Memo

To:	Gloucestershire County Council	From:	Alex Macdonald
Subject:	**Northleach – Prison Copse Wall**	Checked:	Steve Carter
Your ref:		Our ref:	
Date:	30.11.2015		

Following a request from GCC members of the Amey Geotechnical Team undertook a site visit to determine the current condition of the Northleach – Prison Copse Wall site on 25/11/2015. Previously the site has been inspected by the Amey Structures Team.

The site is located at National Grid Reference 410635,214925 (see Site Location Plan, Figure 1 and Aerial Photograph, Figure 2).adjacent to an unnamed road approximately 200m to the west of its junction with the A429 in the village of Northleach. The unnamed carriageway gradually ascends westwards along the southern side of the River Leach valley, which flows towards the east in the valley bottom.

An area of woodland is located immediately to the south of the site which slopes away from the valley bottom at an approximate angle of 10 degrees.

A field is located immediately to the north of the site which falls towards the bottom of the valley with an approximate slope angle of 10 degrees. This field is owned by the Northleach Town Trusties who have given Amey access permission to undertake the inspections. Observations on site and aerial photography indicate that the site is in an area of historical land movement, i.e. landslips.

The carriageway lies at an approximate elevation of 180m AOD and the road is built on sidelong ground, it is likely therefore to be constructed on a wedge shaped section of fill. The carriageway is supported by a retaining wall which appears to be constructed from concrete, faced with Cotswold stone. The retaining wall is approximately 150m in length, the height of the wall increases from 1m at either end to approximately 3m at its centre.

The retaining wall has become visibly distressed with 6 No. diagonal tension cracks located along the central third of the retaining wall (Photographs 1 and 2). The most severe section of defective retaining wall comprises an 8m section that has become detached from the rest of the wall and is leaning out towards the field (Photograph 3 to 5). The retaining wall exposed by the cracking indicates that the concrete behind the brick facing is at least 800mm thick.

A 6” drainage outfall is located 1.5m above ground level approximately 10m to the east of the detached section of retaining wall (Photograph 6). The site walkover indicated that this drainage pipe forms the outfall for a drainage gully located in the carriageway above. The pipe is cracked and deformed, potentially leaking water within the retaining wall (Photograph 7). The stone work around the outfall was damp and the ground below showed signs of scour indicating a significant flow of water through the outfall.

The defective section of carriageway can be divided into 3 areas:

Area 1

An approximately 50mm deep depression has formed in the carriageway above the detached section of retaining wall (Photograph 8). A 2m long, 30mm wide crack is located in the west bound carriageway (Photograph 9). Approximately 4m of cracking, up to 20mm wide has developed diagonally across the eastbound carriageway, it appears that this has occurred relatively recently (Photograph 10). A void has formed in the grass verge in between the cracked carriageway and the defective section of retaining wall.

Area 2

This area is located immediately to the west of Area 1 and is defined by an approximately 10m long, 50mm deep depression (Photograph 11) within the pedestrian footpath which extends along the top of the defective section of retaining wall retaining wall shown in Photograph 2.

Area 3

This area is located immediately to the east of Area 2 and is defined by an approximately 60m long, 20mm wide crack running along the centre of the carriageway. It is probable that this cracking has formed along the carriageway construction joint (Photograph 12). Several cracks approximately 0.5m long and 5mm wide have formed in the east bound carriageway within this area, these appear to have occurred relatively recently (Photograph 13).

