

Customer Service and Operational Performance Panel

Tube Noise Update
6 December 2022



Contents

- Context: introduction and different types of noise complaint
- The causes of Tube noise
- Challenges we face dealing with noise complaints
- Mitigations
- Our noise complaints handling process
- Communications and stakeholder engagement around noise issues



Tube noise

- Tube noise is a longstanding issue for TfL, and we have well established processes in place to mitigate it as far as possible
- We invest significant time and resources into our Tube noise-focused track works. In the last 5 years, we have spent approximately £7-10m a year on rail grinding (for both critical maintenance needs and noise reduction), and over the last year have carried out over 30,000m of rail grinding specifically for noise reduction
- We review and respond to every complaint we receive
- We have to balance our interventions to manage both residential and in-tunnel noise, which affects train operators and customers
- There are a number of known hotspots across London that we manage primarily through the use of regular rail grinding
- We saw a spike in noise complaints around the introduction of Night Tube services in 2016



Two main types of noise issue: residential and in-tunnel



- **In-tunnel noise:** impacts both train operators and our customers
- **Residential noise:** impacts our neighbours living and working close to the railway
- **Balancing the two:** we have to balance mitigations for in-tunnel and residential noise, as these can sometimes conflict. Mitigations for one may make the other worse. We are working on solutions now which manage both effectively

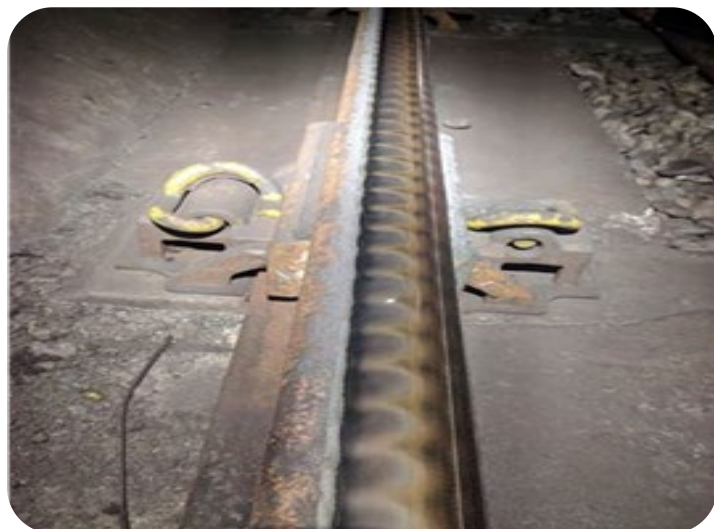


Causes

Longwave corrugation (rail roughness) is caused by repeated acceleration and braking, and is more prevalent on the lines using automatic train operation. There is less corrugation on the manually driven lines which have more speed variation (Bakerloo and Piccadilly lines). Longwave corrugation tends to translate into residential noise.



Longwave Corrugation



Shortwave Corrugation

Shortwave corrugation is caused in the same way as longwave corrugation, but tends to result in in-tunnel noise for train operators and customers.



Causes

Curves and the manner in which the trains operate around these also play a role in the type of corrugation created, and could result in a screeching sound in-tunnel and/or for residents.



