

NORDRESS

Nordic Centre of Excellence
On Resilience and Societal Security



Avalanches in the Nordic countries

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Work performed by: NGI, IMO

What is an avalanche?

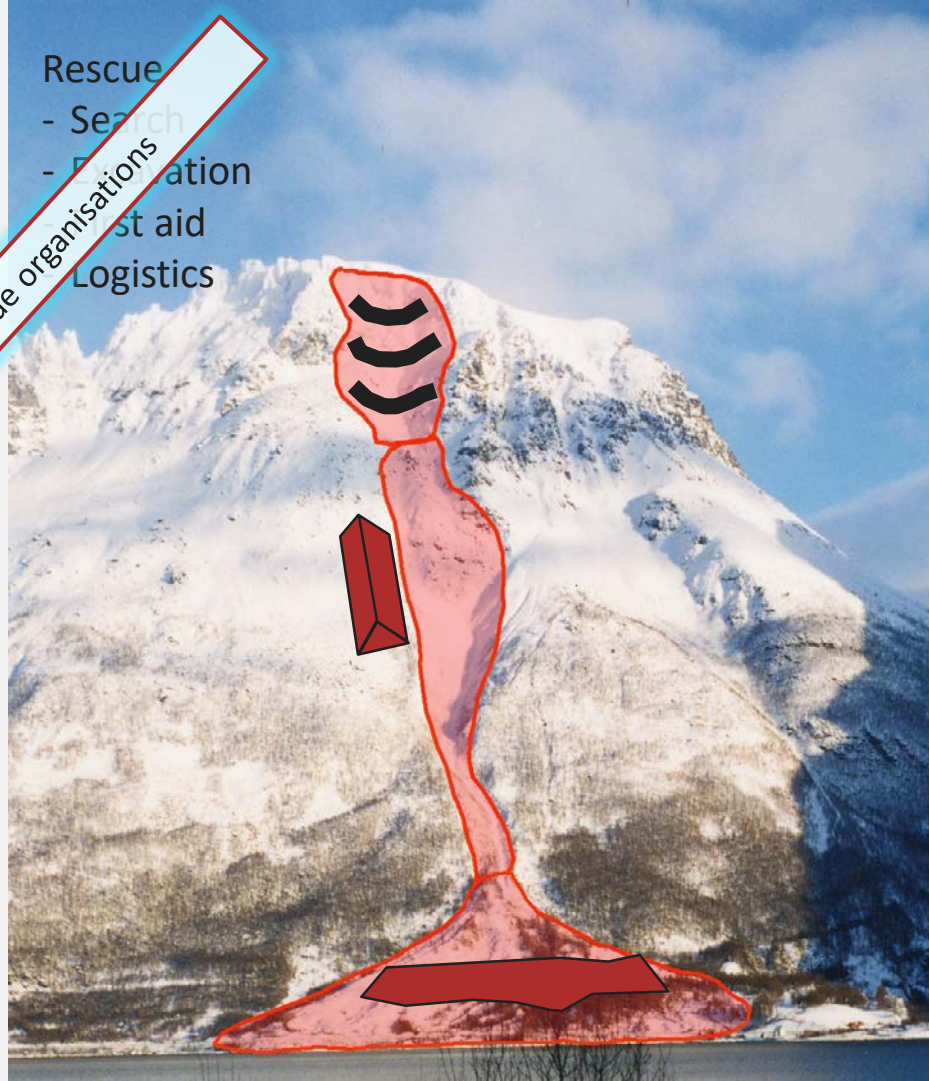
- Terrain
 - Steeper than 30 degrees
- Snow
 - Layered winter snow
 - Wet spring snow
 - Weak layer
- Trigger
 - Additional snow
 - Artificial trigger
 - Internal weakening



Information

Rescue organisations

- Search
- Evacuation
- First aid
- Logistics



Release area

- Terrain analysis
- Meteorology
- Snow physics
- Warning

Path

- Avalanche dynamics

Run out area

- Hazard zoning
- Risk
- Rescue

Mitigation

- Support structures
- deflecting dams
- Catching dams

Effects of avalanches on nordic societies

- Infrastructure
 - Frequent road closures
 - Interference with power supply lines
 - Demanges on roads and railways
- Settlements
 - Threatens old and new houses
 - Limits land use
 - Isolates settlements
- Recreational acitivities
 - Most fatalities
 - Fastly increasing number of tourists



Avalanches in Scandinavia

Settlements
Infrastructure
Recreational

Settlements
Infrastructure
(Recreational)

