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# A Walkover Survey of a Landslide on the A6024 at Little Hey, West Yorkshire

Urban Geoscience & Geological Hazards Programme

Internal Report IR/04/181





BRITISH GEOLOGICAL SURVEY

URBAN GEOSCIENCE & GEOLOGICAL HAZARDS PROGRAMME

INTERNAL REPORT IR/04/181

# A Walkover Survey of a Landslide on the A6024 at Little Hey, West Yorkshire

G O Jenkins & H J Reeves

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# Foreword

This report describes a walkover survey by the British Geological Survey to assess the extent of a landslide (Little Hey), which caused the closure of the A6024 between Holmfirth and Woodhead Reservoir over the weekend of the 27<sup>th</sup> November 2004.

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# Summary

A walk over field visit was carried out on the 30<sup>th</sup> November 2004 on a landslide (Little Hey landslide), which closed the A6024 between Holmfirth and Woodhead Reservoir, West Yorkshire.

The landslide was classified as a shallow translational earth flow, 35 metres in length and 7 metres in width. The slide material consisted mainly of weathered mudstone from the Millstone Grit Group.

The cause of the slope failure was probably the failure of a drainage culvert immediately behind the location of the landslide, introducing water into already saturated sediments following a wet summer.



# 1 Introduction

## 1.1 BACKGROUND

On 30<sup>th</sup> November 2004, Katy Freeborough and Gareth Jenkins (BGS) heard reports of a landslide closing the A6024 road between Holmfirth and Woodhead Reservoir on BBC Radio 2's traffic report. Gareth Jenkins phoned Mr Doug Potter at Kirklees Council to ascertain the extent of the landslide. The landslide was described as being small, of the order of 10 metres, or so, in width and had occurred below the road (Potter, 2004). Mr Potter also stated that the landslide might form part of a larger landslide complex. Following the phone call, Gareth Jenkins and Helen Reeves visited the site of the landslide on the afternoon of the 30<sup>th</sup> November 2004 to collect photographic evidence as well as all the required information for entry into the BGS National Landslide Database. The landslide has subsequently been named the 'Little Hey' landslide.

## 1.2 LOCATION

The Little Hey landslide is located on the north-eastern flank of Holme Moss, on the A6024 (BNG<sup>4</sup>09898 404406) (Figure 1.1) 6km to the southwest of Holmfirth. The site lies within the remit of Kirklees Metropolitan Council, West Yorkshire.

