MEMO

TO: Simon Arscott – Dorset County Council

FROM: Alexis Rose – WSP | Parsons Brinckerhoff

SUBJECT: Dinah's Hollow update March 2016

DATE: 17 March 2016

Scope

A landslip occurred at Dinah's Hollow on 9th March 2016. The site was consequently inspected on Friday 11th March by Ian King and Alexis Rose of WSP | Parsons Brinckerhoff to assess the landslip and surrounding ground conditions. This report summarises the background and the site visit.

Background

In May 2014 WSP | Parsons Brinckerhoff were commissioned by Dorset County Council (DCC) to undertake an assessment and investigation of Dinah's Hollow and design the stabilisation measures that were deemed necessary. WSP | Parsons Brinckerhoff designed a soil nail solution, complete with mesh facing and a toe wall, in combination with appropriate drainage at the top and toe of the banks.

Final design drawings were submitted to DCC in October 2015. In December 2015, WSP | Parsons Brinckerhoff were informed by DCC that the project was on hold as a consequence of funding limitations and objections from land owners.

The road had been closed for approximately 18 months before it reopened to traffic in July 2015. The road was reopened with a single lane section under traffic light control and temporary barriers along the edges of the carriageway.

Landslip event

It is understood that local police were called in the early hours of Wednesday 9th March to inform them that a tree or branch had fallen blocking the road. On arrival they realised a landslip had occurred on the Eastern bank and that the landslip debris had flowed out into the road locally displacing the concrete barrier. DCC were informed and WSP | Parsons Brinckerhoff were notified by lunchtime on the same day.

It is understood that in the period leading up to the landslip there had been some spells of heavy rainfall. On the night of the landslip there was heavy rainfall accompanied by strong north-westerly winds.

Landslip description

The main area of displaced material measured approximately 9m in length, up to 2.5m width and between 1m and 2m high (Figures 1 and 2). The volume of material is predicted to be about 20m^3 and therefore approximately 350kN, or 35 tonnes. The landslip is on the Eastern bank and is estimated to extend between 'local chainage' 130 and 140m. The detailed survey undertaken in February 2015 (Figure 3), shows the location of this recent landslip is coincident with the location of a historic slip.

There are areas of structured material in the current back scar, indicating a relatively more competent material (rock or weathered rock, see Figure 4). This supports the idea that superficial deposits have become saturated and flowed down the face of the slope on the surface of this better quality material. The majority of the landslip material appeared to be heavily saturated silty clayey sand, with occasional gravels and cobbles of sandstone. The material generally has a high silt content, which liquefies when disturbed. The landslip can be classified as a flow landslide.

The backslope has an approximate angle of between 60^o (lower slope with higher clay content) and 80^o (upper slope with lower clay content).

Seepage and saturated ground

There was no sign of seepage during the site visit. However, a video made available by DCC, which was filmed on the morning of 9th March, shows seepage at the top of the back slope as well as the steady continuous movement of material down the slope. The most noticeable seepage observed in the video is a very heavy seepage flowing from what appears to be an animal burrow within the backscarp (see Figure 5). Seepage was also observed by DCC as a 'steady stream' of water flowing over the top of the bank.

On inspection of the ground above the landslip (Figures 6 and 7), wet and spongey ground was discovered immediately above the backscarp along with a network of animal burrows. This observation ties in with the video evidence that water was flowing through the network of animal burrows. It has been noted on numerous previous site visits that silt and ponding occurs in the corner of the field close to the top of the landslip area (see Figure 8). Flattened grass was also observed, which may have been caused by flowing water (see Figure 9).

Other observations

With the presence of the concrete barriers, very little removal of material at the toe of the banks has occurred (either naturally or otherwise). Figure 10 shows how material has built up, which is a combination of leaves and topsoil as well as superficial deposits and indicates that the slopes are likely to be undergoing gradual steady movements.

Fresh vehicle tyre marks were observed on both banks (Figures 11 and 12), which emphasise the presence of heavily saturated sand and soft material at the toe. Some vegetation trimming had taken place relatively recently, by Mr Phillips on the West bank, and by DCC on the East bank.

It has been noted that the photos taken by DCC on 9th March appear to be very similar to the photos taken by WSP | Parsons Brinckerhoff on 11th March. The shape of the landslip and arrangement of the landslip debris appear to be unchanged and the only notable difference is the water present on the 9th March (see Figure 13), which has clearly dried out by 11th March.

The concrete barriers mostly contained the slipped material, but they are not designed as a stabilisation measure and moved laterally a distance of up to about 2.5m. The evidence seems to point to the cause of the slip being saturation of the outer slope in the more weathered material, due to the concentration of surface water on this outer edge from the overland flow and possible flow into animal burrows.

Concluding comments

WSP | Parsons Brinckerhoff recommended that the road should not be reopened until stabilisation measures are in place and that any removal of slipped material would need to be undertaken in a controlled manner, observing for any further signs of on-going movement.

