



From winter's gloom and summer's joy,
Edward McKnight Kauffer, 1927

Network Hot Weather Plan

Summer 2022

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Version 1.0 9th May, 2022

The purpose of this plan is to summarise Operations and Asset issues during Hot Weather and the arrangements required to ensure that the Operational Railway continue to function at elevated temperatures.

Contents

	Page
1	Changes to the plan 3
1.1	Changes to the plans from 2022 Version 1.0 Issue 3
1.2	Changes to the plans from 2022 Draft A Issue 3
1.3	Changes to the plan from 2021 Issue..... 3
2	Weather Forecasts & Monitoring 4
2.1	Provision 4
2.2	Forecasts 4
2.3	Review of forecasts..... 4
2.4	Monitoring..... 4
3	Hot Weather 321 Process..... 5
3.1	321 Hot Weather Process Activities 5
3.2	Prolonged Hot Weather Activities 9
3.3	Extreme Hot Weather (35°C +) 9
4	Stations and Service Control – Hot Weather Activities..... 11
4.1	Infrequent Point Moves and Frame Tests during Hot Weather 11
4.2	Service Control response to incidents involving stalled trains 11
4.3	Trackside Fire risk..... 11
4.4	Detailed Customer Messaging 12
4.5	PIOTs in Hot Weather – Customer Messaging 12
5	Operational & Asset Bottled water emergency supplies 14
5.2	Track & Signal Emergency Water Supply 15
6	Signalling 16
6.1	Train stops and other air operated equipment 16
6.2	Equipment room and Interlocking Machine Room (IMR) Cooling 16
6.3	Point Heaters 16
7	Mechanical 17
7.1	Introduction 17
7.2	Comfort Cooling and Air Conditioning 17
7.3	Tunnel Ventilation 17
8	Track..... 18
8.1	Prevention of Buckling 18
8.2	Critical Rail Temperatures..... 18
8.3	Harrow Hot Weather Plan 20
8.4	Bakerloo line Specific Track Issues 20
8.5	Lubrication Management..... 20
8.6	Conductor Rails..... 21
8.7	Vegetation control..... 21
8.8	Flooding 22
9	Fleet 23
10	Summer Uniforms 23
10.1	Provision 23
10.2	Specific risks arising from Summer Uniforms 23
Appendix 1 - Line Specific Information – Stalled trains/ Tunnel Ventilation..... 24	
Appendix 2 – Example of Hot Weather Plan for Known Vulnerable Points 25	
Appendix 3 – Agenda - 15:00 Conference Call - Risk..... 26	
Appendix 4 – Agenda - 15:00 Conference Call - Strong Risk 27	
Appendix 5 – Agenda - AWCG (STRONG RISK ONLY) 29	
Appendix 6 – Planned BTRS / P&C Work For Summer 2022 30	
Appendix 7 – Summary of Operating and Asset changes compared with 2021 season..... 32	
Appendix 8 – Example of Table for monitoring CRTs..... 34	
Appendix 9 – Infrequent point moves 35	
Appendix 10 – Concerns in the Event of Drought Conditions 37	
Appendix 11 – Mechanical Equipment Details..... 38	
Appendix 12 – Summary of Heat Risks and Mitigation..... 41	

Revisions

22 Mar 2019	Draft A Issue 2019	
26 Apr 2019	Version 1.0 Issue 2019	
10 May 2019	Version 1.1 Issue 2019	
07 Jun 2019	Version 1.2 Issue 2019	
12 Jul 2019	Version 1.3 Issue 2019	
6 May 2020	Version 1 first Issue 2020	
2 June 2020	Version 2	Section 7 and Appendix 10 revised, Appendix 5 populated
4 August 2020	Version 3	Section 8.3 updated, Appendix 5 updated
25 May 2021	Version 1.0 2021 season	
8 th April 2022	Draft A Issue 2022	
6 th May 2022	Version 1.0 2022 season	
11 th July 2022	Version 1.1 2022 Season	

1 CHANGES TO THE PLAN

1.1 Changes to the plans from 2022 Version 1.0 Issue

- Section 8.3 – Harrow Hot Weather Plan updated to reflect new 27°C temp
- Appendix 4 and 5 – References to Head of Asset On Call Removed
- Appendix 4 – Strong Risk attendees updated to ensure correct Asset Reps on call
- Appendix 4 – Fleet added to agenda

1.2 Changes to the plans from 2022 Draft A Issue

- Section 3.2 – Addition to Prolonged Hot Weather around customer comms email highlighting key messages (carry water etc)
- Section 8.1 - Prevention of buckling Central line additional section highlighting action if the Duty Engineer is unavailable
- Section 8.7 – References to the weed-killing train removed, herbicides manually applied
- Appendix 9 – Hammersmith (Dis line) 22a, 23a points decommissioned and removed.
- Appendix 12 – References to trains standing with doors open in sidings removed

1.3 Changes to the plan from 2021 Issue

- Section 3.1 – Clearer guidance around IMR air conditioning checking as part of the 321
- Section 3.3 – Updated AWCG activities
- Section 4.4 – Customer messaging updated for 2022
- Section 4.5 – PIOTs messaging updated and links added
- Section 7.2 – Section updated and BAU references removed
- Section 8.1 – Reference to S1177 updated
- Section 8.3 – Harrow Plan updated to reflect 28°C
- Appendix 5 – AWCG Conference Call agenda added
- Appendix 6 - Updated closures list for 2022
- Appendix 7 - Updated Operations and Asset changes list
- Links checked and updated throughout plan

2 WEATHER FORECASTS & MONITORING

2.1 Provision

The provision of weather forecasts is the responsibility of the Head of Network Operations.

2.2 Forecasts

These are currently issued daily by *MetDesk* to the LUCC prior to start of traffic and available on the intranet:

[Weather Forecasts and Network Warnings - Listed by Year / Month](#)

They include warnings if high temperatures (High Temp – Air temperature 24C or above) are expected to be reached over a five-day period.

	No Risk	Small Risk	Risk	Strong Risk
High Temperatures	<24°C	24°C to 26°C	27°C to 30°C	>31°C

If risk thresholds are reached, the Hot Weather 321 Process will be put in place. This counts down from Day 3 to Day 1, when the hot weather is forecast to arrive. The Senior Operating Officer (SOO) makes the decision to implement the 321 process and will ensure this decision is communicated to all parties.

2.3 Review of forecasts

The LUCC Network Operations Tactical Manager (NOTM) is responsible for reviewing the forecasts each day, and any updates issued during the day. If the Risk or Strong Risk hot weather threshold is expected to be reached this is texted out to all line service controls.

2.4 Monitoring

Weather monitoring stations are located across the network. These give actual rail temperatures from a sample rail, together with air temperatures.

Accurate running and current rail temperatures are gathered from these weather stations with automated temperature monitoring equipment. The sites are located at:

Cockfosters	Hammersmith	Northumberland	Stanmore
Dagenham East	Harrow on the Hill	Park	Sudbury Town
Ealing Depot	Loughton	Northwick Park	Upminster
Finchley Central	Neasden Depot	Rickmansworth	
Hainault	Northfields	Ruislip	

This data can be viewed via the Vaisala website, which updates at least every 30 minutes, [*Contact the Resilience team for log on details*].

The equipment is subject to an annual calibration check by the supplier.

This equipment may be used to make decisions about when any heat related speed restrictions need to be applied and when they may be withdrawn (Permitted by

Engineering standard S1177 A5, section 3.3). Temperature monitoring is also carried out locally by track teams using track thermometers during traffic hour patrols for periods of forecast hot weather.

3 HOT WEATHER 321 PROCESS

3.1 321 Hot Weather Process Activities

Activities ongoing prior to and through the season

	Activities
No Risk Air Temperatures Below 24°C	<p>Routine maintenance activities that are enhanced before the start of the season and maintained throughout the season as follows:-</p> <ul style="list-style-type: none">• Enhanced asset maintenance regimes as follows:-<ul style="list-style-type: none">○ Fleet air con & cab cooling (Section 9)○ Premises air conditioning (inc. IMR cooling) (Section 7)• Track lubrication management incl. slide chairs (Section 8.5)• Bottled water supplies for use during incidents (Section 5)• Summer uniform/ PPE checks (Section 10)• Vegetation clearance programme (Section 8.7)• Monitoring of sites where Critical Rail Temperatures (CRTs) are lower than expected due to outstanding rail stressing (Section 8.2)

Day 3 (2 days prior to Hot Weather/ High Air Temps) – Risk Dependent

	Activities
Small Risk Air Temperatures 24 – 26°C	T/Os to check IMR air conditioning is turned on and functioning. If T/O finds any Mechanical equipment not operating, T/O to raise a P1 fault.
	T/Os to ensure point heaters have been switched off
	Track Managers to review rail lubrication regime and slide chairs
	DSIMs to check T/O resource arrangements against identified at-risk locations on the line.
	NOE ¹ to cross-check the above activities with the relevant teams
	SCMs to check DRM resource arrangements against identified at-risk locations on the line.

