Emergency response to the 2013/14 earthwork failures in the South East

Eleanor Walters – Asset Engineer (South East)
Contents

• The Weather – How bad was it?

• The Failures – Where and When?

• The Response & Remediation – TTH as a Case Study

• Afterwards - Lessons learnt
Rainfall Data – Facts and Figures

**December**
- 2.25 x average rainfall fell (161.4mm)
- 6th wettest UK December, wettest since 1959

**January**
- 2.6 x normal rainfall fell (205.2mm)
- Wettest UK January (beating record of 158.2mm in 1988)

**February**
- 2.8 x normal rainfall fell (147.7mm)
- 2nd wettest UK February

**WETTEST WINTER SINCE RECORDS BEGAN IN 1910**
The Weather

Geology of South East

Geological Key:

<table>
<thead>
<tr>
<th>GROUP</th>
<th>FORMATION</th>
<th>KEY MEMBERS</th>
<th>TYPICAL LITHOLOGY</th>
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</thead>
<tbody>
<tr>
<td>Thames Group</td>
<td>London Clay Formation</td>
<td>Claygate Member*</td>
<td>Clay and silt, minor sand, sand and clay</td>
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<td></td>
<td>Harwich Formation</td>
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<td>Pebbly sand, clayey sand with volcanic silt and clay</td>
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<td>Woolwich Formation</td>
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<td>Clay, shelly clay, sand and thinly laminated sand, silt and clay</td>
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<td>Lambeth Group</td>
<td>Reading Formation</td>
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<td>Upnor Formation</td>
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<td>no group</td>
<td>Thanet Sand Formation</td>
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<td>Chalk Group</td>
<td>Grey Chalk Subgroup</td>
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<td>White Chalk Subgroup</td>
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<tr>
<td>no group</td>
<td>Upper Greensand Formation</td>
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<td>Gault Clay Formation</td>
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<td>Lower Greensand Group</td>
<td>Sandgate Formation</td>
<td>Marefield Clay</td>
<td>Variable claystone, siltstone and sandstone</td>
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<td></td>
<td>Folkestone Formation</td>
<td>Falstone Rockstone/Sandstone</td>
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<td>Hythe Formation</td>
<td>Glouceous sandstone with clay and fuller's earth</td>
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<td>Atherfield Clay</td>
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<td>Claystone and siltstone</td>
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<tr>
<td>Wealden Group</td>
<td>Hastings Beds Formation</td>
<td>Tunbridge Wells Sand</td>
<td>Variable claystone, siltstone and sandstone, ferruginous in part</td>
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<td>Grinstead Clay</td>
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<td>Wadhurst Clay</td>
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<td>Ashdown 'Beds'</td>
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The Failures

Network Rail

Asset Information - Analysis & Reporting

Network Rail

LEGEND

Kent Earthwork Failures
Kent Stations
Kent Boundary
Clay Areas
Chalk Areas
Medway
Thames Road
A Road
Rail
Rivers
Lakes
Woodland
Urban
National Park
Routes Boundaries

KENT EARTHWORK FAILURES
Client: ASSET MANAGEMENT
Job No: 5231

A better railway for a better Britain
1. Wadhurst - 17th December
2. Wadhurst 2 - 22nd December
3. High Brooms - 24th December
4. Scrag Oak – 28th January
5. Harley Shute – 30th January
6. Battle – 3rd February
7. Whatlington – 3rd February
8. Stonegate – 9th February
9. Whatlington 2 – 2nd March
17/12/2013 – 1st slip

18/12/2013 - Line reopened at 20mph

22/12/2013 – 2nd slip. Line closed to 27/12/2013

23/12/2013 - Further deterioration of 2nd slip

27/12/2013 – line reopened with ESR
Original landslip

- 03/02/2014 – 1st Slip: Line Closed between Battle and Robertsbridge
- 11/02/2014 – Emergency Design Issued
- 07/03/2014 – 2nd Slip: Failure of Sheet Piled Wall
- 10/03/2014 – Redesign
- 31/03/2014 – Line Reopened with TSR
- 15/05/2014 – Remediation Completed
Whatlington Embankment: TTH 53.1254 (Down)

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- 10/03/2014 – Redesign
- 31/03/2014 – Line Reopened with TSR
- 15/05/2014 – Remediation Completed
Stonegate Embankment: TTH 43.0880 (Down)

- 09/02/2014 – Embankment Failure - Line closed
- 18/02/2014 - Sheet piled wall instructed
- 13/03/2014 – Line reopened with TSR
- 19/03/2014 – Fresh cracks appear
- 08/05/2014 - Acceleration of anchoring
- 17/07/2014– Target for remediation to be completed.
- 17/08/2014 – Line speed reinstated
Stonegate Embankment: TTH 43.0880 (Down)

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The Response

Context

Forty landslips cause rail disruption in Kent and Sussex
The Response

Public Engagement

In order to try to mitigate the impact of the incidents on the network on passenger journeys, Southeastern implemented the following measures:

► Introduced emergency timetables to prevent delays worsening/spreading beyond immediately affected services
► Tight management of staff leave to ensure crew availability at all times
► Enabling the use of tickets on high speed services
► Employing extra staff to ensure “delay-repay” and other compensation claims are dealt with promptly

Parliamentary Briefing – 7th January 2014

• Could you have foreseen this disruption?
• How are you managing the response?
• How much will it cost?

Line fully re-opened end of March 2014
Afterwards

Arup Weather Readiness Review

Aim:
• Improve the SE Route’s response to adverse / extreme weather events

Findings:
• Strengths:
  • Variety of asset tools,
  • Relationships with Ops/Control and
  • Highly dedicated staff

• Challenges
  • Relentlessness of the rain
  • Prioritising speed over haste
  • Staff working ‘above and beyond’ to the extent they risked their personal safety

How can SE teams work together to maximise quality of output & emergency response service?
Afterwards

Lessons Learnt

Transport resilience Review (conducted by the DfT published in July 2014):

Dave Ward, Route Managing Director:

“We tell people we will not operate a service until we have proven that it is safe to do so. The challenge and onus is on us to do that in the safest and most expeditious manner.”
The End