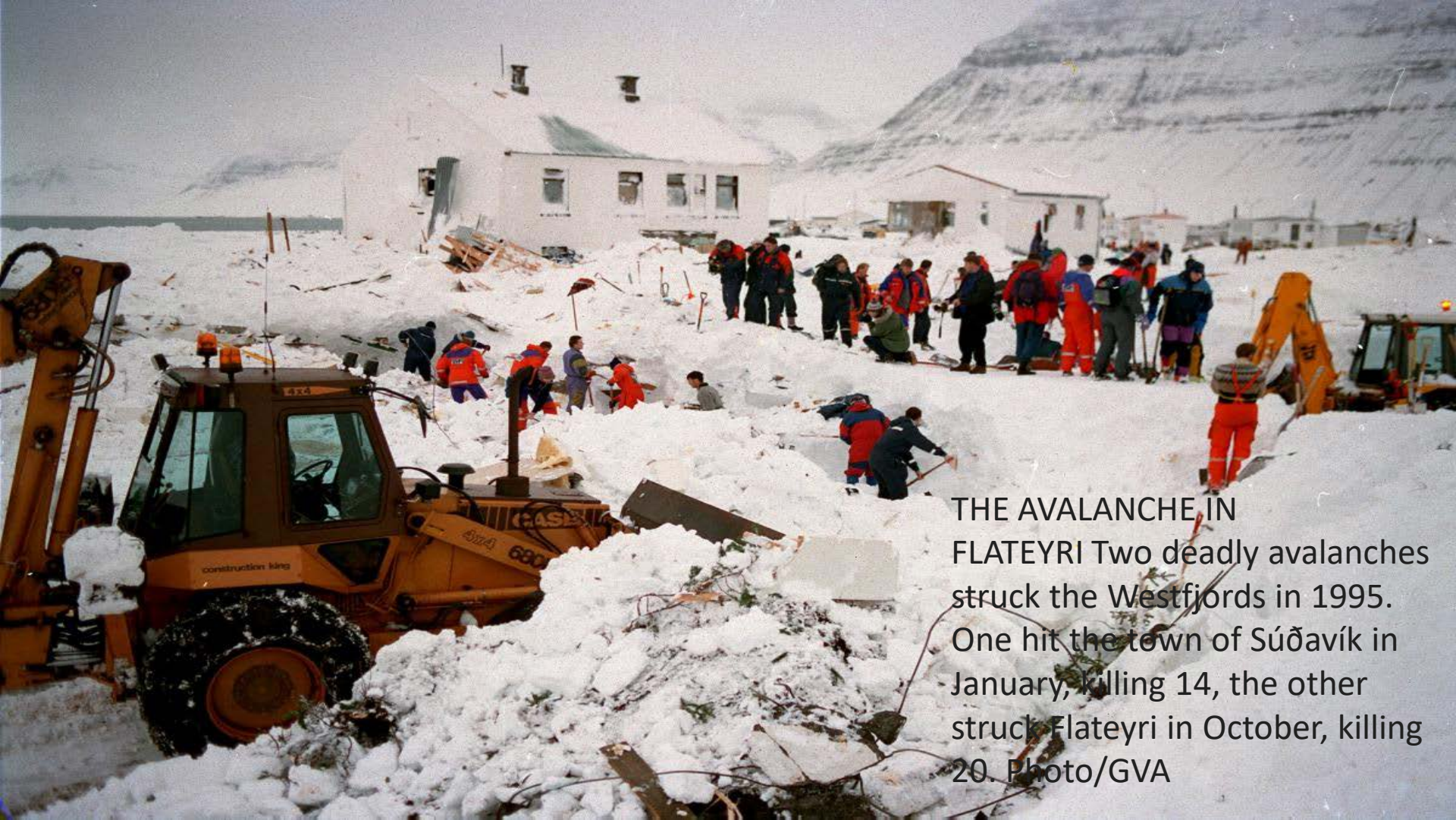
Settlements
Infrastructure
Recreational

Recreational

Recreational



The most important villages in Iceland that are threatened by avalanches and landslides

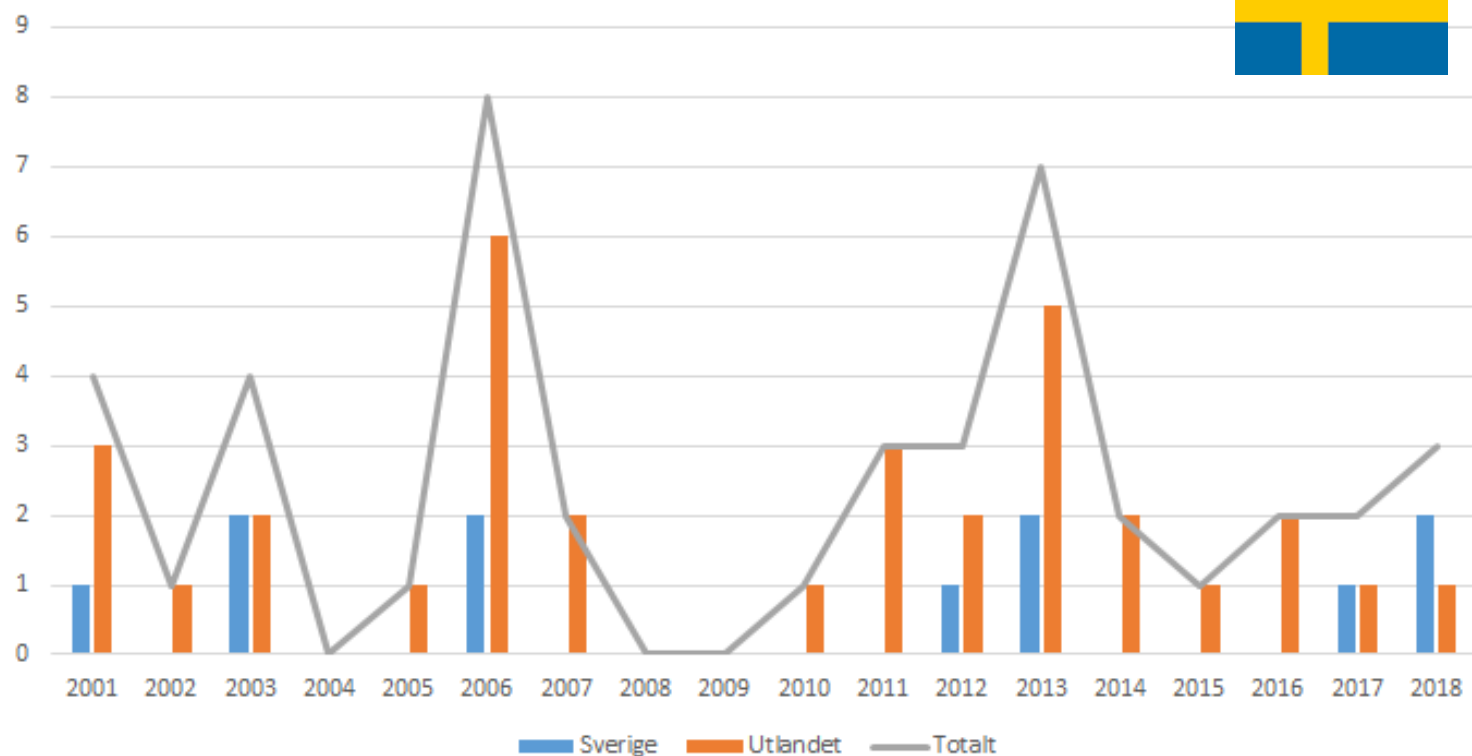


THE AVALANCHE IN
FLATEYRI Two deadly avalanches
struck the Westfjords in 1995.
One hit the town of Súðavík in
January, killing 14, the other
struck Flateyri in October, killing
20. Photo/GVA



