: Geotest AG

Information

For further information please visit the information stand at the car park of the Gletscherschlucht restaurant at the Glacier Gorge in Grindelwald and the website www.gletschersee.ch

The consequences

The gallery is being built by blasting. The building time is limited to 10 months to ensure the artificial drain is in operation by spring 2010. During the initial weeks, therefore, work will be carried out in two shifts in at the area around the gallery portal, thereafter the site will operate around the clock. Unfortunately the building work, particularly the blasting, will cause noise.

We kindly ask you for your understanding!

Created by	Corporation of Riverbed constructions and Grindelwald Community
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Concept, text & Photos:	Suzanne Michel, Berne
Editor:	Claudia Bernet, Berne
Design:	Geotest AG, Mätzener & Wyss AG, Chief Engineer of District 1, VAW ETH Zurich
Diagrams:	Jane Dubach, Susten VS
Translation:	Sutter Druck AG, Grindelwald
Printed by:	500, January 2009
Number of copies:	