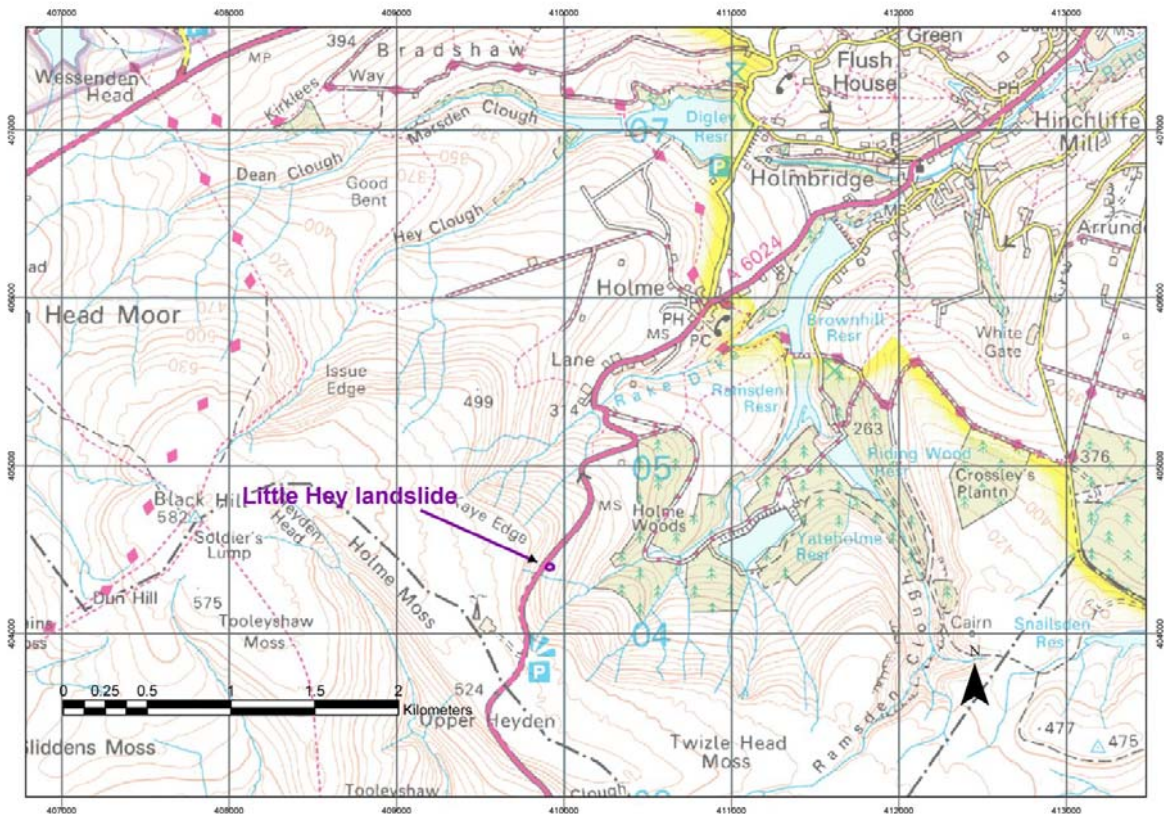


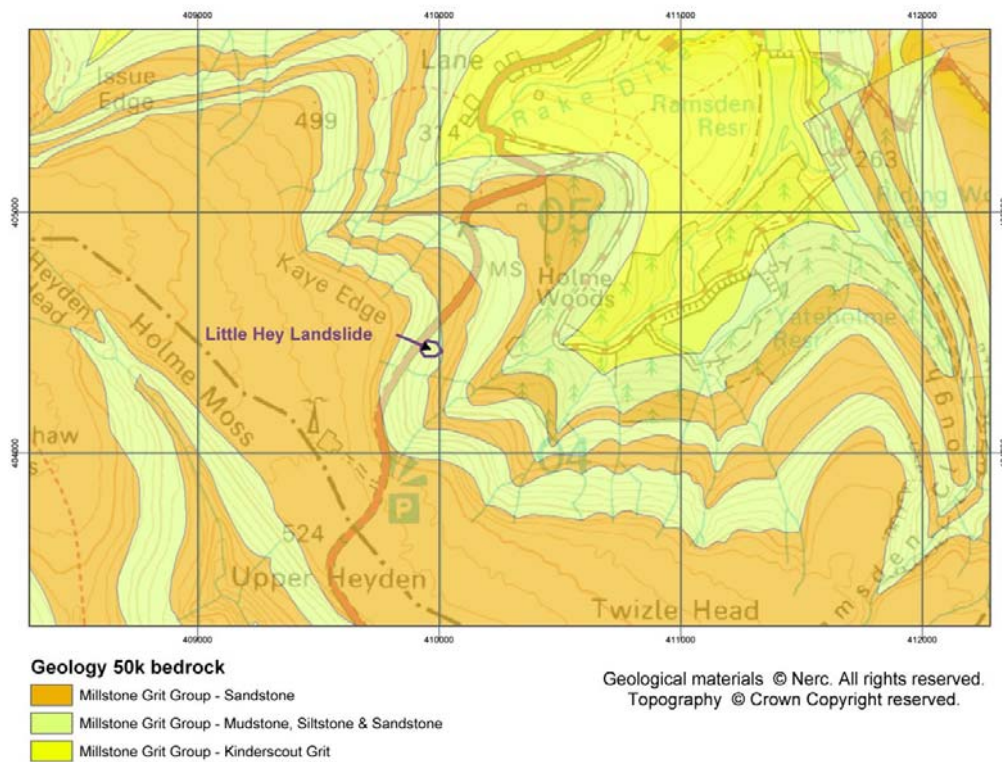
Figure 1-1. Location map of Little Hey landslide, A6024, West Yorkshire (landslide not drawn to scale)

### **1.3 GROUND SURVEY & DATA COLLECTION**

The fieldwork involved a rapid walk over survey of the landslide to acquire data for entry into the BGS National Landslide Database, along with the collection of a photographic record of the slide. The survey's duration was limited by fading light. All fieldwork was carried out in accordance with the British Geological Survey's Health and Safety Guidelines.