Insulated Rail Joints



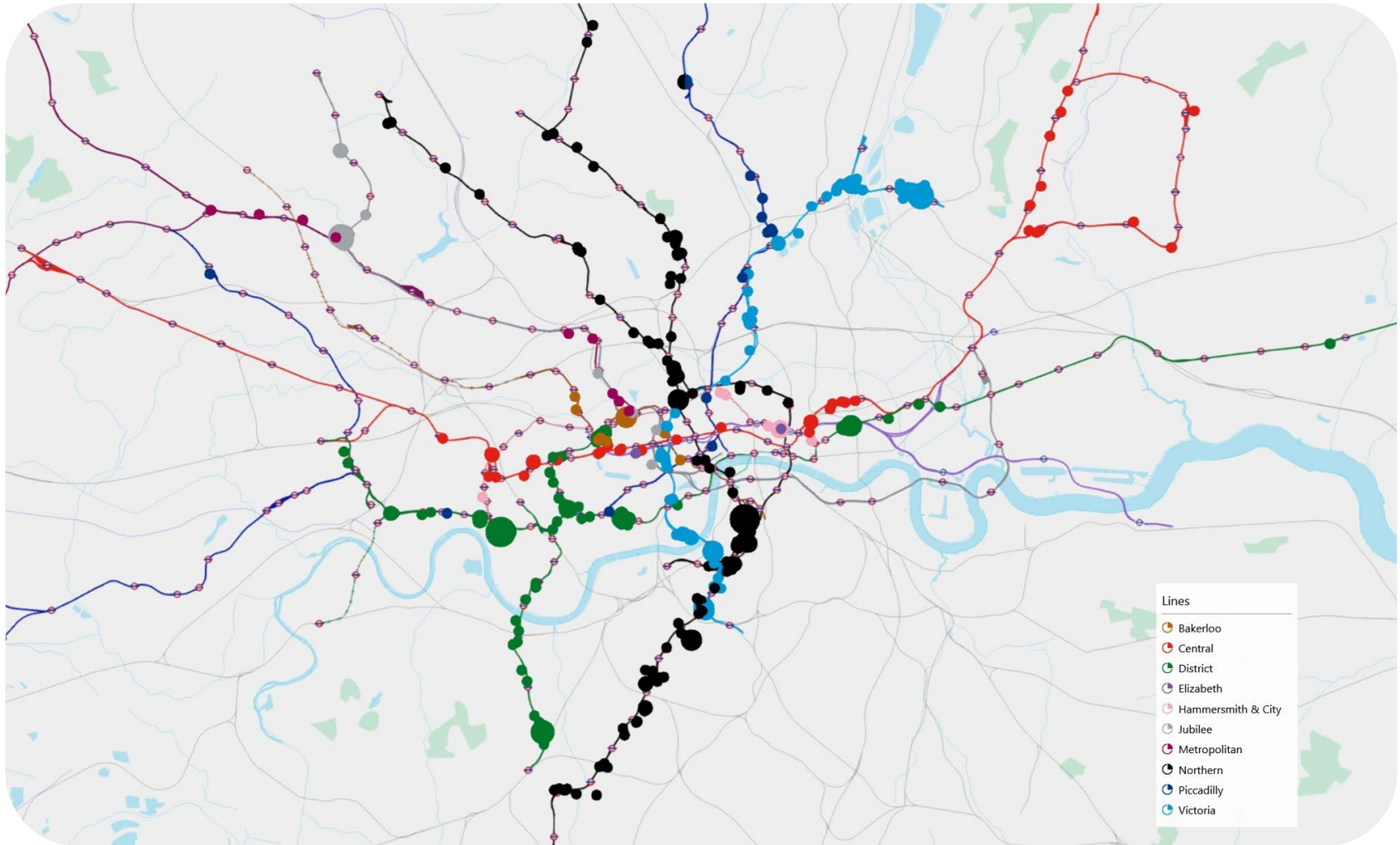
Points and Crossings

In some cases, residential noise complaints are also related to **impulsive noise** caused by trains passing over track infrastructure, including:

- Insulated rail joints - part of older signalling systems to enable signalling sections
- Points and crossings - enables trains to traverse from one set of tracks to another
- Voiding sleepers
- Rail defects



Tube Noise Hotspots



Map shows areas of complaints across London, by Tube line. Bigger dots indicate larger numbers of complaints.



Context and challenges

- Financial restrictions
Tube noise interventions can be extremely costly, and we are still dealing with the financial challenges from the pandemic
- Primary focus: safety and reliability
The first priority of our track programme must always be the safe and reliable operation of the railway
- Operational restrictions
We can only carry out interventions during engineering hours, and we have to maintain good operations for Londoners. We only have two rail grinding machines
- Engineering restrictions
The age and design of the infrastructure of the world's oldest metro, for example small, shallow tunnels and curved platforms, makes eliminating noise challenging



