The Drainage System

Overview of Current Status, Consequences and Interfaces

Track Engineering Conference
Mona Sihota, Head of Drainage
30 June 2016
Current Status

Current challenges/issues faced by Drainage and Track

► Belief that Drainage is secondary
  • Not as important as Rail, Ballast, Sleeper volumes
  • Drainage pipe metres are ORR reportable in CP5
  • Increased focus from Regulator on Drainage

► Unit cost of Drainage renewals is high
  • CP5 start at approx. £200/yard, now between £400 (Works Delivery) to £750 (IP Track) per yard

► Skilled resources for drainage design and drainage construction are under utilised
  • Impacts on good system engineering and continuous improvements
Current Status (continued)

Current challenges/issues faced by Drainage and Track (continued)

► Accountability for drainage is held by RAM (Geotech) in the Routes
  • Relationships between RAM (Track), RAM (Geotech) and RAM (Drainage) confusing or in silos
► Number of wet beds and cyclic top sites increasing
  • How many wet beds were there in 2015/16 excluding Scotland?
► Asset data in Ellipse and at hand back poor
  • Does not reflect systems approach
► No more money now or potentially in CP6
Drainage Policy

Drainage Asset Management Policy

Network Rail’s obligation is to comply with the network license agreement by providing asset management processes, policies and information. Network Rail’s role is to develop, maintain and operate rail infrastructure in partnership with our customers, suppliers and other stakeholders.

The vision is for Drainage to be regarded as a system which is recognised as delivering benefit to the whole life of the railway. To achieve this:

The drainage asset management policy is to develop safe, sustainable and resilient drainage systems to enable water to flow through the railway infrastructure from points of entry to point of exit in such a way as to allow earthworks, track and structures assets to perform in an optimal manner. We shall comply with all legal, regulatory and environmental requirements placed upon us. We will not compromise the safety of our employees, our customers or the public.
Drainage is a System

KEY:
- Counterfort/slope drain
- Cascade/flume
- Manhole/catchpit
- Culvert (<450mm dia.)
- Track drainage outfall
- Collector drain
  - E&D Structures
  - Track
- Carrier drain
  - E&D Structures
  - Track
- Network Rail boundary fence line
- Earthworks Accountable
- Structures Accountable
- Track Accountable

Wet tunnel – Track carrier drain integral to slab track
Dry tunnel – Track carrier drain
Wet tunnel – Track collector
Wet tunnel – Drain integral to tunnel structure
Consequences of non-system approach
It is understood that the cause of the flooding was water flowing from the adjacent fields, via the cutting crest drainage and into the track drainage. Due to the nearly flat gradient of the track drainage through this area, the track drainage was unable to discharge this quantity of water, causing flooding of the track through the cuttings and into the tunnel.
Heavy rainfall in the catchment area the day before. The culvert system on the stream was unable to cope with the flows, causing water to back up behind the railway embankment. The railway embankment could not withstand the differential water levels.

Train B454 was sent onto the line without additional precautions, despite the heavy rainfall during the previous evening. The driver was unable to see the washout in time to be able to stop the train before it ran onto the unsupported section of track.
Field flooded and collated at track side until amount of water caused a washout. Not high risk site for Earthworks or Track.

Have you seen the Canadian Railway wash out YouTube video? Previously shown at PWI Conference, Nottingham, Sept 2015.
Track drainage inspection after Track Renewal found multiple catchpits buried in new ballast, two catchpits that had clearly been hit by an RRV or other machine causing damage (broken rings/broken lids), 50% of the catchpits have had rings nudged sideward causing a large amount of new ballast to enter the catchpits.

Two close calls were raised in relation to the broken/displaced lids found, which were rectified on site during inspection to avoid injury.
Do you reckon this pile has left the drainage intact? Between platforms 11 and 12 at Reading Station

- Great Western Electrification Programme
Diagram showing cross section of double track railway alignment including an overhead power supply system.
Help is out there

Sources of information and support

► Route Drainage Engineers

<table>
<thead>
<tr>
<th>Region</th>
<th>Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anglia</td>
<td>Marek Niewiarowski</td>
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<tr>
<td>LNE/EM</td>
<td>Matthew Shelton</td>
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<td>LNW</td>
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<td>Scotland</td>
<td>David McGlone</td>
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<td>Sout East</td>
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<td>Hector Kidds</td>
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<tr>
<td>Western</td>
<td>Mark Howells</td>
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► Route Drainage Maps

► Geo-RINM Viewer

► Drainage Decision Support Tool

► My Work App

► Collaboration with other riparian owners

► Head of Drainage
Change the Status Quo

Make a difference for Track and Drainage

► Is the solution addressing the symptom or the root cause?

► Have you looked at the Track system boundaries (looked past the rail, ballast and sleepers)?
  - Ballast is part of drainage system
  - Clean ballast shoulders support good drainage
  - What is happening in cess?

► Have you considered whole life?
  - Keep water away = track formation stable

► Has consideration been made for reasonably opportunities
  - Work with Route Drainage engineers
Thank You