	Activities
Risk Air Temperatures 27 – 30°C	Activities as “Small Risk” and also:-
	NOTM to create SAFE item to log all related actions.
	NOTM to liaise with Comms to ensure Stations and Service Control implement Hot Weather Communications:- Posters, PA, Social Media (Section 4.4).
	SOO to review weather conditions and if required chair a 1500 conference call with NOTM, NOE, Central line DE, SCMs, R&E, Asset Operations – On-Call and a Resilience Team rep – Agenda – Appendix 3.

	Activities
Strong Risk Air Temperatures 31 – 34°C+	Activities as “Small Risk” and “Risk” and also:-
	NOE to contact Track Managers/ DSIMs to confirm available resource (T/Os and Track teams) for day 1.
	SOO to consider the likelihood of TSR requirements and ensure lines and resources are ready for this possibility (<i>see con call agenda</i>)
	SOO to review the outputs from any Network Rail EWATs, and ensure any impact on LU routes is understood.
	SOO to chair 1500 conference call with key parties to confirm activities. <ul style="list-style-type: none"> • Agenda – Appendix 4 • Key parties are as follows:- SOO, NOTM, SCMs, NOE, Central Line DE, Asset Operations - On-Call, Resilience Team Rep, TDM, Track on-call, Track Delivery Mgr, Signals on-call, Stations (Mechanical) Rep, Access Operations, NMCC Manager.
	NOTM to send Comms to senior team using existing texting mechanisms to confirm status. (Example text: ‘Strong Risk of air temperatures exceeding 31°C on x date. All Hot Weather preparedness actions underway with LUCC, Track, Ops, Signals and Comms).

****For all actions NOE to coordinate with the Central line DE.**

¹ Network Operations Engineer

Day 2 (1 day prior to Hot Weather/ High Air Temps) – Risk Dependent

	Activities
Small Risk Air Temperatures 24 – 26°C	T/Os to check IMR air conditioning is turned on and functioning. If T/O finds any Mechanical equipment not operating, T/O to raise a P1 fault.
	T/Os to ensure point heaters are switched off
	Track Managers to review rail lubrication regime and slide chairs
	DSIMs to check T/O resource arrangements against identified at-risk locations on the line.
	NOE to cross-check the above activities with the relevant teams
	SCMs to check DRM resource arrangements against identified at-risk locations on the line.

	Activities
Risk Air Temperatures 27 - 30°C	Activities as “Small Risk” and also:-
	NOTM to confirm coverage arrangements and log detail on ‘Multi Incident Triage Board’ and SAFE as required.
	NOTM to liaise with Comms to ensure Stations and Service Control implement Hot Weather Communications:- Posters, PA, Social Media (Section 4.4).
	SOO to review weather conditions and if required chair a 1500 conference call with NOTM, NOE, Central line DE, SCMs, R&E, Asset Operations - On-Call and a Resilience Team rep – Agenda – Appendix 3.

	Activities
Strong Risk Air Temperatures 31 - 34°C+	Activities as “Small Risk” and “Risk” and also:-
	NOE to contact Track Managers/ DSIMs to confirm available resource (T/Os and Track teams) for day 1.
	SOO to consider the likelihood of TSR requirements and ensure lines and resources are ready for this possibility (<i>see con call agenda</i>)
	SOO to review the outputs from any Network Rail EWATs, and ensure any impact on LU routes is understood.
	SOO to chair 1500 conference call with key parties to confirm activities. <ul style="list-style-type: none"> • Agenda – Appendix 4 • Key parties are as follows:- SOO, NOTM, SCMs, NOE, Central Line DE, Asset Operations - On-Call, Resilience Team Rep, TDM, Track on-call, Track Delivery Mgr, Signals on-call, Stations (Mechanical) Rep, Access Operations, NMCC Manager.
	NOTM to send Comms to senior team using existing texting mechanisms to confirm status. (Example text: ‘Strong Risk of air temperatures exceeding 31°C on x date. All Hot Weather preparedness actions underway with LUCC, Track, Ops, Signals and Comms).

****For all actions NOE to coordinate with the Central line DE.**

Day of Hot Weather/ High Air Temps

	Activities
Small Risk Air Temperatures 24 - 26°C	NOE to monitor Vaisala Weather Station equipment and review Rail Temperatures (Section 2.4)
	Track teams to monitor CRTs as required, using Vaisala, Rail Thermometers or watchmen (Section 9.1).
	NOE/ Met SCM to implement the Harrow Plan as required (Section 8.3).
	T/Os to check IMR air conditioning is turned on and functioning. If T/O finds any Mechanical equipment not operating, T/O to raise a P1 fault.
	T/Os to confirm point heaters have been switched off
	Track Managers to review rail lubrication regime and slide chairs
	DSIMs to check T/O resource arrangements against identified at-risk locations on the line.
	NOE to cross-check the above activities with the relevant teams
	SCMs to check DRM resource arrangements against identified at-risk locations on the line.

	Activities
Risk Air Temperatures 27 - 30°C	Activities as "Small Risk" and also:-
	NOTM to create SAFE item to log all related actions.
	NOTM to liaise with Comms to ensure Stations and Service Control continue Hot Weather Communications:- Posters, PA, Social Media (Section 6.5).
	SMs - The use of Infrequent Point Moves (in open sections) on Risk/ Strong Risk days will be avoided (Section 6.1):- Or <ul style="list-style-type: none"> Where moves are required SMs will ensure DRMs/ T/Os have been notified and, where possible, will be in attendance.
	SOO to review weather conditions and if required chair a 1500 conference call with NOTM, NOE, Central line DE, SCMs, Access Operations, Asset Operations - On-Call and a Resilience Team rep – Agenda – Appendix 3.
	Depots to lower droplights on all appropriate stock as part of train prep.

	Activities
Strong Risk Air Temperatures 31 - 34°C+	Activities as "Small Risk" and "Risk" and also:-
	NOE to contact Track Managers/ DSIMs to confirm available resource (T/Os and Track teams) for day 1.
	All parties (SM, NOE) to confirm with NOTM all staff resources (Track/ DRMs/ T/Os) in situ as required.
	SOO to consider the likelihood of TSR requirements and ensure lines and resources are ready for this possibility (<i>see con call agenda</i>)
	SOO to review the outputs from any Network Rail EWATs, and ensure any impact on LU routes is understood.
	SOO to chair 1500 conference call with key parties to confirm activities. <ul style="list-style-type: none"> Agenda – Appendix 4 Key parties are as follows:- SOO, NOTM, SCMs, NOE, Central Line DE, Asset Operations - On-Call, Resilience Team Rep, TDM, Track on-call, Track Delivery Mgr, Signals on-call, Stations (Mechanical) Rep, Access Operations, NMCC Manager.
	NOTM to send Comms to senior team using existing texting mechanisms to confirm status. (Example text: 'Strong Risk of air temperatures exceeding 31°C on x date. All Hot Weather preparedness actions underway with LUCC, Track, Ops, Signals and Comms).

****For all actions NOE to coordinate with the Central line DE.**

3.2 Prolonged Hot Weather Activities

- If London enters a prolonged period of hot weather lasting longer than 7 days of continuous Risk, a state of business as usual will be reached.
- London Underground will remain at Day 1 in the 321 process, with the assumption that Day 1 activities will continue to be carried out by the business, however daily conference calls will not be carried out after 7 days of at Risk have been reached. Instead, a conference call will only be required on a Monday (to confirm week ahead arrangements) and Thursday (to confirm weekend arrangements) ensuring all assets and Communications are in alignment with Day 1 activities.
- This business-as-usual state will continue until the risk status drops below Small Risk for 3 days or more, at which point the 321 process will be deactivated. This is to avoid continually stopping and starting the 321 process.
- The exception to this will be a Strong Risk, which must always have a conference call, to ensure readiness of response for both customer and staff welfare to this extremity of temperature. The SOO can also request a Hot Weather Conference Call at any time if they feel there is an operational need to hold one.
- As part of the comms package for a sustained spell of hot weather the SOO will discuss with the Customer Experience Team (Sarah Swalheim/ Helen Dimond) the possibility of adding the carry water/ feeling unwell messages to the weekly multi-modal email (who will liaise with the Customer Information Team).

3.3 Extreme Hot Weather (35°C +)

In event of an extreme hot weather front (likely to be 35°C or above air temperatures), which has the potential to cause significant impacts affecting the entire TfL Network or London as a whole, the Adverse Weather Command Group (AWCG) would be set up (please see appendix 5 for attendees and conference call agenda).