619 **544**
LU trains Of which run every weekday morning



159 years
Moving London – the world's oldest metro

 **272**
stations

1,107km 
of track

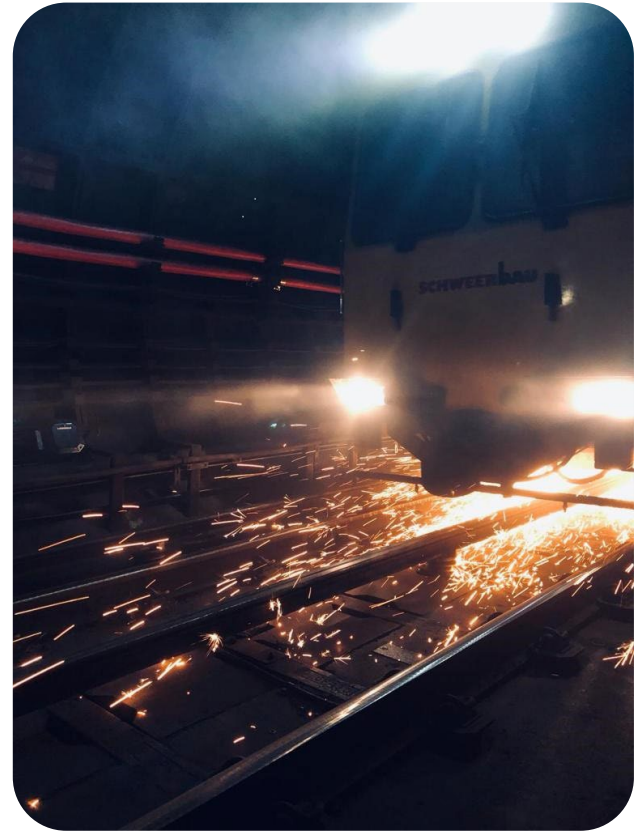
36 

trains an hour run in each direction on the Victoria line



How are we tackling noise: mitigations

- **Primary mitigation:**
 - Rail grinding is the most effective tool we have to remove corrugation, which is the principal cause of noise
 - It must be repeated at regular intervals (usually 6 months – a year), to maintain effectiveness
 - In the last year, we have carried out over 30,000m of noise-related rail grinding to lower noise levels for residents, customers and train operators
- **Factors affecting how we respond:**
 - Curved or straight track
 - The nature and condition of the track, rails and any track fastening products which may have been used
 - Friction between wheels and the rail
 - Speed, frequency and repetition of acceleration and braking in the same spots
 - How the line operates, i.e. automatic or manual signalling and train operation



Balancing mitigations to address residential and in-tunnel noise: Pandrol Vanguard

- We introduced Pandrol Vanguard, a resilient track fastening product, in response to concerns over in residential noise in 2016 ahead of the opening of Night Tube
- This was effective in reducing residential noise but had the unintended consequence of increasing in-tunnel noise by trapping energy from the trains in the tunnel and causing corrugation to form on the rails more quickly
- We are working on alternative solutions, including trialling new products, and the use of rail grinding to address corrugation
- Following a successful trial on the Jubilee line between Baker Street and St John's Wood, we are now starting to roll out the use of an alternative product (Delkor) at selected locations on the network where our data suggests it will be most effective



Pandrol Vanguard track fastening product.



Alternative engineering solutions/trials

Deep Tube reconditioning to replace Pandrol Vanguard with Delkor

Effective, but very slow and costs £8,200 per metre with 6.7km of PV replacement costing circa £59.9m

Removal of Pandrol Vanguard and re-rail, followed by grinding (trial)

Back to how the track was pre-Pandrol Vanguard, reducing corrugation build up

Resilient rubber pads under the rails and grinding (trial)

Trialling a softer under rail pad than used previously, helping to absorb energy from the passage of trains

Jubilee line extension - low level reservoirs (trial)

Placing lubricators in noise sites where screeching is caused by wheels rubbing against rails

Speed variations (trial)

