Avalanche protection dam of Cialancier in Saint Etienne de Tinée : From 2D digital modeling to the start of the onsite work

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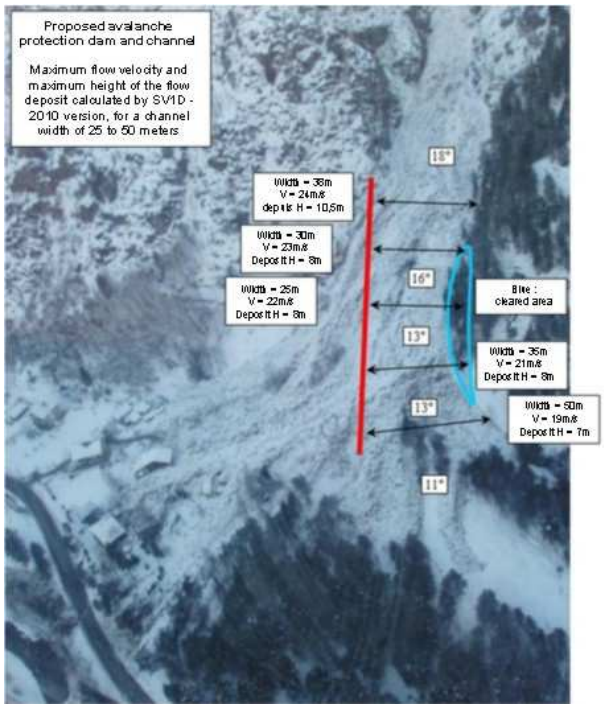
ABSTRACT : On 16 December 2008 at 11.15 am, a large scale avalanche started in the upper watershed of the Fougeret couloir and ended its course in the hamlet of Cialancier, in the municipality of Saint Etienne de Tinée. A house was destroyed and two others were damaged. Luckily, there were no casualties. This article describes how to design and build an avalanche protection dam.

KEYWORDS Avalanche protection – Modeling – Work



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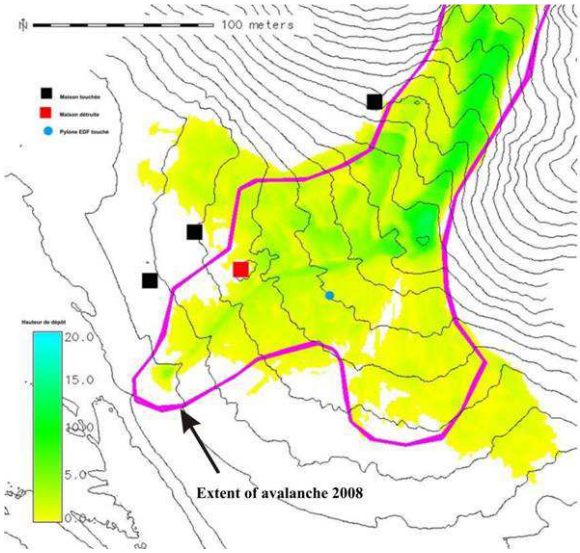


Preliminary design of an avalanche protection dam using Saint Venant 1D software and basic calculations

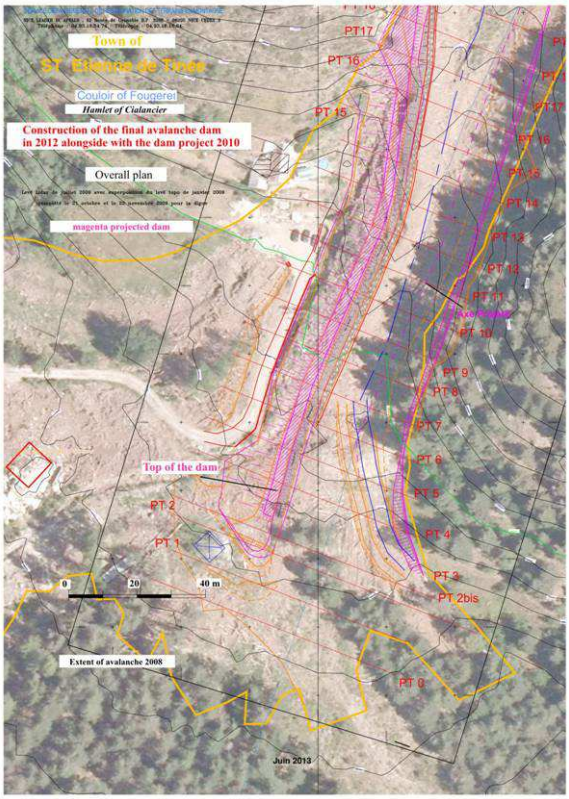
Result of *Saint Venant 2D* modeling, similar to the avalanche of December 2008 on Digital Terrain Model (DTM, 1 meter pixel size), alongside with the proposed work, Hmax =
12 m. In pink is highlighted the real extent of the avalanche of December 2008

Result of *Saint Venant 2D* modeling, similar to the avalanche of December 2008 on Digital Terrain Model (DTM, 1 meter pixel size), alongside with the proposed work, Hmax =
14 m. In pink is highlighted the real extent of the avalanche of December 2008.