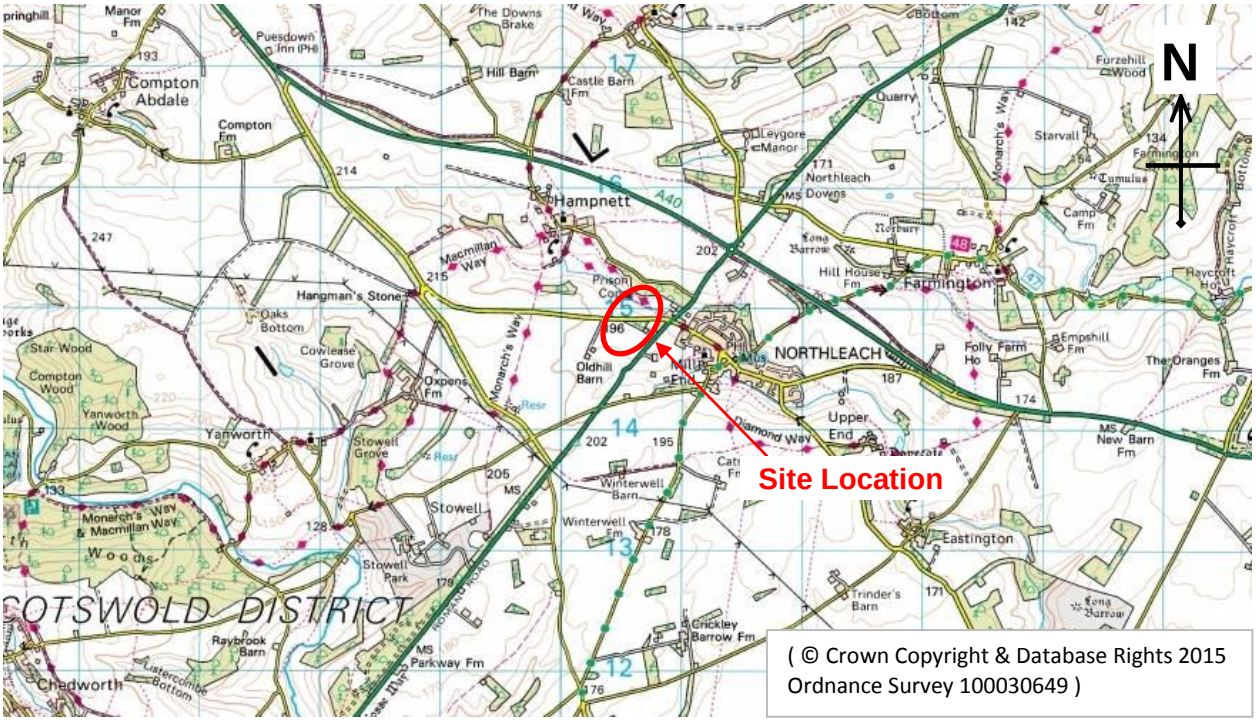

Figure 1 – Site Location Plan

Figure 2 – Aerial Photograph

Photograph 1. View to the north of the retaining wall cracking (25.11.2015)

Photograph 2. View to the north of the retaining wall cracking (25.11.2015)

Photograph 3. View to the north of the retaining wall cracking and displacement (25.11.2015)

Photograph 4. View to the east of the retaining wall cracking and displacement (25.11.2015)

Photograph 5. Detailed of the retaining wall cracking and construction (25.11.2015)

Photograph 6. Drainage outfall (25.11.2015)

Photograph 7. Cracked drainage outfall pipe (25.11.2015)

Photograph 8. Area 1 – View towards the west of the depression within carriageway (25.11.2015)

Photograph 9. Area 1 - Cracking within the westbound carriageway (25.11.2015)

Photograph 10. Area 1 - View towards the east of the cracking within the eastbound carriageway (25.11.2015)

Photograph 11. Area 2 – View towards the east of the depression within the pedestrian pavement (25.11.2015)

Photograph 12. Area 3 - View towards the west of the cracking along the centre of the carriageway (25.11.2015)

Photograph 13. Area 3 - Cracking within the eastbound carriageway (25.11.2015)

Conclusions and Recommendations:

The carriage way at the Prison Copse site has been constructed on sidelong ground, where there are indications that historic slope instability has previously occurred.

The inspections indicate that the carriageway cracking and depressions are due to the deterioration and movement of the adjacent retaining wall. It is likely that the retaining wall defects have been caused by drainage issues and possible slope movement.

The total extents of the carriageway movement are indicated by the approximately 80m of tension cracks across the site. Area 1 is the most severe area of carriageway cracking and depressions, it is located directly above the section of retaining wall which appears to have become detached and is leaning out towards the field.

It is considered possible that a catastrophic failure of the road could occur, creating a health and safety risk to the public. It is recommended that traffic management to close the road is installed as soon as possible.

Following the installation of traffic management it is recommended that the road is either permanently closed or that a remedial solution is developed to enable the reopening of the road.

To permanently close the road it is recommended that the following be undertaken:

- Investigate permanently closing the carriageway and the implications that this may have on services, land ownership and legal issues.

To develop a remedial solution it is recommended that the following be undertaken:

- Keep the road closed until the remedial solution is completed.
- Prepare a feasibility/optioneering report to outline potential remedial options and costs.
- Undertake a drainage survey of the site.
- Undertake a ground investigation in order to establish possible causes of failure, to define ground and groundwater conditions and to determine geotechnical parameters for the design of remedial options.
- Undertake remedial works to strengthen / remove defective retaining wall.

Originated:	**Alex Macdonald**	**30th November 2015**
Checked / Reviewed:	**Steve Carter**	**14th December 2015**