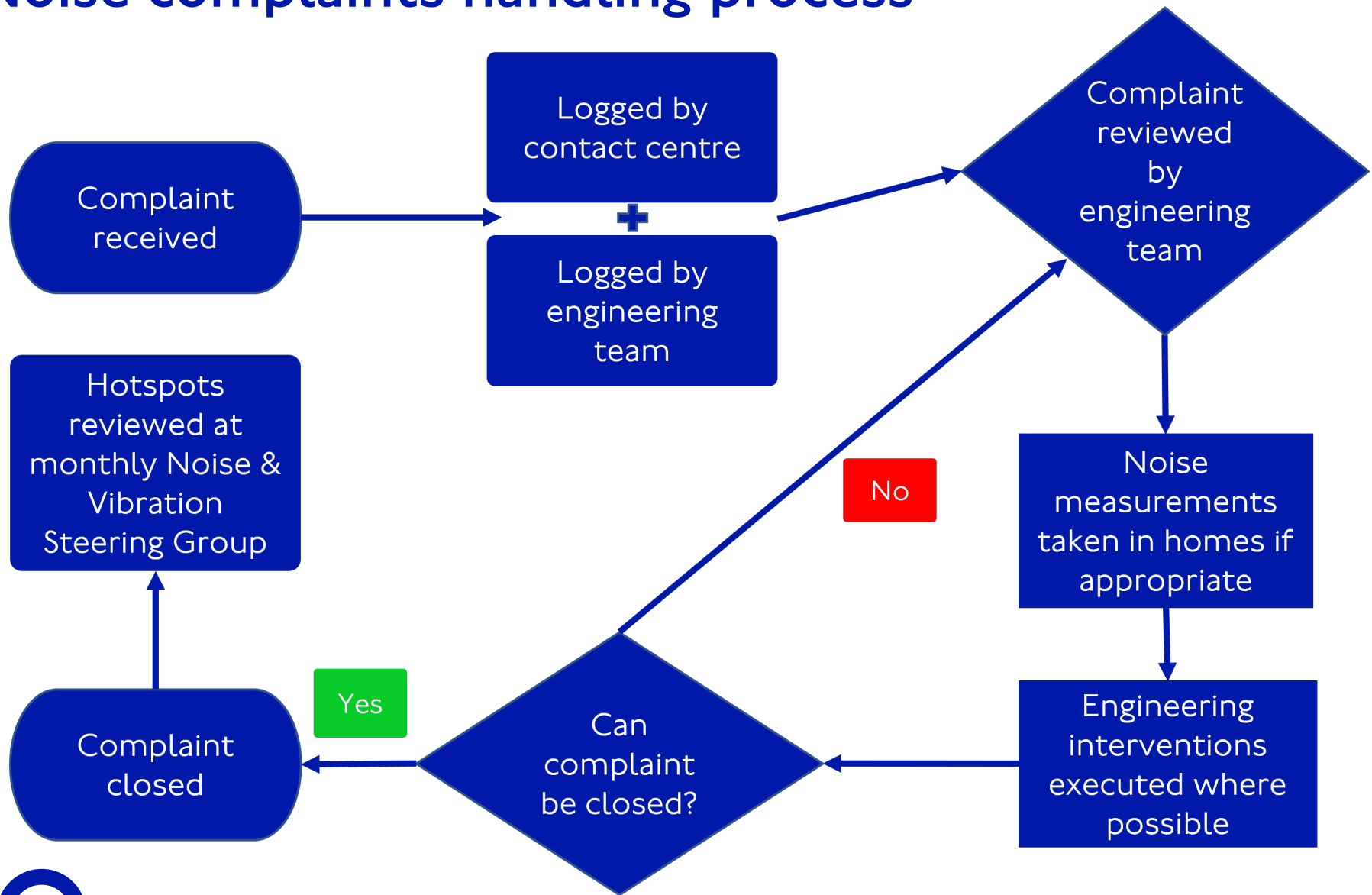
Altering or reducing speeds on automatic operation lines, but knock-on impact on service levels, the Northern line has been chosen for the trial

On-train lubrication system (Jubilee line)

On-train lubricators to minimise screeching noise in airborne sections



Noise complaints handling process



Communications and stakeholder engagement

Noise and Vibration Steering Group

Monthly internal meeting of engineering and stakeholder representatives to review complaints and hotspots

Mayor's Questions

Frequent answers drafted on the Mayor's behalf to questions about Tube noise from Assembly Members as part of Mayor's Question Time

London Assembly – Regular Updates

Six-monthly updates are issued to London Assembly Members on noise hotspots and our mitigation plans

Contact Centre

The Customer Contact Centre has dedicated representatives to handle noise complaint issues, who work closely with the business to provide the best quality information

Meetings

We frequently attend meetings with residents and elected representatives to discuss noise concerns in specific areas

Single Points of Contact (SPOCs)

Government Relations team SPOCs for all London MPs and Assembly Members to ensure questions are handled in a timely and efficient manner





Questions?



EVERY JOURNEY MATTERS