- The AWCG is a response team comprising of senior line management ('Heads of', Director level managers and the SCMs) who will provide 24/7 coverage for defined periods when severe weather seriously threatens the running of the railway.
- The AWCG is set up by the SOO after consultation with the Head of Network Operations who will agree the decision with the Head of Network Command, Head of Customer Services and Head of APCD.
- The AWCG's key responsibility is to make strategic decisions about London Underground operation throughout the risk period.
- The AWCG will also nominate a representative to attend any London Resilience Partnership (LRP) conference calls and to update the DfT as required. Likely agenda for LU issues would cover:-
 - LU Incidents/ affected services/ estimated resumption
 - Any identified future risks or concerns for LU

- Interface with the NMCC and Pan TfL Transport modes
- Interface with Network Rail and the TOCs
- Interface with the LRP

4 STATIONS AND SERVICE CONTROL – HOT WEATHER ACTIVITIES

4.1 Infrequent Point Moves and Frame Tests during Hot Weather

During high temperatures (risk and above e.g. 27°C+) points in open sections are more susceptible to failure particularly if they are not used on a regular basis. Points that are used infrequently for the purpose of facilitating service amendments if required (otherwise known as “Spoof Moves”), can trigger points failures during high temperatures.

Every day, prior to the start of traffic, Service Managers should conduct Frame tests and test all routes, including their infrequent point moves (as listed in Appendix 9). It is recommended that where possible these moves should not be used during high temperatures (over 27°C).

Where using these points is unavoidable (i.e. they are a requirement to manage the timetable), the Service Manager should arrange for a DRM or Technical Officer be on site to assist in the event of a failure.

In the event that a set of points develops a reoccurring fault as a consequence of hot weather conditions, a bespoke hot weather plan can be developed to mitigate against further failure, like the Harrow plan (see Section 8.4), or as per the plan recently used for 40 points at Acton (see Appendix 2).

4.2 Service Control response to incidents involving stalled trains

On a hot day, if a train is stalled in a tunnel, or in bright sunshine, service controllers should remember to include the impact of heat on passengers and staff in their assessment of how to respond to that stalled train. This is referenced in Rulebook Leaflet LF17² and the Overview Response to Stalled Trains.

Stations teams should also be ready to expect such a call for detrainment and to prepare in anticipation of the decision being made so that there is no delay in implementing evacuation.

4.3 Trackside Fire risk

This is particularly the case if there is a combination of litter build up and oil/grease. All the track teams have access to oil absorbing compounds to use around flange oilers which are the prominent source of grease.

- The Track litter picking programme now only covers tunnel areas. Track litter picking in open sections will only take place when a job is raised via the Lucc Asset Team.
- All Stations and Asset staff should report any build-up of litter to the Lucc Asset Team if spotted during routine inspections for a job to be raised with the Track litter picking team.
- If smoke or fire is spotted trackside, Service Control or Station staff should ensure an appropriate response is given – As Rulebook Leaflet 39³.

² <https://transportforlondon.sharepoint.com/b/r/sites/TMSRulebook/Rule%20Book%20MS/LF17%20-%20Service%20control%20response%20to%20incidents%20involving%20stalled%20trains.pdf?csf=1&web=1&e=sUN2k5>

³ [Rule Book 12 - Fire Safety - including OSN158.pdf](#)

- Full details All Stations and Asset staff should report any build-up of litter to the LUCC Asset Team if spotted during routine inspections for a job to be raised with the Track litter picking team.
- For fire risk from vegetation, see section 8.7 below.

4.4 Detailed Customer Messaging

When an Amber or Red “Risk” warning is received by the NOTM they will ensure Stations and Service Control are delivering the following communications out to customers across the Network:-


- The Stations PA announcement during hot weather will only be broadcast when advised by the LUCC. The PA script is being updated for 2022 and will reflect any changes needed to face covering guidance.
- PA announcements are made at Stations and via train PAs that support the Carry Water message – LIS to be briefed in order to pass on information to Train Operators
- When the Station PA script is sent to stations and activated by the LUCC, if platform duties (formally known as SATs) are being performed then the station teams should inform their staff to make the following announcements as part of their platform duties
 - “Staff performing platform duties to deliver “remember to bring water with you tomorrow” messages during the PM peak before the hot weather warning comes into effect if possible;
 - AM peak message “pick up a bottle of water for the journey home, it is going to remain very hot today”.
- Station platform DMIs to be updated to display, “pick up a bottle of water for the journey home, it is going to remain very hot today”.
 - This cascade will be initiated by the LUCC to the SCMs/Line controllers/LISs.
 - The Communications team will also CC all AMs, HOCSs and HOLOs to inform them of the change too, so that it boosts awareness that there is a seasonal PIOT risk.
 - CCing all AMs also picks up those stations where DMIs are updated locally by stations. Communications team to remember to send out reminder to remove messages once the hot weather has passed.
- A whiteboard poster with “carry water” messaging is being drafted for distribution to all stations in the event of hot weather.
- In addition NOTM to contact Customer Information/TfL Publishing, to trigger an additional PIOT reminder in the Metro. Details as below:-
 - Rob Carney or Matt Jane - [REDACTED]
 - TDM Team
 - Emily Herreras-Griffiths - [REDACTED]
 - Libby Gibson - [REDACTED]
 - TDM - [REDACTED]

4.5 PIOTs in Hot Weather – Customer Messaging

When it is hot, there is a greater risk of customers becoming ill when travelling. The overall campaign to encourage customers to keep themselves well when travelling in hot weather has not been finalised but is expected to be similar to that used last

summer. When the LUCC issue a “hot weather warning” stations should act as directed in the warning – see section 4.4. above.

[When dealing with PIOTs, remember to make use of the “Move the Train, Move the Person” process, detailed in Rule Book leaflet 36^{\[2\]}:](#)

When dealing with people who are ill, all should consider risk of infectious disease. Please refer to [Rule Book leaflet 50^{\[3\]}](#), before following the arrangements for persons ill on a train and the specific COVID PIOT guidance for LU that has been in use throughout covid:  [LU guidance - Dealing with people that are unwell.pdf](#)

Note:

Social Distancing has been removed across LU – the only remaining hot weather COVID messaging issue is face covering as above.

[2]

<https://transportforlondon.sharepoint.com/sites/TMSRulebook/Rule%20Book%20MS/Forms/RuleBooksBB.aspx?id=%2Fsites%2FTMSRulebook%2FRule%20Book%20MS%2FLE36%20%2D%20What%20to%20do%20when%20a%20person%20is%20ill%20on%20the%20train%2Epdf&parent=%2Fsites%2FTMSRulebook%2FRule%20Book%20MS>

[3] <https://transportforlondon.sharepoint.com/sites/TMSRulebook/Rule%20Book%20MS/LF50%20-%20Keeping%20yourself%20safe%20when%20helping%20a%20customer%20who%20is%20unwell%20.pdf>

5 OPERATIONAL & ASSET BOTTLED WATER EMERGENCY SUPPLIES

5.1.1 Staff Water

Background & Provision

Operational staff have been provided with refillable water bottles to ensure they have access to water at any time to prevent de-hydration. All staff book-on for shifts at locations with drinking water supplies, such as train crew depots. All stations have drinking water available in kitchens or mess areas. To avoid waste all staff should be encouraged to use these mains drinking water supplies and not order bottled water.

5.1.2 Emergency Bottled Water for use in an incident

Background & Provision

During an incident, to prevent de-hydration of passengers, supplies of bottled water are located at 29 strategic sites across the network. This is specially packaged (case with four packs of 6x500ml bottles) so it can be readily carried by one person down staircases to the site of an incident.

The distribution of this water will be coordinated by the LUCC once an incident is identified.

Locations of supplies

A map showing locations where water is stored is available on the Intranet:

<https://transportforlondon.sharepoint.com/sites/conplans>

Deployment of water to incidents

This is arranged through the LUCC incident desk (auto 1800)

Arrangements for replenishing stocks of water

NOTE: At the time of preparing this plan the water supplier is unable to make emergency deliveries. In consequence it is essential that stations immediately report an incident where it has been necessary to use their emergency water, so more can be ordered. The report should be made to the Contingency Planning Team:

- e-mail [REDACTED] (please put "Emergency Water" in title).
- phone Auto 59208 (office hours).

The Network Contingency Planning Manager is responsible for ensuring that there is a system for supplying and distributing the water.

5.2 Track & Signal Emergency Water Supply

Background & Provision

To provide emergency bottled water to support Track and Signals Teams who may be trackside in hot weather during emergencies for prolonged periods attending and repairing faults.

In the event that there is no bottled water available at the T&S Team home depot/location the manager for the area can contact Stores to arrange for Emergency Supply. Stores will endeavour to deliver to the location however if there are constraints, collection must be arranged.

Please note this process is for **Emergencies Only**. If it becomes apparent that there are depot/locations breaching this process, it will be flagged to the applicable Asset Head.

Standard practice for ordering water is through the on-line catalogue (pallets of water Part No 17213/050). The delivery lead time from the catalogue is three working days and also has the option to deliver within 24 hours.