Antal omkomna i laviner 2001-2018

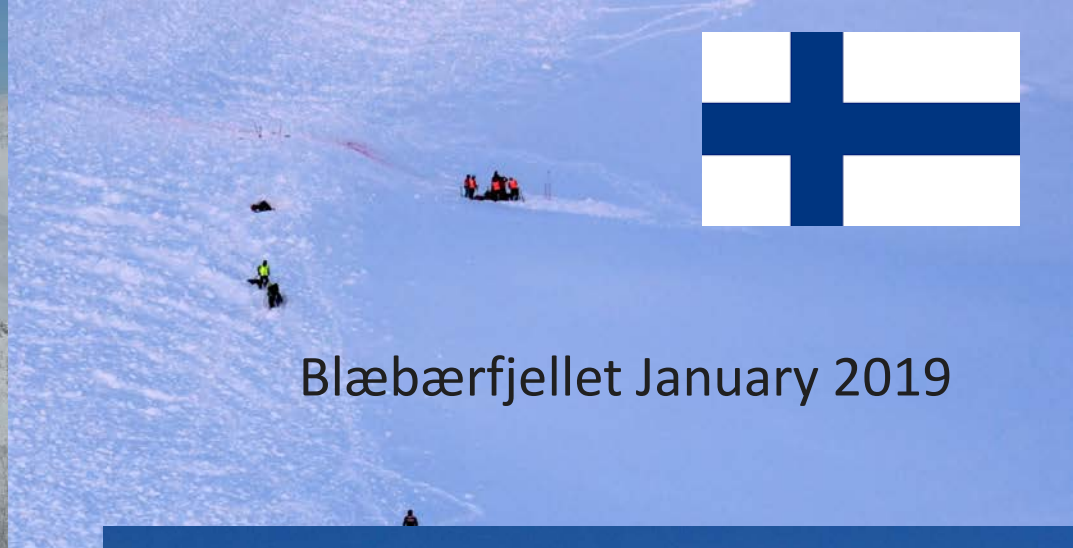
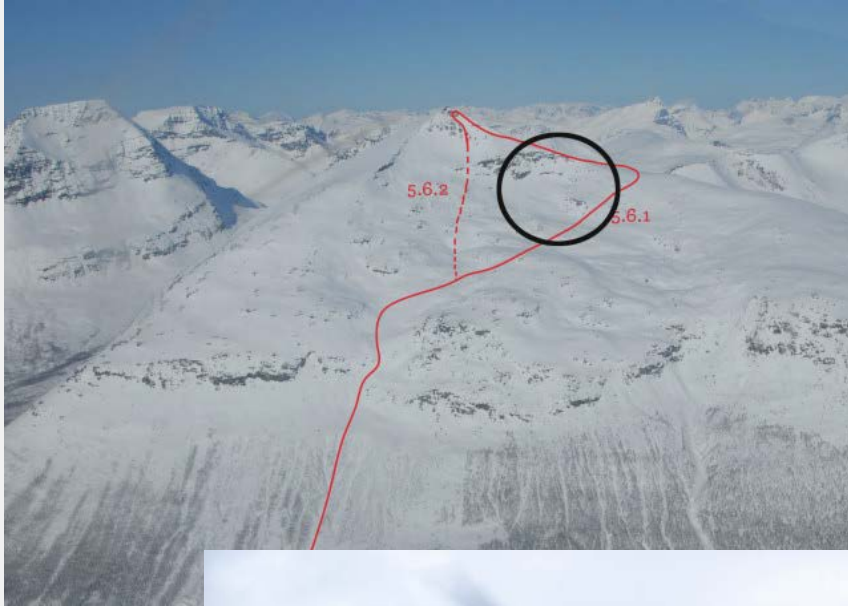
I Sverige samt svenskar utomlands



Rapporterade laviner utlösta av skoteråkare

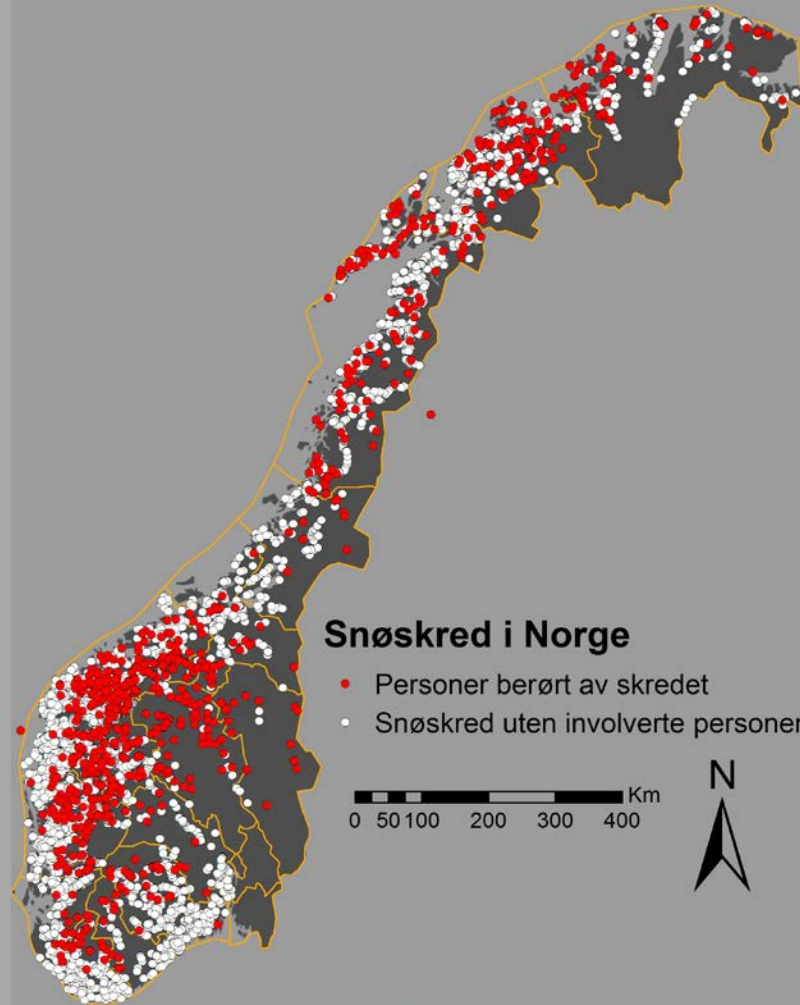


Källa: Naturvårdsverket.