Whilst the mechanism of failure may be as previously envisaged, there is more evidence of the contribution to the failure mechanism from surface water flows. It is likely that the primary cause of the landslip was the excess of water and therefore it is recommended that measures are undertaken to better control and mitigate against this landslip trigger.

Figure 1: Landslip – viewing South

Figure 2: Landslip – viewing North

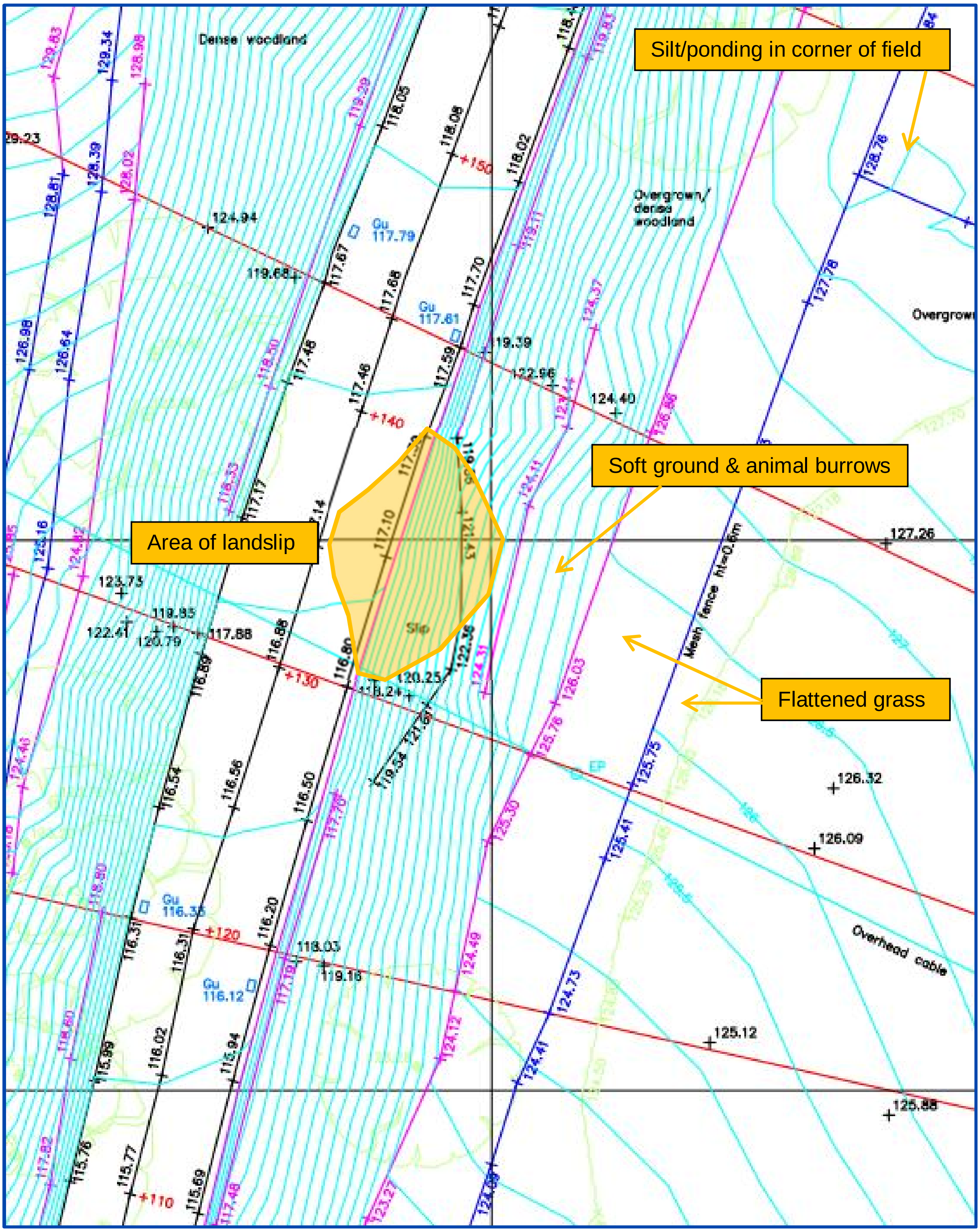

Figure 3: Survey plan with features highlighted

Figure 4: Backslope of landslip with features highlighted

Figure 5: Extract from video with features highlighted

Figure 6: Ground above landslip

Figure 7: View from top of landslip

Figure 8: Fields above landslip – viewing West

Figure 9: Viewing South from field above landslip

Figure 10: Material collecting at toe of slope (approx. chainage 180, East)

Figure 11: Wheel marks exposing fresh saturated sand (approx. chainage 250, East)

Figure 12: Tyre marks exposing soft material (approx. chainage 250, West)

Figure 13: Photo taken by DCC on morning of 9th March