Network Rail

Drone usage during autumn

Central route
part of North West & Central region

28/03/23

Where it all began…

- Drone usage for autumn railhead inspections initially discussed during late Spring 2022.
- Trial flights completed during May and June 2022, to ascertain whether railhead contamination could be identified from drone images, as well as understanding the quality of images available from the various drones available.
- Following completion of drone flights, it was identified that identifying railhead contamination using drones was possible; the M300 drone and H20T camera were identified as providing the best quality images (although there are limitations with this drone)
- Drone courses attended in July 2022.
- Following the drone course, a period of training flights was required prior to an assessment by an NR pilot to allow the newly qualified pilots to fly over the infrastructure; assessments were completed in September 2022.
- **Railhead inspections using drones commenced for autumn 2022…**

Safety Statistics

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
SPADs	0	1	0	1	1	0	0	0	1	**0**
Overruns	15	6	9	7	11	3	3	19	18	**3**
WSTCFs	11	44	20	7	21	12	6	29	38	**12**
ROLA	85*	38*	59*	61*	73*	88	45	50	42	**32**
Freight Slip								7	6	**4**

**Pre-2018, Reportable Railhead Conditions were defined as Poor/ Exceptional Railhead Conditions*

- Decrease observed across all KPIs for autumn 2022
- The most significant reduction was observed for station overruns (83.3 % decrease compared to autumn 2021), followed by WSTCFs (68.4 %) and ROLAs (23.8 %)

Focus on WSTCFs

Average WSTCF rectification times		
Area	**2021**	**2022**
Banbury	13hrs 36mins	13hrs 17mins
Saltley	364hrs 12mins	11hrs 15mins
Sandwell	981hrs 28mins	23hrs 22mins
Central route	**478hrs 18mins**	**16hrs 48mins**

Average no of WSTCF incidents		
Area	**2021**	**2022**
Banbury	7	3
Saltley	20	4
Sandwell	11	9
Central route	**38**	**12**

- **11 of the 12 WSTCFs** involved a track circuit that was considered a **repeat failure location**
- **9 of the 12 WSTCF**s occurred at known **high risk sites**
- **9 of the 12 WSTCFs** were **returned to normal working within 24hrs**, with 11 of the 12 being returned to normal working within 48hrs
- The **quickest resolution time** to a WSTCFs was **2hrs 44mins** at Blakedown (27/11)
- The **longest resolution time** was **60hrs 47mins** for PDNY on the Darlaston Curve; this track circuit isn't fitted with RCM but the issue was discussed between Ops and Maintenance and additional actions identified for any similar future issues.
- **Two WSTCFs occurred outside of the 'traditional' autumn season** – rectification timescales impacted by IA

- **Significant improvement observed** in **rectification times** for returned track circuits to normal working following a WSTCF, particularly for Saltley & Sandwell STME area
- Reduction in number of WSTCFs observed across the route and all three STME areas; this is in part due to the **implementation of the IIT team** and monitoring of track circuit alarms **Documented process introduced** detailing the actions required from Ops and Maintenance in the event of a WSTCF, including how RCM/II would be used to return to normal working
- **Daily conference calls introduced**, chaired by the SDM, which were used to discuss any ongoing WSTCF issues and provide a forum to focus on plans to resolve the issues.

Successes and challenges…

Success

- Ability to inspect more of the infrastructure in a shorter time frame
- No requirement to take a line blockage to complete drone inspections – providing both safety and performance benefits
- For WSTCF rectification (where RCM fitted), no requirement for S&T to attend site as images can be shared.
- Improved rectification timescales observed for all KPIs – although drone usage is one of several measures influencing this.

Challenges

- Weather impacts – M300 can't be used when its raining (but there are other options…)
- Purchasing of drones – depending on the equipment purchased, this can be expensive
- For autumn 2023, understanding how updates to CAA legislation will impact and the changes that need to be implemented

Proactive Drone Inspections

Sutton Park (02/10): Level 0 contamination

Known area for WSTCF and freight slipping to a stand; RCM/II not fitted.

Proactive Drone Inspections

Small Heath – Camp Hill – Bordesley (22/10): Level 0 contamination

Known area for WSTCF; RCM/II fitted.

Proactive Drone Inspections

Darlaston Curve (29/10): Level 0 contamination

Known area for WSTCF; not monitored by RCM/II

Proactive Drone Inspections

Sutton Park (29/10)

Proactive drone inspection over Sutton Park.

Level 2 contamination found: arranged a slower speed pass by RHTT 3J01 on Sunday 30/10.

Area not monitored by RCM/ II.

Potentially a WSTCF prevented.

Proactive Drone Inspections

BA, BB, BC, & BD: Smethwick – Langley Green (11/11) – BD high risk site

- RCM alarm reported by IIT team for BD track circuit.
- Autumn MOM attended and found level 3 contamination on four track circuits.
- All four track circuits manually treated and returned to level 1 contaminations
- Slow speed treatment also arranged for RHTT – with 20mph treatment put in place daily for the remainder of the season

- BD track circuit alarmed again on 17th November – BD track circuit also runs through a set of points; agreed with S&T that points can be treated by RHTT providing mitigations in place.
- Drone used to film RHTT jetting through points and inspect railhead/ track circuit following treatment (footage: DJI_20221117100005_0003_W.MP4)

BD high risk site (3 x WSTCFs in autumn 2021; 0 x WSTCFs in 2022)

Reactive Drone Inspections

Daw Mill (31/10)

Multiple WSTCF – 8 x track circuits.

Drone used to inspect track circuits before and after slower speed RHTT treatment – removing the need to take a line blockage

Drone images shared with S&T, which were reviewed along with the RCM traces.

Normal working to resumed 23hrs 42mins after the initial failure was reported.

Reactive Drone Inspections

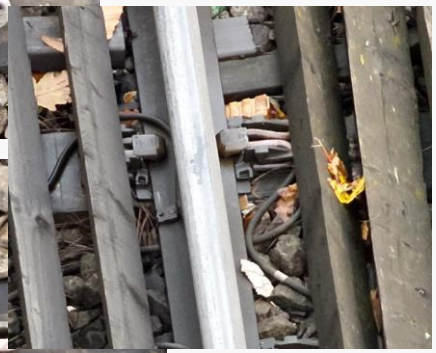
Blakedown (27/11)

WSTCF involving DRFT track circuit.

Contamination identified via drone inspection; slower speed treatment arranged by the RHTT, which removed all contamination.

Drone used to inspect length of track circuit following slower speed treatment to confirm status of railhead.

Inspections completed and track circuit returned to normal working in 2hrs 44mins, without the need to take a line blockage and disrupt the train service.



Reactive Drone Inspections

Rowley Regis (03/12)

WSTCF involving BM track circuit.

Contamination identified via drone inspection.

Drone used to inspect length of track circuit following completion of treatment.

Inspections and treatment completed, with TC returned to normal working in 7hrs 58mins.

Next Steps…

- Build upon success of autumn 2022!
- Review CAA legislation to understand the changes required to be implemented for autumn 2023, working with the National Air Ops Team
- Purchase M30T drones to allow flights to take place in all weathers
- Following trials at the end of autumn 2022, look to introduce night time inspections (where required)
- Identify other options for drone usage…