## 2 Geological Background

The Little Hey landslide lies within the 1:50,000 scale geological map sheet 86 (Glossop). The area is underlain by the Millstone Grit Group (Fig. 2.1), which forms the characteristic landscape of the Dark Peak. The Millstone Grit Group is primarily composed of strong coarse-grained fluvial sandstones, alternating with weak to moderately weak siltstones and mudstone horizons (Aitkenhead *et al.* 2002). The area lies outside the limit of the last (Devensian) glaciation, therefore there is no till cover. The valleys and cloughs (local name for a narrow mountain valley) of the area have been formed by fluvial incision of the antecedent topography.



**Figure 2-1. Map of the bedrock geology of Little Hey landslide, West Yorkshire.**

### 3 Nature of Landslide

Observation of the Little Hey Landslide during the walk over survey (Figure 3.1) showed it to be approximately 35 metres in length (downslope) with a maximum width of 7 metres (across slope). The average slope gradient in the vicinity of the landslide was approximately 25°, with the surrounding natural slope closer to 15° (Figure 3.2). The Little Hey landslide was classified as a shallow non-circular rotational failure (slump) degrading into an earth debris flow (Figure 3.3), which moved in a south-easterly direction (135°) and undercut the foundations of the A6024 road to Holmfirth (Figure 3.4). Fig. 3.3 shows evidence that the Little Hey Landslide is part of a much larger-scale landslide, that exists above and below the A6024.

The material in the slide consisted of weathered, very soft, light grey mottled rusty orange, fine to coarse sandy CLAY. This material was saturated, due to the large amounts of rainfall that had occurred in the area both during the weekend of the 27<sup>th</sup> November 2004 (information obtained whilst talking to Peak District Ranger) and during the summer of 2004 (Anon, 2004).

A drainage culvert was observed immediately behind the backscarp of the landslide on the northbound side of the A6024 (Figure 3.5). This was constructed from paving slabs and was presumably designed to intercept drainage of water above the road. Water was present in much of the culvert at the time of the field visit, although it was absent where the landslide undercut the road and reappeared again further down the road past the landslide (Fig. 4.4). It is thought that leakage from this culvert could have introduced additional water into the already saturated ground under the road, causing an increase in the pore water pressure leading to the failure of the slope below the road. It could also be possible that the landslide above the road had affected the foundations of the culvert, causing the culvert to be uplifted and leak.



**Figure 3-1. View close-up of Little Hey landslide taken from [BNG 409821 403950], facing 002° (N) (H.J. Reeves, BGS © NERC 2004)**



**Figure 3-2. Close-up view of Little Hey landslide detail. Photograph taken from [BNG <sup>4</sup>09851 <sup>4</sup>04402], facing 260° (SW) (H.J. Reeves, BGS © NERC 2004).**



**Figure 3-3. Evidence for large-scale landsliding on the slopes around the Little Hey landslide. Photograph taken from [BNG <sup>4</sup>09821 <sup>4</sup>03950], facing 002° (N) (H.J. Reeves, BGS © NERC 2004).**



**Figure 3-4. Undercutting of the A6024 due to the slope failure at Little Hey landslide. Photograph taken from [BNG 409861 404401], facing 030° (NE) (H.J. Reeves, BGS © NERC 2004).**



**Figure 3-5. View of the drainage culvert immediately behind the Little Hey landslide. Photograph taken from [BNG 409865 404414], facing 240° (SW) (H.J. Reeves, BGS © NERC 2004).**

## 4 Conclusions

The landslide at Little Hey is a shallow non-circular rotational failure that degrades downslope to an earth/debris flow in weathered mudstones of the Millstone Grit Group. The landslide material is a very soft, light grey mottled rusty orange, fine to coarse sandy CLAY, that was in a saturated condition at the time of the survey.

The cause of the failure is likely to have been due to the leakage of water from the culvert on the north-western side of the A6024 between the Woodhead Reservoir and Holmfirth. The introduction of water under the road increased the pore water pressure of already saturated sediments on the slope below it (following a wet summer and period of heavy rainfall), and resulted in the failure of the slope.

Inspection of the wider area around the landslide indicates that the Little Hey landslide is located in an area of more extensive, large-scale landsliding. The Little Hey event may represent partial re-activation of these larger failures. However, a more detailed site and geomorphological investigation would be needed in order to identify the nature of slope movements on this hillside.

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