Locations of supplies

Acton Stores

Opening Times:

Mon –Thurs Days	07.30-15.30
Fri Days	07.30-12.30
Nights	22.00-05.00
Sunday	When covering a BTR from Sunday 7am to Monday 5am

Stores Contacts

- Mark Payne – [REDACTED]
- Pat McGoldrick – [REDACTED]

6 SIGNALLING

6.1 Train stops and other air operated equipment

Any glycol introduced into the air systems to prevent moisture freezing in winter needs to be removed if there is any left (as it tends to become more viscous and hence risk causing failures in hot weather), it can also be corrosive.

Train stop maintenance is carried out on a sixteen-weekly regime, part of this maintenance requires that air is passed through the system – this should remove any remaining Glycol. This maintenance is logged in Ellipse and can be verified to confirm that this has been done.

6.2 Equipment room and Interlocking Machine Room (IMR) Cooling

Arrangements are detailed in section 7 below.

6.3 Point Heaters

Winter Weather Precautions are typically withdrawn through April. However, during April and at the start of May, if air temperatures are expected to exceed 25°C pointer heaters should be switched off to avoid point heaters over-heating and causing issues with dry slide chairs that in turn cause signal failures.

7 MECHANICAL

7.1 Introduction

This plan is based on asset knowledge gained from past performance, PPM remedial work, asset location, safety critical equipment and asset availability from previous summer months.

The Plan is based around supporting critical assets (Lifts, Signalling and Comms) as well as priority stations, control centres and key office locations additional maintenance will take place to ensure assets are operating to optimum performance. For passenger comfort and safety, ventilation and fans will be subject to major maintenance interventions (Victoria line and JLE ventilation equipment). Platform cooling at Oxford Circus and Green Park will be cleaned and switched-on assisting air movement (there is no cooling function on these assets)

Blue fans, placed strategically on station hot spots such as corridors and walkways and some circulating areas are switched on and left to run during traffic hours/ engineering hours.

To ensure the above are met, the following actions are taken:-

7.2 Comfort Cooling and Air Conditioning

Stations:-

Sub-surface Stations are on a Planned Preventative Maintenance (PPM) frequency of 4-8 weeks.

Non sub-surface stations will be on a PPM frequency of 6 months

All faults will be closed within 5 days, and under best endeavours responded to within 24 hours.

Secure Rooms:-

All secure rooms will be on a PPM frequency of 4 weeks on sub surface locations or problem locations identified via the reliability growth plans.

All faults will be responded to within 2 hours

All faults will be repaired within 4 hours, parts and access permitting

Locations with Enhanced Maintenance Frequencies:-

Appendix 11 lists locations where:

- Weekly maintenance during engineering hours is undertaken at certain locations only:
- Both weekly maintenance during engineering hours on secure room assets

7.3 Tunnel Ventilation

Large fans for general ventilation of the system are listed in Appendix 11. This includes the sites requiring an enhanced routine maintenance regime.

8 TRACK

8.1 Prevention of Buckling

Each track team manages the prevention of buckling program, for their line, prior to the start of the season. All track managers have confirmed that rail stressing is up-to-date for the start of the 2022 season.

Note: Following any rail replacement in engineering hours it is rarely possible to also re-tension the rails in the same shift. Hence it is essential that any sites are identified, recorded and the Lucc informed, so they can be monitored by the Lucc ASSETS NOE. Monitoring, as detailed below, is then essential until the tensioning of the rails is restored.

All actions detailed below must be carried out with reference to engineering standard “Track – Managing Temperature Dependent Risk” (S1177 – Issue A5).

8.2 Critical Rail Temperatures

To allow for the monitoring of Critical Rail Temperatures (CRT) in hot weather conditions the following measures have been agreed:

The Track Infrastructure Managers will ensure that suitable staff are booked on day shift every day to lead and undertake any heat patrolling activities

SSL sites and affected Bakerloo and Victoria Line sites:

- A daily spreadsheet detailing current CRT sites will be sent to the Lucc ASSETS NOEs by the Track Managers from each line.
- The spreadsheet should be updated by 08.00 to comply with the LU look ahead for the 08:30 conference call.
- The Lucc ASSETS NOEs will monitor rail temperatures through the day using the *Vaisala* website and compare the actual temperature with the quoted CRT on the tracks.
- The Lucc ASSETS NOE will text out remote temperature monitoring trigger information and will notify the Service Manager that the trigger temperature has been reached.
- The affected Track Infrastructure Manager will be responsible for raising the job with the Lucc Asset Team to implement cab riding or place TSRs (via the Service Manager).
- TSRs will be implemented by turning Speed Restriction Boards, which are already in place. These can be turned back once the CRT has dropped below the critical temperature.
- The affected Track Infrastructure Manager will also be responsible for any TSR withdrawal with subsequent notification from the Lucc ASSETS NOE that the temperature has fallen below CRT.
- In the event that TSRs need to be removed outside normal track shift patterns Track Infrastructure Managers should, where possible, make

arrangements for track staff to be available to turn the boards back on each line.

- Where track staff are not available, the ERU can be used, as a last resort, to turn the speed restriction boards (e.g. following the end of track shift in the pm).
- Where the heat is causing multiple issues across multiple sites, and there are not enough track staff to attend all sites, the Service Manager should be informed that CRTs have been reached and the implementation of a TSR is necessary, they can then implement the TSR station to station as a temporary measure.

Central line sites:

- Central line track will maintain an up to date file showing the current status of Central Line Prevention Of Buckling (POB) accessible by the Duty Engineer and LUCC ASSETS NOE via livelink: - <http://llinkdms.mr.int/livelink/livelink.exe/overview/300299258>
- The Duty Engineer will monitor track temperatures and issue heat duties, TSR related cab rides and speed restrictions (via the Line Controller) and remove them once the temperature has fallen below the critical rail temperatures (via the DSIM).
- The Duty Engineer will inform the Track Infrastructure Manager that this has been carried out. The Track Infrastructure Manager will inform the relevant staff.

In the event that the Duty Engineer is unavailable:

- If there is no Duty Engineer relief, the Duty Engineer finishing shift must notify the following teams / individuals that there will be no DE before they book off:
 - Central line Service Manager
 - Network Operations Engineer (NOE) / Operations Engineer (OE)
 - Duty Signal Incident Manager (DSIM)
- The DE must undertake a full handover with the NOE and DSIM on any live issues / risks, and any TSRs.
- In the absence of a DE, the NOE/OE will then monitor any CRTs on the Central line and notify track if they reach the threshold (as per nearest *Vaisala* Weather Station)
- If a speed restriction is required this will be placed (as per BAU), by a T/O under instruction from the DSIM
- The request for the TSR will be made via the NOE, and relevant documentation completed and shared through the normal process.
- The NOE will contact the Central Line Track Manager and Service Manager to confirm any TSR changes.

JNP lines:

- The Jubilee, Northern and Piccadilly line track teams will monitor rail temperatures via the Vaisala website and the relevant action taken as detailed in the POB plan available to the NOE and track teams:

Metropolitan Line Specific Track Issues:

The following assets require additional attention:

Switch diamonds (“Moveable angles”) require painting with Heat Reflecting paint to reduce the amount of temperature related expansion on hot days. The point work involved is:

South of Harrow on the Hill:	200 crossover: 200MA, also the scissors crossover 202MA
Harrow North Junction:	Diamond crossings associated with 215 and 217 points – 215 and 217 MA

8.3 Harrow Hot Weather Plan

Because of the physical characteristics of the point work, it is necessary to leave 200, 201, 202, 215 and 217 points in the normal position at extremes of temperature.

Following failures in high temperatures, the automated temperature monitoring equipment at Harrow will be used to identify when the rail temperature reaches 27C. The use of this point work will then cease until it falls below 27C.

The NOE will monitor the rail temperatures and advise the MCL Service Manager when use of 200, 201, 202, 215 and 217 points should stop, and also in the afternoon when temperatures have declined sufficiently to allow normal operation to be resumed.

8.4 Bakerloo line Specific Track Issues

Network Rail are responsible for the track asset north of Queens Park. They are responsible for ensuring rails are stressed to the appropriate level, and will monitor critical rail temps. When a blanket speed restriction needs to be applied this will be organised by Network Rail with the Bakerloo Line Service Manager.

8.5 Lubrication Management

Prevention of wheel screech & corresponding wheel spalling on the fleet and rail damage:

In certain weather conditions the problems of wheel screech can increase. If a wheel screech problem is identified it should be reported to the LUCC Asset Team and a fault raised:

- for track teams to assess as soon as possible and implement appropriate mitigation (e.g. hand greasing);
- to ensure the lubrication team is informed so track side lubricators are checked and if necessary adjusted.

Once identified the area should be monitored closely in case of re-occurrence.

Points and crossings

All pointwork can be affected in hot weather. This can result in slide chair lubrication deteriorating resulting in points failures.