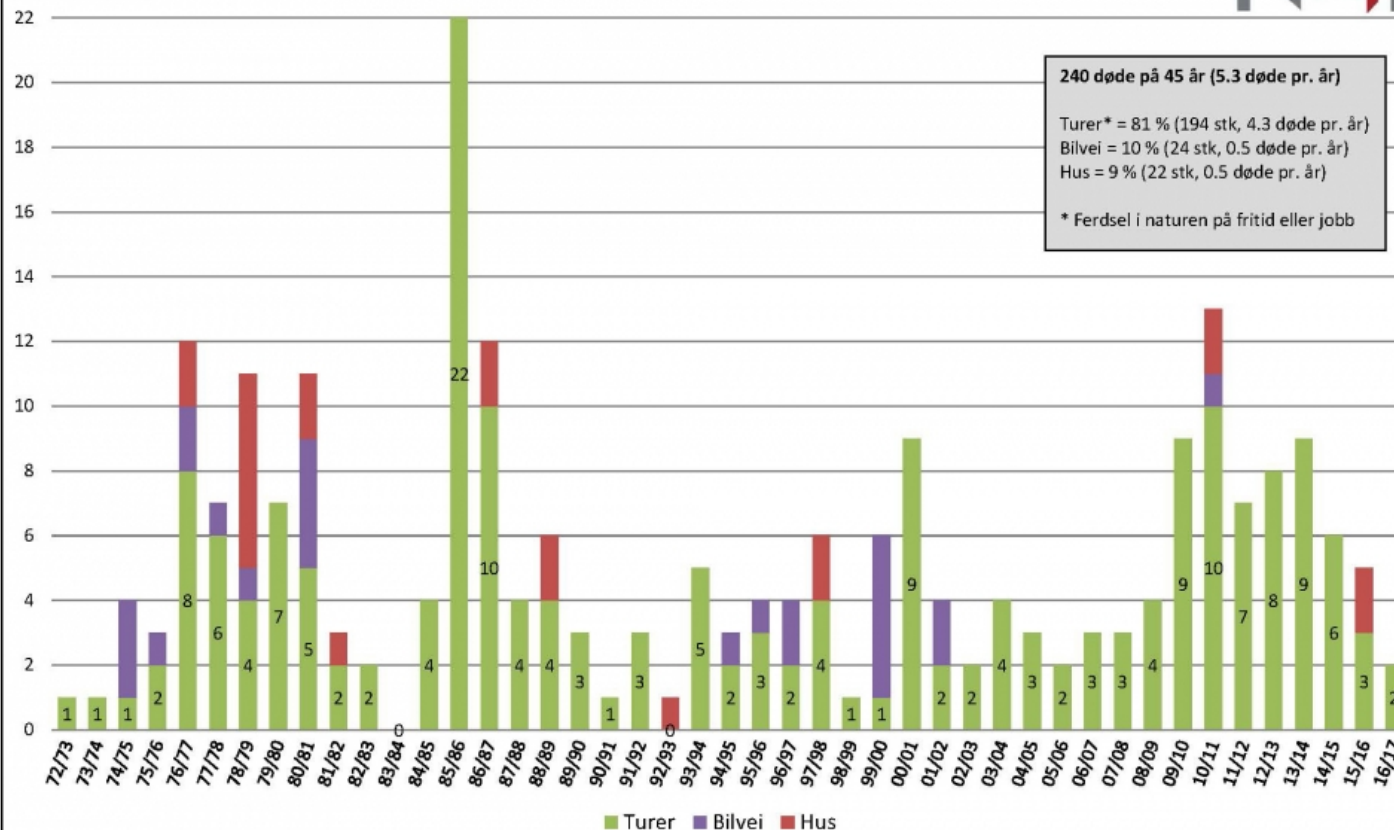


Blæbærfjellet January 2019





Døde i snøskred i Norge 1972-2017

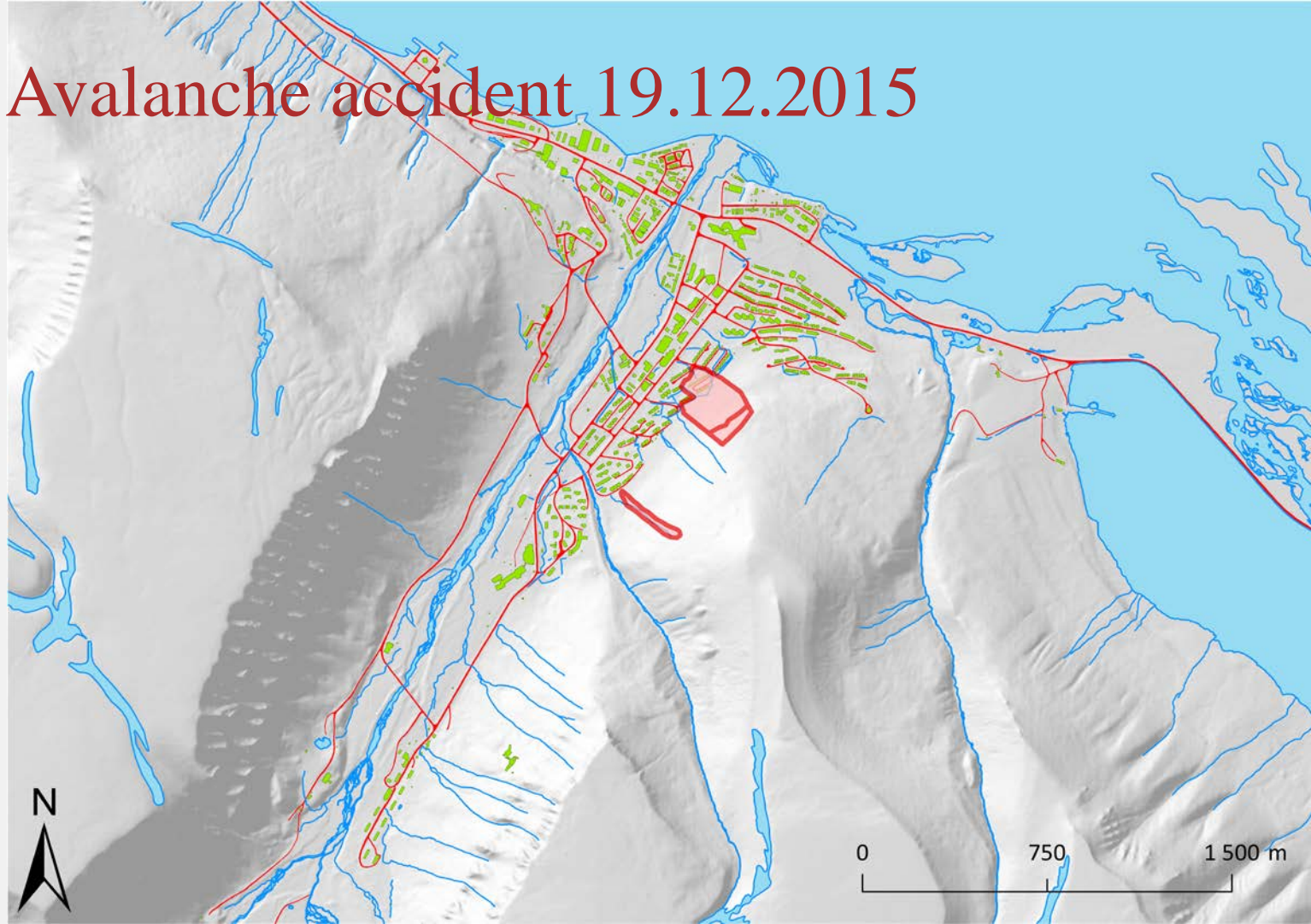


Avalanche accident 19.12.2015

