Gardenstown Landslide
Newsletter – March 2018

Landslide Development

A landslide occurred overnight on 28 November 2017 in Gardenstown, which resulted in soil and rock debris being deposited on the B9123 Harbour Road. Since December 2017 the landslide has deepened into the slope, with material from the centre of the slope continually making its way to the toe. Following extensive wet weather, the landslide developed significantly on 6 March 2018, this resulted in the loose soil and rock debris mobilising, building up behind the temporary concrete blockwork wall at the toe and eventually causing the wall to topple.

Safety

Throughout the landslide event, the health and safety of the public,personnel on site and the surrounding infrastructure has remained the main pritority. Overhanging rocks and loose soil exposed by the landslide has the potential to mobilise, representing a signifcant risk to human life and damage of properties. Consequently, taking cognsiance of the surrounding environment restrictions, monitoring and controlled openings were implemented to limit exposure to the risks.

Water

Water entering the slope is considered to be a major contributing factor to the landslide. Several sources were observed across the back scar during the initial site inspections in early December. The water produced mud flows which extended several metres down the slope. As the landslide developed, water was seen to be seeping from within the central part of the landslide, leading to the formation of the V-shaped channel that can now been seen in this area. In the recent landslide, water was noted from several sources including an old pipe protruding from the back scar.

If you know of any old wells, drainage, springs or sources of groundwater near the area of landslide please inform a representative from Aberdeenshire Council, Atkins or BAM Ritchies.

Landslide Causes

The cause of the landslide at Gardenstown is suspected to comprise a number of factors, including:

- **Topography:** Steep slope conditions allow the soil to easily move downslope.
- **Geology:** Ground conditions comprising a combination of weak soil material (colluvium) and loose rock debris.
- **Groundwater**: The distribution and effects of natural groundwater on the slope.
- **Drainage:** Poor or damaged drainage network allowing water to collect/discharge into the slope.
- **Weather:** Intense rainfall and snow melt causing saturation of the soil on the slope.
- **Infrastructure:** Surrounding buildings and structures providing additional loading onto steep slope.

Ground Investigation

BAM Ritchies commenced a ground investigation on 14 February 2018 to better understand the complex ground conditions surrounding the landslide. This information is vital to develop a safe, permanent stabilisation design.

Temporary Works

BAM Ritchies will be undertaking temporary measures to clear the road and reinstate the temporary wall. The following activities will commence W/C 19 March 2018:

- Establish early warning system to protect workers at toe of slope.
- Protection of houses by placement of concrete lane dividers.
- Removal of debris from the road.
- Reinstate concrete wall at toe of landslide.
- Continue monitoring landslide through inspections and remote survey.

Permanent Works

Completion of the temporary works will allow the ground investigation to be completed. Once all investigation has been reviewed, a stabilisation design, currently considered to comprise soil nailing and meshing will be designed and installed. The stabilisation will be undertaken from the top of the slope, down to road level.

These measures will be implemented in conjunction with a scheme to manage the flow of groundwater and surface water away from the landslide area.


Geobrugg TECCO mesh, soil nails & erosion protection

Find out more at
http://www.aberdeenshire.gov.uk/gardenstownlandslip