When a hot weather warning has been issued, track teams should pay particular attention to slide chair lubrication during patrolling and if required arrange additional lubrication.

8.6 Conductor Rails

Track also ensures that the nuts and bolts on anchors shall be kept oiled and the caps of the six insulators at each end of each rail are greased to allow easy movement of conductor rail ends. This applies to both composite and non-composite conductor rails. Composite (aluminium) conductor rails must also be able to expand freely without binding on the retaining lugs of the insulator cap or the anti-friction pads.

8.7 Vegetation control

Vegetation control (weed killing) inside the cable run is managed via the Vegetation Delivery Team:

Track bed:

The Vegetation Delivery Team will manually spray herbicides in key locations and will remove any build-up of weeds. Notification of these works is published in the Traffic Circular.

Lineside

The Vegetation Delivery Manager is responsible for managing the vegetation between the cable run and the fence line, through their Vegetation Contract Managers (zonal based e.g. East end of the Central and District line). The actual work is undertaken both by directly employed staff and specialist contractors.

Note the vegetation control is a year-round activity with gangs trimming trees and trackside vegetation.

The Vegetation Manager has confirmed the 2022 programme to keep the cable runs free from vegetation is continuing to plan. In addition, the vegetation teams will monitor areas where the LU cable run is on 3rd party property with others responsible for the vegetation (for example Network Rail at Barking) and report any areas requiring attention.

Fire risk

This is particularly the case if there is a combination of litter build up and oil/grease. All the track teams have access to oil absorbing compounds to use around flange oilers which are the prominent source of grease.

- The Track litter picking programme (managed by the Cleaning Delivery Manager) now only covers tunnel areas. Track litter picking in open sections will only take place when a job is raised via the LUCC Asset Team.
- All Stations, Operational and Asset staff to report the build-up of litter to the LUCC Asset Team if spotted during routine inspections for a job to be raised with the Cleaning Delivery team.

8.8 **Flooding**

There is a separate heavy rainfall plan which details areas most at risk, mitigation and management arrangements⁴.

Heavy thunderstorms bring the risk of flooding, either during a storm, or later if an initial storm caused the drains to become clogged with debris.

Civil engineers are responsible for having a detailed plan of drain maintenance which is covered by two areas:

- Station drainage has a regular program of maintenance which covers all the drains within stations.
- Track drainage also has a maintenance plan, but certain critical areas are monitored as a high priority.

⁴ Link to the heavy rainfall and flooding plans:

<https://transportforlondon.sharepoint.com/sites/weather-event-plans/SitePages/Network-Heavy-Rain-and-Flooding-Plan.aspx>

9 FLEET

Train equipment assessed to be critical or cooling equipment in hot weather is detailed below.

	Fleet – Air conditioning & Fan Systems
Line	Cab Air Conditioning / Air cooling Saloon Ventilation Fans
2009 TS Victoria line	Cab air conditioning and saloon fans included in maintenance regime – no concerns
1972 TS Bakerloo line	Cab air conditioning and saloon fans integral part of train maintenance regime – no concerns
1992 TS Central line and Waterloo and City lines	Air Conditioning maintenance is a specific action within the modular maintenance regime between Feb and April. Whole fleet now has forced cooling of the ATO controller equipment to avoid heat build-up.
'S8' trains, Metropolitan line, 'S7' trains, Circle, H&C, and District lines	S8 & S7 trains not offered for service without functioning air conditioning. Now established equipment, no problems anticipated.
1996 TS Jubilee line	Cab cooling maintenance integral part of train maintenance – summerisation plan has begun, no problems anticipated.
1995 TS Northern line	Cab cooling maintenance integral part of train maintenance – summerisation plan has begun, no problems anticipated.
1973 TS Piccadilly line	Cab cooling maintenance integral part of train maintenance – summerisation plan has begun, no problems anticipated.

10 SUMMER UNIFORMS

10.1 Provision

Local managers are responsible for ensuring that their staff are issued with appropriate uniform items and PPE for summer.

10.2 Specific risks arising from Summer Uniforms

Staff to be reminded that when accessing the track full length trousers should be worn.

Train drivers (if wearing shorts) must remember to carry a pair of paper (disposable) trousers whilst on duty.

APPENDIX 1 - LINE SPECIFIC INFORMATION – STALLED TRAINS/ TUNNEL VENTILATION

Bakerloo line 1972 TS trains only have limited ventilation fan capacity. The train braking system dissipates energy as heat. The tunnel section south of Queens Park was not built with separate ventilation shafts. In consequence the tunnel section is prone to high temperatures, notably between Paddington and Baker Street.

Central line 1992 TS trains have forced ventilation (powered by batteries) which operates automatically and can be sustained for approximately one hour following switching off of traction current. The tunnel section between White City and Liverpool Street was not built with separate ventilation shafts so is prone to high temperatures. The sections Liverpool Street to Stratford and Leytonstone to Newbury Park do have separate ventilation shafts between each station.

Waterloo and City line 1992 TS trains have forced ventilation (powered by batteries) which operates automatically and can be sustained for approximately one hour following switching off of traction current. The running tunnels do not have a separate ventilation shaft so are prone to high temperatures

Victoria Line 2009 TS trains have forced ventilation (powered by batteries) which operates automatically and can be sustained for approximately one hour following switching off of traction current. The whole line does have separate ventilation shafts between each station.

Jubilee line 1996 TS trains have forced ventilation (powered by batteries) which operates automatically and can be sustained for approximately one hour following switching off of traction current. The tunnel section Finchley Road to Green Park has ventilation shafts between each station and can be kept cool. The tunnel section Green Park to Canning Town has a comprehensive ventilation system remotely controlled from Neasden which can manage air flows and can keep the tunnel cool around a stalled train.

Northern line 1995 TS trains have forced ventilation (powered by batteries) which operates automatically and can be sustained for approximately one hour following switching off of traction current. The tunnel sections of the line were not built with separate ventilation shafts and are prone to high temperatures.

Piccadilly line trains have ventilation fans. The train braking system dissipates energy as heat. The tunnel section between Barons Court and Finsbury Park was not built with separate ventilation shafts so is prone to high temperatures. The section north of Finsbury Park does have separate ventilation shafts between each station.

S Stock trains have a comprehensive ventilation system which continues to work (powered by train batteries) following switching off of traction current. The tunnel sections are reasonably well ventilated throughout.

APPENDIX 2 – EXAMPLE OF HOT WEATHER PLAN FOR KNOWN VULNERABLE POINTS

Example of a Bespoke Vulnerable Points Plan

This type of plan can be used/ modified if a set of points is identified as being at risk in high temperatures. Below details a plan put in place at Acton during the summer 2017 until the risk was removed.

40 pts at Acton.

- A Tech Officer should remain on standby at Acton Town once track temps of 32°C are reached. T/Os will monitor the points – but the points will remain in use.*
- The T/O should be briefed that in the event of a failure with 40 points they should go trackside first instead of to the IMR.*
- The Service Control Team should be briefed that in the event of WL25 route 1 failing that they should re-select for route 2. This should allow movement into platform 2.*
- The T/O arriving trackside will carry out testing and make assessment as to whether the points can be nursed to continue to operate both normal and reversed.*
- If the points are taken out of commission they should be returned to service once the track temperature falls to 32 degrees or below based on advice by the T/O or DSIM.*

APPENDIX 3 – AGENDA - 15:00 CONFERENCE CALL - RISK

Set up call on-line using “Teams” function when sending out invitations.	For use only if “teams” function has failed: Phone number: [REDACTED] Chairperson code: [REDACTED] Participant Code: [REDACTED]
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1. Roll call:

- **(Chair)** Senior Operating Officer
- Network Operations Engineer
- Central line Duty Engineer
- SCMs or Service Manager for each line
- Network Operation Tactical Manager
- Access Operations (Tim O’Sullivan/ Darren Pearce / Mriju Sukumaran)
- Resilience Team Rep (Alison Mansfield/ Malcolm Dymott)
- Asset Operations - On-Call
- TDM [REDACTED], Emily Herreras-Griffiths/ Libby Gibson / Ceri James / Sam Whitney)

2. Weather overview:

From the Met Desk Pan TfL Forecast - 5 day look ahead.