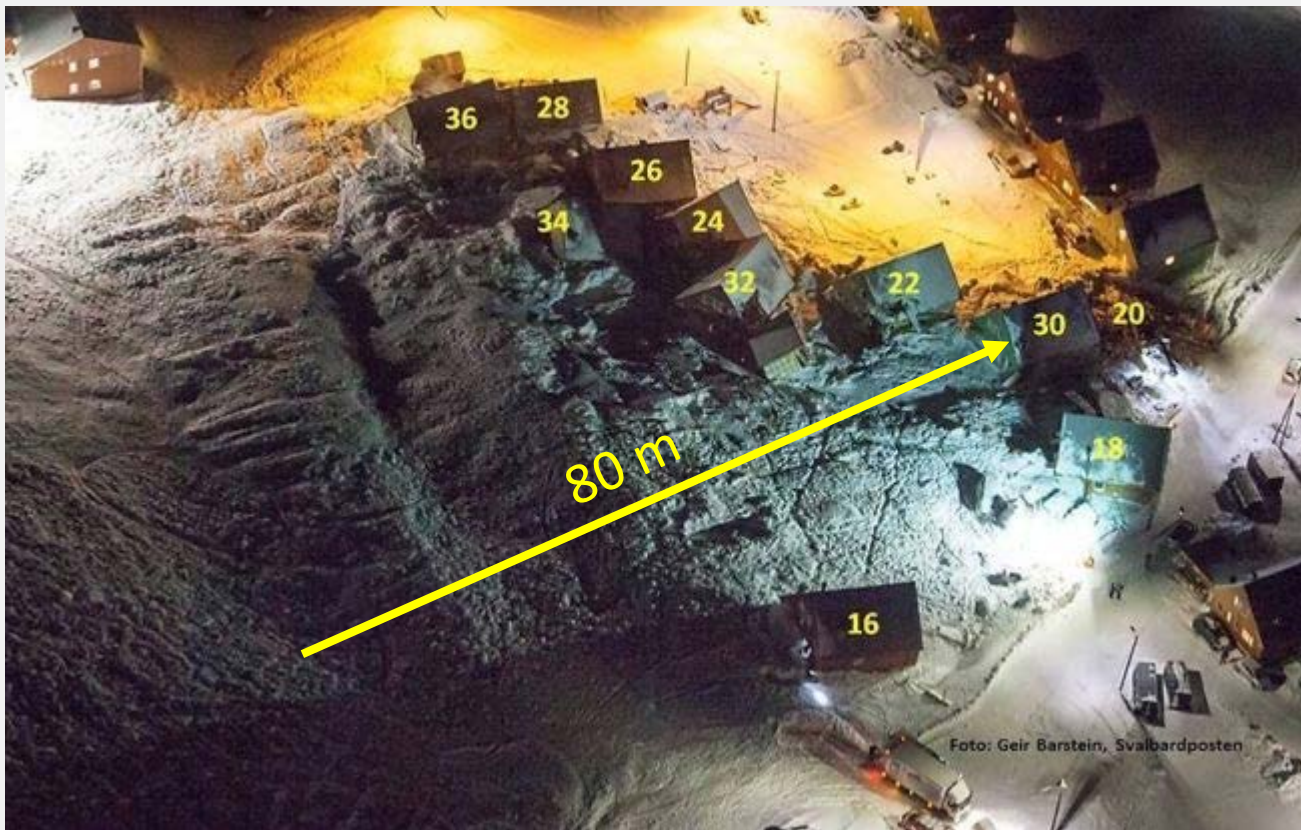


0 750 1 500 m

A scale bar is located in the bottom right corner, showing distances of 0, 750, and 1 500 meters.