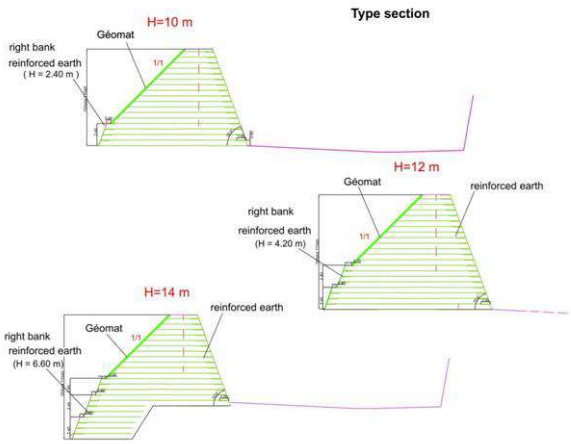
This result shows that:

- The flow of the reference event is diverted mainly to the left side
- Less than 1 m thick overflow occurs at the upstream part of the dam

Accordingly, it is proposed to increase the height of the dam by 14m

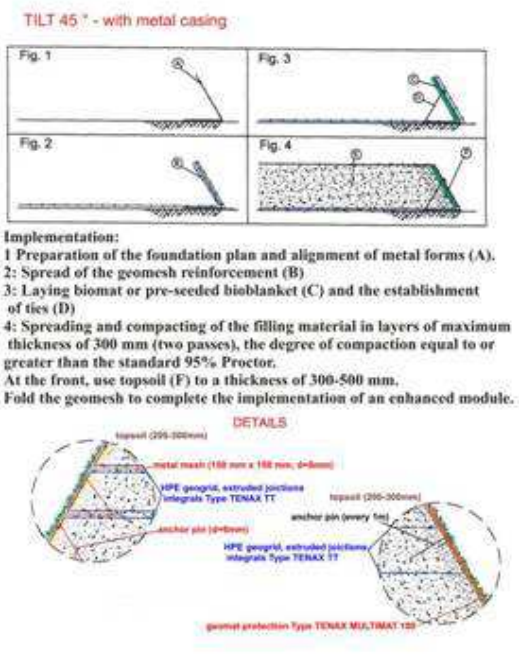


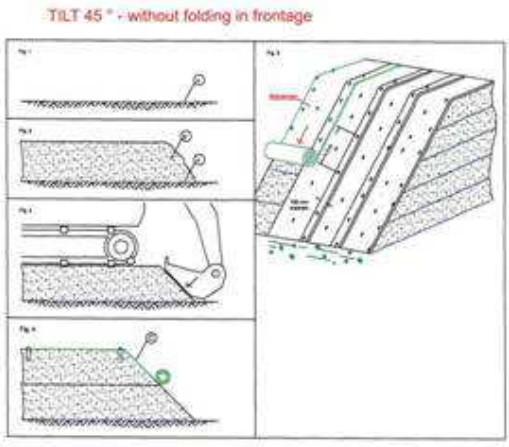
After the creation of a Digital Terrain Model (DTM) based on a Lidar survey done by helicopter, iterative simulations of the avalanche of reference have been done using the *Saint Venant 2D* software *Irstea*, based on volumes mobilized and the coefficients of friction, matching a flow velocity, extension and thickness of deposits consistent with those observed or measured in December 2008



Overview of the dam after revegetation by hydroseeding – June 2013

Building scheme





Implementation:
1 Preparation of mounting and spreading of the geomesh (A)
2-3: Spreading and compacting of the filling material in layers of maximum thickness of 300 mm (two passes), the degree of compaction equal to or greater than the standard 95% Proctor.
At the front, well compacted topsoil must be used about 300 mm thick
4: Anchoring geomat (C) at the edge using U-shaped pins. Unwinding of geomat
5: To ensure uniform protection of the facade against any erosion, provide an overlap between the strips of geomat least 10 cm. Webs will be fixed by U-shaped pins. Add pins at mid-width of the strips to ensure good contact between bank and geomat.