3. Discuss/ confirm the following actions:

- Readiness/ Resource availability of:-
 - Signals (NOE)
 - Track (NOE)
 - Confirm staff available to monitor track/ carry out cab rides
 - Fleet (NOE)
 - Stations (NOE)
- Update from the lines
 - Check any Infrequent Point Move requirements (SCM)
 - DRM availability to monitor essential points moves (SCM)
 - T/Os available to monitor essential points moves (NOE)
- R&E to confirm no planned works likely to impacted..... **(Access Operations)**
- Stations Hot Weather Comms in place **(NOTM)**
- External Comms in place **(TDM)**

4. AOB:

5. Close the call.

APPENDIX 4 – AGENDA - 15:00 CONFERENCE CALL - STRONG RISK

Set up call on-line using “Teams” function when sending out invitations.	For use only if “teams” function has failed: Phone number: 020 3651 8923 Chairperson code: 13071386# Participant Code: 53529691#
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1. Roll call:

- **(Chair) Senior Operating Officer**
- Network Operations Engineer
- Central line Duty Engineer
- SCMs
- NOTM
- Access Operations (Tim O’Sullivan/ Darren Pearce/ Mriju Sukumaran)
- Resilience Team Rep (Malcolm Dymott/ Alison Mansfield)
- Asset Operations
 - On Call Track Manager
 - Vegetation Delivery Manager (Joel Baker – one of the three vegetation managers if not available)
 - Stations – Mechanical Manager (Simon Lawlor/ Ben Jones/ Craig Patnell)
 - On Call Signals Manager
 - On Call Fleet Manager
- TDM (), Emily Herreras-Griffiths/ Libby Gibson / Ceri James / Sam Whitmey)
- External Comms
- NMCC Duty Manager
- If weather is exceptional, the Thalys Duty Manager in Lucca to be invited

2. Weather overview:

From the Met Desk Pan TfL Forecast - 5 day look ahead.

3. Discuss/ confirm the following actions:

Signals	<ul style="list-style-type: none"> • Vulnerable Points? • Known faults for CER/SER/IMR air conditioning? • Additional T/O Availability and planned location for known problem points? • Signals Resource availability in the event of TSRs? 	
Track	<ul style="list-style-type: none"> • Track Team Availability? • CRT Monitoring in place (and submitted to NOE?) • Track team give update on the 	

	likelihood of TSRs needed <ul style="list-style-type: none"> • Critical works impacted? • Vegetation all ok (track fires?) • Litter Picking up to date (track fires)? 	
Stations	<ul style="list-style-type: none"> • Air Conditioning outstanding faults (Service Control Rooms)? • Station Cooling and air conditioning maintenance up to date? 	
Fleet	<ul style="list-style-type: none"> • Any known concerns? 	
LUCC ASSETS NOE /DE	<ul style="list-style-type: none"> • Any further information/ updates from assets? 	
R&E	<ul style="list-style-type: none"> • Confirm no planned works likely to impact on service? 	
SCMs	<ul style="list-style-type: none"> • Confirm no anticipated issues with any Infrequent Point Move requirements? • Confirm DRM availability and location to monitor essential points moves? • Any issues raised by NR (line interfaces)? 	
NOTM	<ul style="list-style-type: none"> • Stations Hot Weather Comms in place? 	
TDM	<ul style="list-style-type: none"> • External Comms in place? 	
Resilience Team	<ul style="list-style-type: none"> • Any further information/ updates? 	
NMCC	<ul style="list-style-type: none"> • Any areas of specific concern from Surface/ Rail? 	
AOB		

APPENDIX 5 – AGENDA - AWCG (STRONG RISK ONLY)

Adverse Weather Command Group – Standing Agenda & Guidance Notes		
	Roll-Call.	<ul style="list-style-type: none"> • Head of Network Delivery/ Head of Command & Control (Chair) • Senior Operating Officer • MetDesk Forecaster • Asset Reps (On-Call Signals, Track, Fleet, Mechanical) • B&V line rep • Cen line rep • Jub line rep • Nor line rep • Pic line rep • Met line rep • H&C line rep • Dis line rep • Line Operations Director • Customer Service Director • Access Operations Rep • Communications/ TDM Rep • Surface Transport Rep • Others – (Optional Attendees) Director of Asset Operations, Director of Network Operations
	MetDesk Forecaster	<ul style="list-style-type: none"> • Will give an update on the weather forecast, including, timings and longevity.
	SOO briefing.	<p>SOO to give an update briefing to provide the AWCG with the current status of the network and 321 planning.</p> <p>Review of actions from previous meetings.</p>
	Strategic Direction/ Priorities/ Actions	<p>Discuss the strategic direction, priorities and actions for the business, taking into account the update given by the SOO focussing on:-</p> <ul style="list-style-type: none"> • Any known Service restrictions or closures, • Any known Asset restrictions • Status of Surface Transport • The impact of other TOC Operations • Customer communications – to reflect the available level of train service or alternative routes. • Maintain LU staff confidence. • Supporting Company (both LUL and TfL) reputation. <p>After the strategic direction and actions have been agreed the TDM/ Communications Rep will ensure these outcomes are delivered to the business (where appropriate) using standard Communications channels</p>
	AoB	
	Confirm agreed actions	Chair to read back agreed actions, and confirm with all members they are fully aware of the tasks required to be undertaken and their respective timescales.

	Arrange next meeting	Set a timetable for further meetings
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APPENDIX 6 – PLANNED BTRS / P&C WORK FOR SUMMER 2022

Start Date	End Date	Line	Service Closure/Impacted Route	Work Scope
Sat 26-Mar-2022	Fri 01-Apr-2022	Northern	Moorgate to Kennington	Bank Blockade
Sat 02-Apr-2022	Sun 03-Apr-2022	Metropolitan	Northwood to Amersham, Chesham, Watford (Chiltern closed)	4LM SMA13
Sat 02-Apr-2022	Fri 08-Apr-2022	Northern	Moorgate to Kennington	Bank Blockade
Sat 09-Apr-2022	Sun 10-Apr-2022	Bakerloo	(NR) Queen's Park to Harrow & Wealdstone	NR Track maintenance
Sat 09-Apr-2022	Fri 15-Apr-2022	Northern	Moorgate to Kennington	Bank Blockade
Fri 15-Apr-2022	Mon 18-Apr-2022	District	Tower Hill to West Ham	Crossrail
Sun 17-Apr-2022	Sun 17-Apr-2022	District	(NR) Turnham Green to Richmond	NR Cyclic maintenance
Fri 15-Apr-2022	Mon 18-Apr-2022	Hammersmith & City	Hammersmith to Barking	Crossrail
Fri 15-Apr-2022	Sat 16-Apr-2022	Northern	Charing Cross and Euston (City) to Stockwell and Battersea	BSCU
Sun 17-Apr-2022	Mon 18-Apr-2022	Northern	Moorgate to Kennington	Bank Blockade
Sat 16-Apr-2022	Fri 22-Apr-2022	Northern	Moorgate to Kennington	Bank Blockade
Fri 15-Apr-2022	Mon 18-Apr-2022	Piccadilly	Acton Town to Heathrow and Rayners Lane to Uxbridge	P&C Northfields
Sat 23-Apr-2022	Sun 24-Apr-2022	Central	Woodford to Epping	Railgrinding
Sat 23-Apr-2022	Fri 29-Apr-2022	Northern	Moorgate to Kennington	Bank Blockade
Sat 30-Apr-2022	Mon 02-May-2022	Bakerloo	(NR) Stonebridge Park to Harrow & Wealdstone	NR Track maintenance
Sat 30-Apr-2022	Mon 02-May-2022	District	Earl's Court to Wimbledon	Parsons Green
Sat 30-Apr-2022	Mon 02-May-2022	District	Tower Hill to West Ham	Crossrail
Sat 30-Apr-2022	Mon 02-May-2022	Hammersmith & City	Hammersmith to Barking	Crossrail
Sat 30-Apr-2022	Fri 06-May-2022	Northern	Moorgate to Kennington	Bank Blockade
Sat 07-May-2022	Sun 08-May-2022	District	Tower Hill to Upminster	4LM SMA06/07 System Test
Sat 07-May-2022	Sun 08-May-2022	Hammersmith & City	Hammersmith to Barking	4LM SMA06/07 System Test
Sat 07-May-2022	Fri 13-May-2022	Northern	Moorgate to Kennington	Bank Blockade
Sat 14-May-2022	Mon 16-May-2022	Northern	Moorgate to Kennington	Bank Blockade
Sat 14-May-2022	Sun 15-May-2022	Piccadilly	Acton Town to Heathrow	P&C Northfields
Sat 21-May-2022	Sun 22-May-2022	District	Tower Hill to West Ham	Crossrail
Sat 21-May-2022	Sun 22-May-2022	Hammersmith & City	Hammersmith to Barking	Crossrail
Sat 21-May-2022	Sun 22-May-2022	Northern	Archway to High Barnet and Mill Hill East	East Finchley platform works
Sat 28-May-2022	Sun 29-May-2022	Piccadilly	Acton Town to Uxbridge	BTR Sudbury Town/Hill
Thu 02-Jun-2022	Sun 05-Jun-2022	Northern	Archway to High Barnet and Mill Hill East	East Finchley platform works