Avalanche accident 19.12.2015



Avalanche accident 19.12.2015



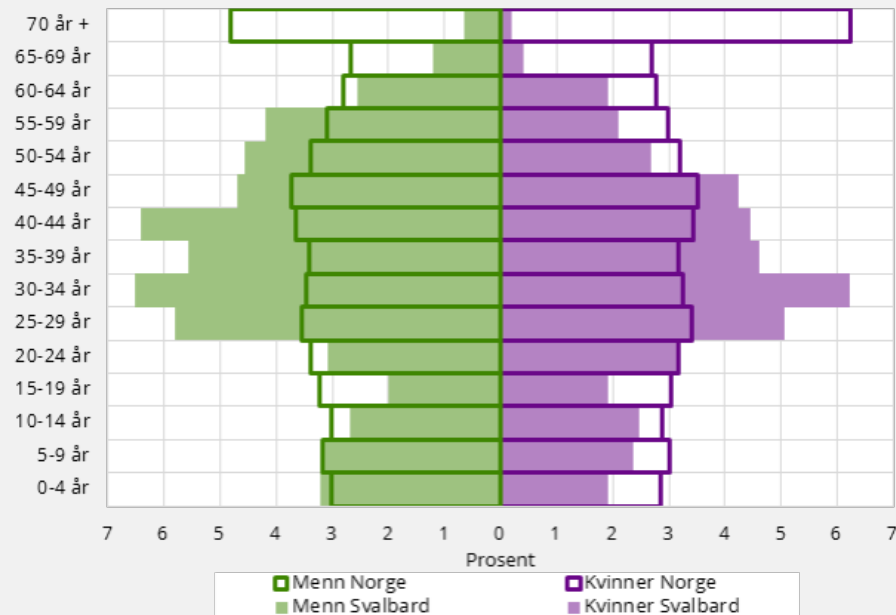
Effects of the Longyearbyen population

Pros

- Young
- Fit
- Everyone has a shovel
- Everyone has a headlamp

Cons

- No memory
- Little experience



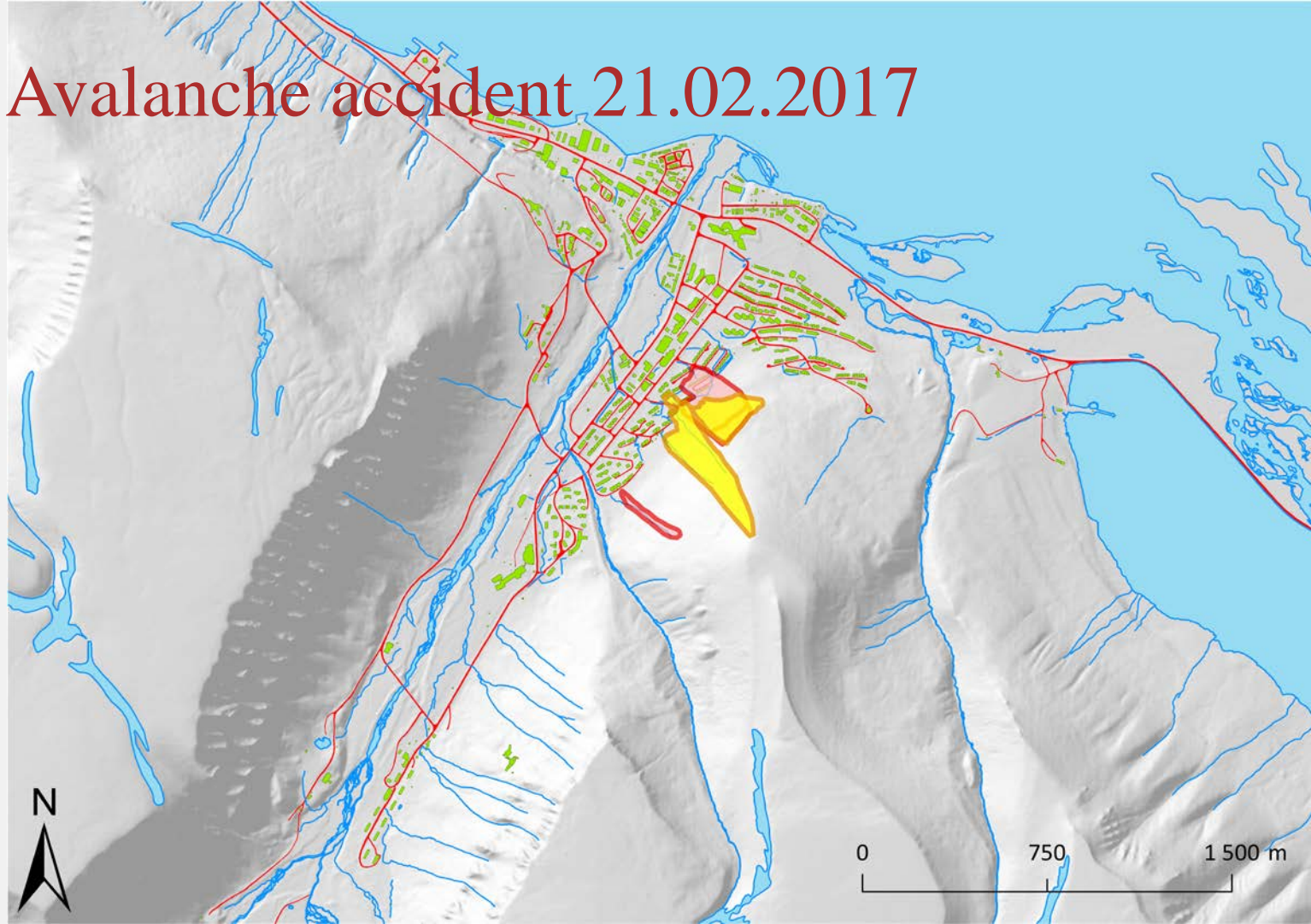
Kilde: Statistisk sentralbyrå.

Avalanche accident 21.02.2017



0 750 1 500 m

A scale bar is located in the bottom right corner, showing distances of 0, 750, and 1 500 meters.



Avalanche accident 21.02.2017



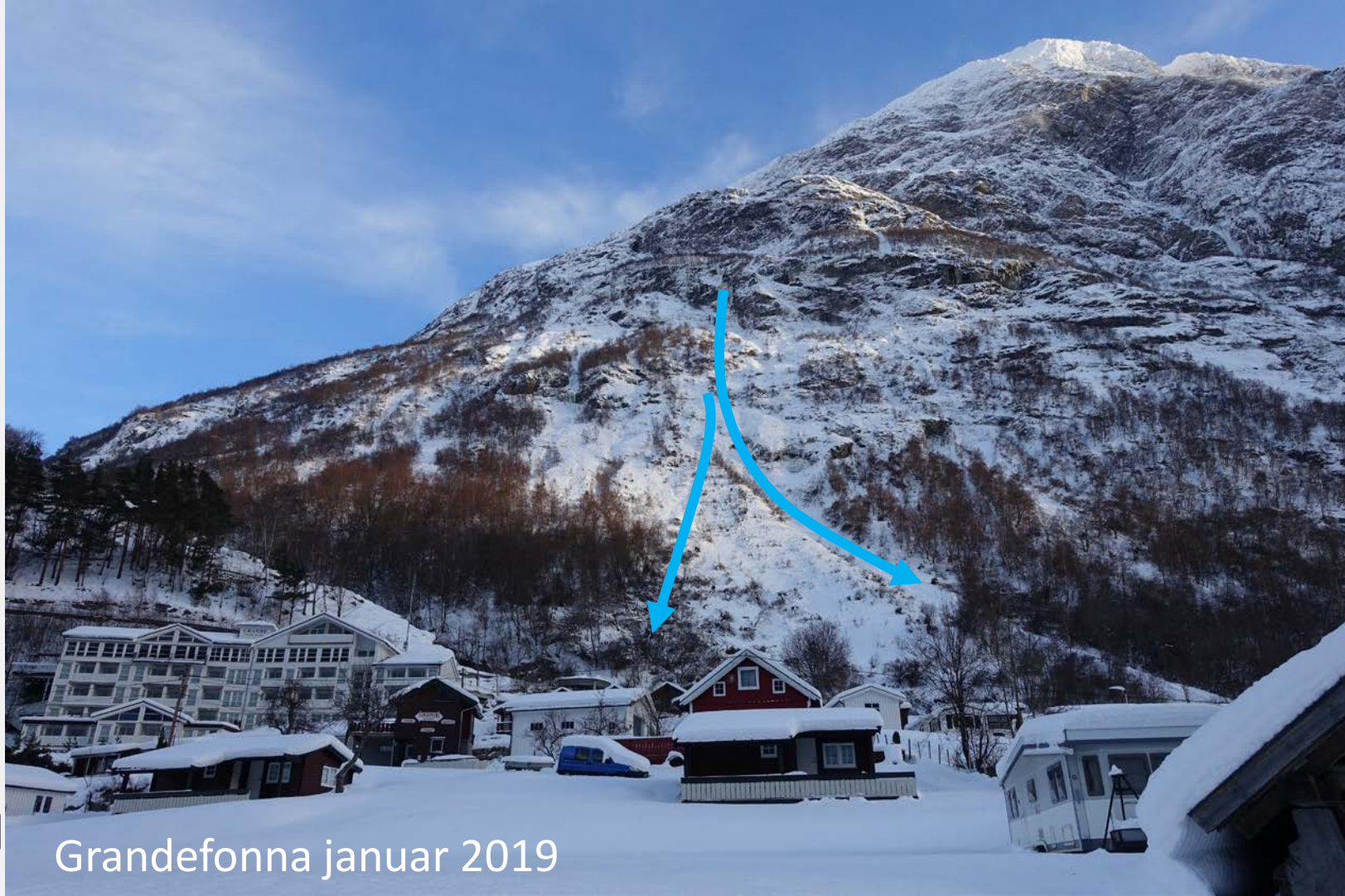
Avalanche accident 21.02.2017



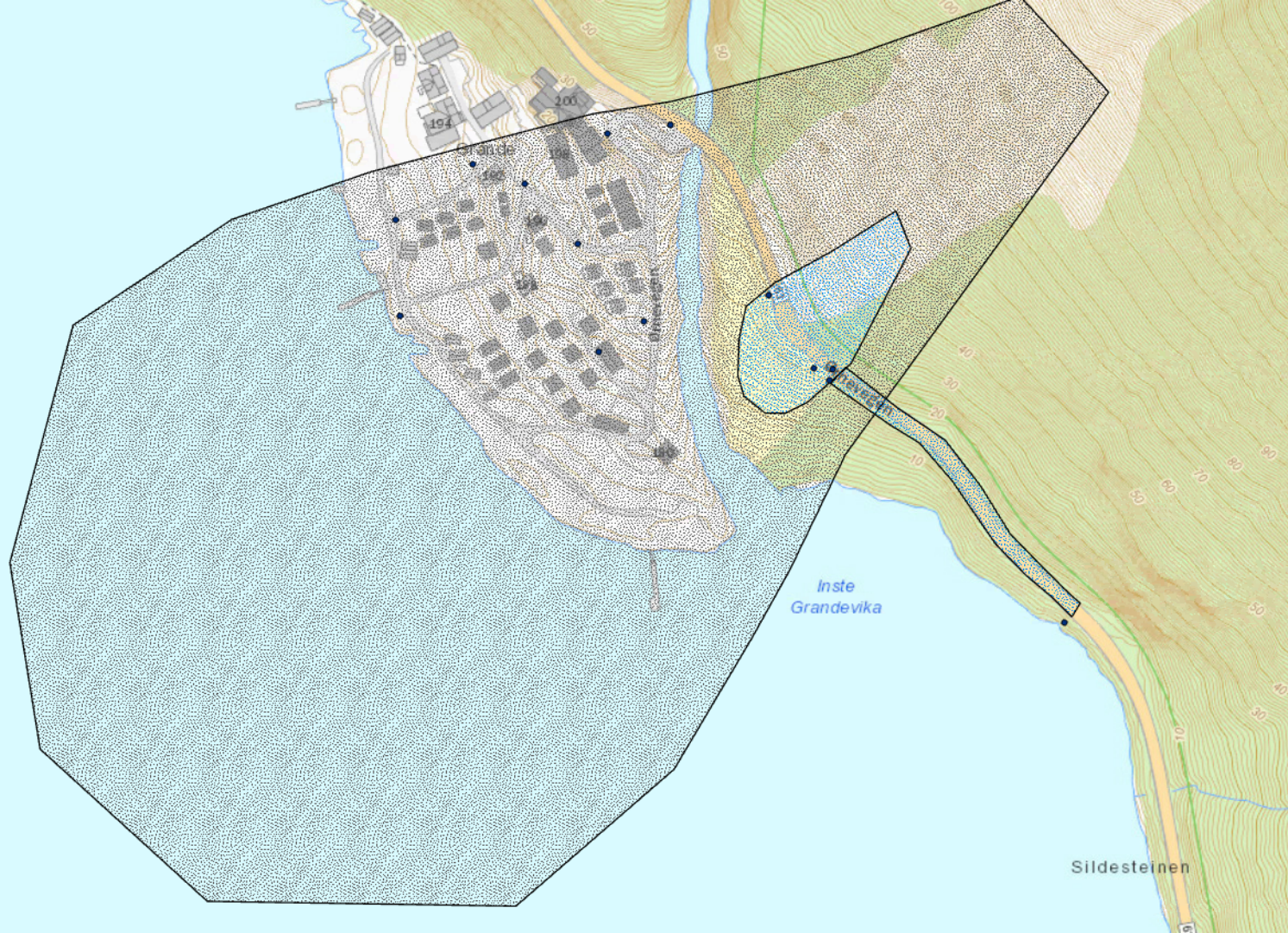


Grandefonna januar 2019

Grandefonna januar 2019



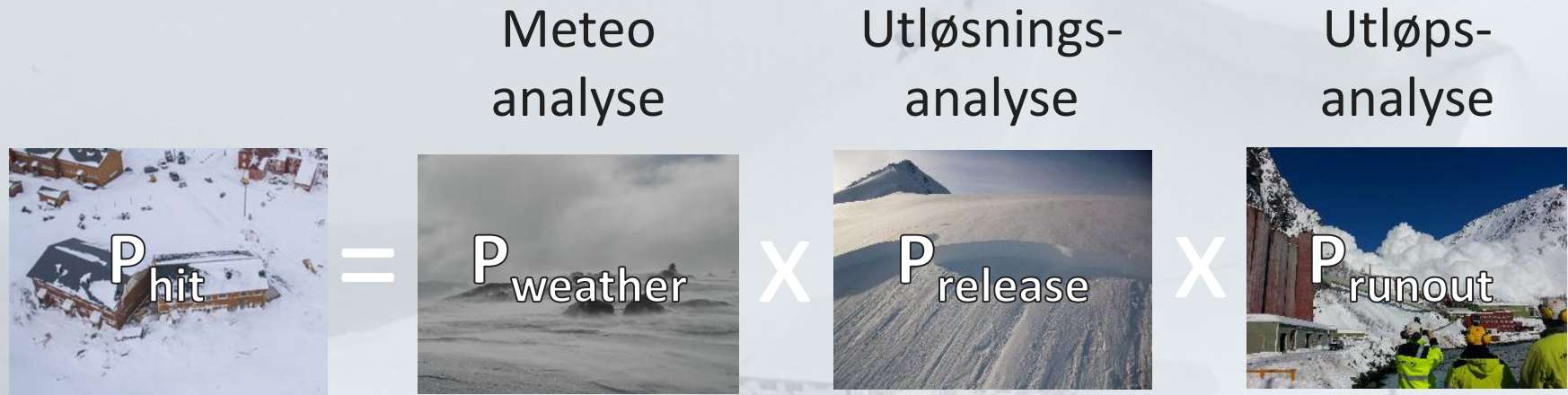


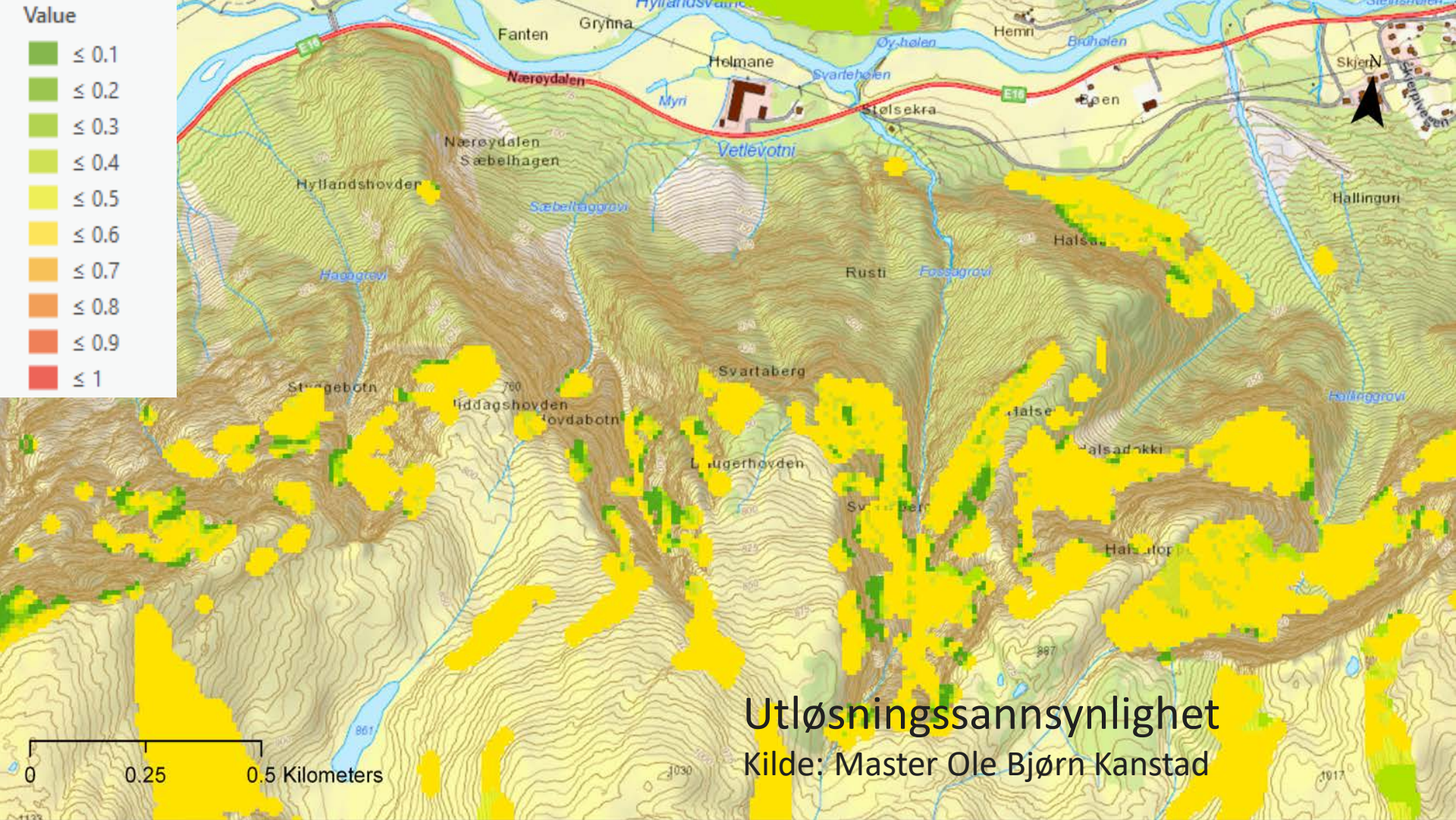


What is the probability that this house is hit within the next 24h?



Probabilistic estimate for avalanche runout





Avalanches in Scandinavia

Mitigation

Forecasting
Physical mitigation
Land use planning

Forecasting
Physical mitigation
Land use planning

Forecasting
Physical mitigation
Land use planning

Forecasting

Forecasting

Roundup

Avalanches

- cause most fatalities
- are frequent and repetitive
- effect mostly infrastructure
- can effect settlements in extreme situations
- decisive for land use planning
- Mitigation possible but costly
- mainly recreational accidents in normal years





#onsafeground

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