Sat 11-Jun-2022	Sun 12-Jun-2022	Circle	Aldgate to Edgware Road (via Victoria)	Crossrail, Tower Hill points, rail grinding
Sat 11-Jun-2022	Sun 12-Jun-2022	District	Embankment to Upminster	Crossrail, Tower Hill points, rail grinding
Sat 11-Jun-2022	Sun 12-Jun-2022	Hammersmith & City	Hammersmith to Barking	Crossrail, Tower Hill points, rail grinding
Sat 18-Jun-2022	Sun 19-Jun-2022	Circle	Until 08:00 Sat: Whole line	SMA06 Go Live
Sat 18-Jun-2022	Sun 19-Jun-2022	District	Until 08:00 Sat: Ealing Broadway to Richmond and Dagenham East, Edgware Road to Kensington (Olympia) and Wimbledon From 08:00 until 11:00 Sat: Whitechapel to Upminster From 11:00 Sat and all Sun: Stepney Green to Becontree	SMA06 Go Live
Sat 18-Jun-2022	Sun 19-Jun-2022	Hammersmith & City	Until 11:00 Sat: Hammersmith to Barking From 11:00 Sat and all Sun: Stepney Green to Barking	SMA06 Go Live
Sat 18-Jun-2022	Sun 19-Jun-2022	Metropolitan	Until 08:00 Sat: Aldgate to Wembley Park	SMA06 Go Live
Sat 25-Jun-2022	Sun 26-Jun-2022	Circle	Aldgate to Edgware Road (via Victoria)	South Ken ITT
Sat 25-Jun-2022	Sun 26-Jun-2022	District	Embankment to Earl's Court and High Street Kensington to Edgware Road	South Ken ITT
Sun 26-Jun-2022	Sun 26-Jun-2022	District	(NR) Turnham Green to Richmond	NR Cyclic maintenance
Sat 02-Jul-2022	Sun 03-Jul-2022	Piccadilly	Acton Town to Uxbridge	BTR Sudbury Town/Hill
Sat 09-Jul-2022	Sun 10-Jul-2022	Jubilee	Waterloo to Stanmore	4LM SMA08 and railgrinding
Sat 09-Jul-2022	Sun 10-Jul-2022	Metropolitan	Aldgate to Harrow-on-the-Hill	4LM SMA08 and railgrinding
Sat 16-Jul-2022	Sun 17-Jul-2022	Jubilee	Waterloo to Stanmore	ITT Wembley Park, Finchley Road
Sat 16-Jul-2022	Sun 17-Jul-2022	Metropolitan	Aldgate to Harrow-on-the-Hill	ITT Wembley Park, Finchley Road
Sat 23-Jul-2022	Sun 24-Jul-2022	Metropolitan	Wembley Park to Rickmansworth, Watford and Uxbridge (Chiltern closed)	4LM SMA09 system test
Sat 30-Jul-2022	Sun 31-Jul-2022	Circle	Aldgate to Edgware Road (via Victoria)	South Ken ITT
Sat 30-Jul-2022	Sun 31-Jul-2022	District	Embankment to Earl's Court and High Street Kensington to Edgware Road	South Ken ITT
Sat 06-Aug-2022	Sun 07-Aug-2022	Circle	Aldgate to Edgware Road (via Victoria)	South Ken ITT
Sat 06-Aug-2022	Sun 07-Aug-2022	District	Embankment to Earl's Court and High Street Kensington to Edgware Road	South Ken ITT
Sun 14-Aug-2022	Sun 14-Aug-2022	Bakerloo	(NR) Queen's Park to Harrow & Wealdstone	NR Track maintenance
Sat 13-Aug-2022	Sun 14-Aug-2022	District	Barking to Upminster	SMA07

APPENDIX 7 – SUMMARY OF OPERATING AND ASSET CHANGES COMPARED WITH 2021 SEASON

	Bakerloo	Central	Victoria	Waterloo & City	Jubilee	Northern	District	Piccadilly	Circle, H&C	Metropolitan
Operation	None	Night tube restarted	Night tube restarted	None	Night tube restarts 16 May	Night tube restarts summer 22	None	Night tube restarts summer 22	None	None
Effects	n/a	Equipment still in use overnight – less time to cool down	Equipment still in use overnight – less time to cool down	n/a	Equipment still in use overnight – less time to cool down	Equipment still in use overnight – less time to cool down	n/a	Equipment still in use overnight – less time to cool down	n/a	n/a
Assets										
Fleet	None	First trains with new traction control electronics in service	None	None	None	None	None	None	None	None
Effects	n/a	Monitor	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
Signals	None	None	None	None	None	Battersea Extension signalling	New signalling Earl's Ct area commissioned, Stepney – Barking goes live summer 22	None	None	None
Effects	n/a	n/a	n/a	n/a	n/a	Monitor	Monitor	n/a	n/a	none
Track	None	Small number of renewals	no open sections, little change to depot	none	none	n/a	Parsons Green points renewed	Northfields points, South Harrow sidings renewed	None	None
Effects	n/a	None	n/a	n/a	none	n/a	new assets less susceptible to heat issues	new assets less susceptible to heat issues	none	None
Civil Engineering (integrated with stations)	None	Elizabeth line station areas now LU assets at Bond St, Tott. Ct. Rd, Liverpool St	None	None	n/a	Bank station – new platform, tunnels and associated ventilation upgrades Battersea Extension in service	Elizabeth line station areas, new footbridge and station entrances in service at Whitechapel	None	Elizabeth line station areas now LU assets at Farringdon, Moorgate and Liverpool Street	n/a
Effects	n/a	n/a	n/a	n/a	n/a	Minimal	Minimal	n/a	n/a	none

	Bakerloo	Central	Victoria	Waterloo & City	Jubilee	Northern	District	Piccadilly	Circle, H&C	Metropolitan
Stations	None	Elizabeth line station areas	None	None	None	New stations on Battersea extension	Elizabeth line station areas	None	Elizabeth line station areas	None
Effects	n/a	Additional equipment	none	n/a	n/a	Additional equipment	Additional equipment	n/a	Additional equipment	n/a
Power	None	None	None	None	None	None	None	None	None	None
Effects	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Notes	Heat in tunnels is reason no improvements in train service – not sustainable on hot days	-	-	-	-	-	-	-	-	New tall buildings south of Harrow-on-the-Hill reflect heat onto 200 points – started to fail on hot days in 2021

Items in green have been updated for 2022

In addition, several stations have new MIP lifts. Past experience has been minimal or no heat related issues with these.

APPENDIX 8 – EXAMPLE OF TABLE FOR MONITORING CRTS

The table below will be maintained by Central Line track and reviewed by the Duty Engineer (up to date version available on livelink, <http://linkdms.mr.int/livelink/livelink.exe/overview/300299258>).

[illegible]

APPENDIX 9 – INFREQUENT POINT MOVES

	Location	Point Number	Action/ Notes
Bakerloo	Queens Park - Reversing from Northbound road to Southbound platform	21 pts	
	Queens Park - Reversing from Northbound platform back Southbound	19c, 19b pts	
	Queens Park - From both platforms into or out of South Sheds	19's a,b,c, 20a 20b, 22a 22b, 23 pts	
Central	North Acton from platform 2 to the westbound road	2405 / 2404 pts	
	Northolt from platform 1 to the eastbound road	1605 / 1606 pts	
	Woodford from platform 2 to the eastbound road.	7316 / 7317 pts	
Victoria	N/A – All infrequent moves in tunnel section and unaffected by hot weather.		
Jubilee	West Ham	9a and 9b pts	
	Finchley Road	20a and 20b pts	
	Neasden	22a and 22b; 28a and 28b pts	
	Wembley Park	47a and 47b pts	
Northern	Colindale Sidings	P7a/7b & P8a/8b pts	T/O standby
	Finchley Central South Sidings	P56a/56b & P58a/58b pts	T/O standby
	East Finchley Crossover	P23a/23b pts	Out of commission in hot weather
Piccadilly	Acton Town	42,47,76 & 77 pts.	
	South Harrow	12 pts	
	Hounslow Central	5 pts	
	Boston Manor	7 pts & 8 pts	Lower Risk - Used in the AM start-up and PM close-down, when it is cooler.
	Northfields	22 pts	

	Location	Point Number	Action/ Notes
	Hammersmith (Again – some of these are only regularly used when its cooler)	All pts	
District	Hammersmith	17a pts	22a, 23a points decommissioned and removed.
	West Kensington	12a, 12b pts	
	Earl's Court	14b, 17b, 23a, 23b pts	
	Gloucester Road	205a, 205b pts	
	West Ham	12a, 12b, 13a, 13b, 14a, 14b, 15a, 15b pts	
	East Ham	5a, 5b pts	
	Upney	23, 24a, 24b pts	
H&C / Met	Harrow on the Hill	200, 201, 202, 215 & 217 pts	See section 8.3

APPENDIX 10 – CONCERNS IN THE EVENT OF DROUGHT CONDITIONS

Key water issues:

- Every station fire protection system monitors water main pressure and will automatically flag any reduction. Where the reduction is sufficient to degrade the fire protection response it will set off the fire alarm causing station to be evacuated. This applies to any station with water based protection – for example all with escalators.
- Keeping trains clean is part of essential maintenance, dirty trains are more likely to suffer doors failures and dirt on the underframe is a fire hazard.
- Fleet aim to pass every train through a washing machine every 3 to 6 days. All train washers are relatively new and generally use recycled water except for the final rinse.
- Trains also receive heavier, manual, exterior cleans (more thorough wash, and covers any areas missed by washing machines)
- Prior to heavier maintenance, most of the parts of trains subject to worst dirt build up and some other equipment are subject to high pressure water jetting. This is important – cannot effectively inspect for crack/damage under dirt.
- If drought lasts through summer into autumn, the 3rd party (Network Rail and Chiltern Railways) high pressure water jetting trains on Metropolitan Line may be affected. Although not re-filled by LU, they do get filled in London region.
- Also related to drought is:
 - The impact on earth structures:
 - Increased risk of lineside fires from dry vegetation (difficult to clear – bird nesting season is about to start)

APPENDIX 11 – MECHANICAL EQUIPMENT DETAILS

Locations with Enhanced Maintenance Frequencies:-

The following locations will receive enhanced maintenance:-

Weekly maintenance during engineering hours at the following locations:

Liverpool Street Central line CER and SER P Way area
Holborn Secure Rooms, Central line CER and SER (Remote monitoring installed)
Tottenham Court Road Central line CER and SER
Waterloo IMR (Bakerloo Line only)
Piccadilly Circus Chillers (Machine Chamber)

Weekly maintenance during engineering hours on secure room assets within SER/UPS rooms at the following Victoria Line upgrade sites:

Blackhorse Road	Northumberland Park Depot
Brixton	Oxford Circus
Finsbury Park (Vic Line SER only)	Seven Sisters
Highbury and Islington	Stockwell (Vic Line SER only)
Kings Cross	Tottenham Hale

JNP locations:-

All secure rooms will be on a PPM frequency of 4 weeks on sub surface locations or problem locations identified via the reliability growth plans.

All faults will be responded to within 2 hours

All faults will be repaired within 4 hours, parts and access permitting

Victoria Line ventilation equipment

Mid-tunnel Ventilation Fans

The following fans will receive a major maintenance visit and 4 weekly checks:-

Coburg Street (Euston)	Moreton terrace (Pimlico)
Dover Street (Green Park)	Netherton Road (Seven Sisters)
Drayton Park (Arsenal)	Palace Street (Victoria)
Gibson Square (Highbury and Islington)	Pulross Road (Brixton)
Great Titchfield Street (Oxford Circus)	Rita Road (Vauxhall)
Kings Cross	Somerleyton Road (Brixton)
	Tynemouth Road (Seven Sisters)

JLE ventilation equipment

Mid-tunnel Ventilation Fans

The following fans will receive a major maintenance visit and weekly operational checks:-

Alaska Street Vent Shaft - Waterloo Station
Arlington Street Vent Shaft - Piccadilly Circus To Green Park
Canning Town Portal Vent Shaft - Canning Town To North Greenwich
Downtown Road Vent Shaft - Canary Wharf To Canada Water
Pioneer Wharf Vent Shaft - Canary Wharf To Canada Water
Prestons Road Vent Shaft - Canary Wharf To North Greenwich
Storey's Gate Vent Shaft - Westminster To Green Park
Wardens Grove Vent Shaft - London Bridge To Southwark
Stratford Station
North Greenwich Station
Canary Wharf Station
Canada Water Station
Bermondsey Station
London Bridge Station
Southwark Station
Waterloo Station
Westminster Station
King's Cross Station

Platform Air Conditioning Units

Oxford Circus and Green Park

Both locations receive a clean in April and September and are left to run on fan only to assist air movement

Blue Summer Fans

Blue Summer Fans are large, heavy duty, free standing, portable fans used during warmer periods to move air in specific public areas on some stations. Power supplies are in place.

The Blue Summer Fans are installed within a meshed cage.

The Blue Summer Fans shall be cleaned in and out of season and maintained in season only.

Angel	Bond Street x 2	Earls Court
Bank/Monument x 2	Caledonian Road	Elephant and Castle
Belsize Park	Chancery Lane	Green Park
Blackhorse Road x 2	Charing Cross x 3	Hampstead

Holland Park x 2	Manor House	Tottenham Hale
Kings Cross	Notting Hill Gate	Warwick Avenue
Knightsbridge	Seven Sisters	Waterloo
Liverpool St x 2	St Johns Wood	

The Blue Summer Fans will be run from May to October, the exception to this will be the fans at Bank/Monument and Kings Cross which will be left in an operational state and turned on and off at the discretion of the Station Staff.

The maintenance regime is as follows:-

4 weekly:-

- Switch off fan and isolate at the power supply isolator.
- Open enclosure and sweep around the base.
- Remove dust and any debris.
- Wipe front grille, rear grille and top of fan to remove excess dust
- remove front / rear grille to clean inside the head unit.
- Wipe dust from fan blades, motor unit and inside of the casing.
- Clean doors top and rear of enclosure
- Return to service.

APPENDIX 12 – SUMMARY OF HEAT RISKS AND MITIGATION

Risk	Cause(s)	Mitigation	Challenges
Tube tunnels become unacceptably hot	High ambient temperatures Waste heat from equipment	Tunnel ventilation fans Station comfort cooling Restrictions on train service increases	S stock air conditioning warms sub-surface tunnels Increasing passenger volumes warm tunnels
Train interiors become unacceptably hot	High ambient temperatures	Cab air cooling/air conditioning (all passenger trains), Saloon ventilation fans (1972, 73 TS), Pressure ventilation (1992, 95 & 96 TS)	Keeping filters clean in air conditioning/cooling systems Both covered by fleet maintenance activities
		Full air conditioning on S stock	Reminding Train operators to leave the automatic door closing circuit 'switched in'
On first hot day of season train pressure ventilation fans fill saloons with dirt and dust	Dust builds up in winter when too cool for fans switch on	Systems re-designed to switch on at least once a week all year to keep ducts clear	-
Working environments become unacceptably hot	High ambient temperatures, lack of shade	Comfort cooling, window blinds in train cabs, emergency water supplies (Section 4.0 of this plan).	Required PPE for staff working outside and in tunnels
Equipment overheating (especially on first hot day of season)	Clogged filters / ducts in air conditioning	Comprehensive routine maintenance regime for cooling systems Location specific maintenance intervals to suit known speeds at which filters clog up	New systems not on asset register Train service increases may increase rate that filters clog up in air conditioning
Track buckling	Running rails expand in heat	Pre-season rail stressing programme Prohibition of disturbance of ballast when rails are hot Heat patrolling when rails in compression, with speed restrictions in extreme heat temperature Weather stations remotely monitor rail temperatures - minimises time patrolling/speed restrictions have to be applied	Keeping records up-to-date if stress lost (e.g. emergency repairs break track) and following renewals
Track tamping programme disrupted	Unable to tamp above set temperatures	None, other than avoiding programming too much work mid-summer	Loss of productivity
Track lubrication regime fails	Lubricant properties change with heat (e.g. lose viscosity on rails)	Lubrication teams warned if unexpectedly high or low temperatures anticipated Track lubricator settings adjusted Continuing work reviewing and testing new lubricants / techniques	Temperature changes at faster rate than routine maintenance dates Other works prevent access to lubricators
Track – increased point failures	Switch rails expand – switch diamond crossings particularly susceptible	Known 'problem' switch and stock rails painted white to reflect heat Restrictions on use of known suspect assets (e.g. Harrow North Junction) Renewals avoid use of switch diamonds	Operational inconvenience at loss of route – associated delays – though minimised by timetable changes

Risk	Cause(s)	Mitigation	Challenges
Air operated equipment - unexpected failures	Glycol added in winter becomes very viscous in heat and clogs air valves	Clean out glycol from air operated equipment on 16-week maintenance cycle Enhanced air dryers mean no longer necessary to use glycol in many air systems	16 weeks may be too long an interval in selected locations
Equipment overheats on very hot days	Insufficient ventilation / cooling	Most equipment rooms have air cooling systems (see above) Ventilation improvements (e.g. Central line 1992 TS ATO controllers) Good initial design e.g. heat sink for series diode on 1973TS Replace equipment unable to cope (e.g. a faulty batch of position detectors in 2012) Monitor brand new equipment e.g. new 'MIP' lifts at several stations	Future increases in train services, also climate change, may increase heat production beyond system capabilities Unexpected problems with new equipment
Lineside fires – especially around cable runs	Vegetation becomes dry and prone to combustion, discarded litter lineside and behind platforms in open areas	Routine vegetation clearance – all cable runs cleared Routine litter picking (especially glass bottles) Smoking ban has reduced risk of starting fires Litter bins re-introduced on stations	Cable runs on 3 rd party property (e.g. Network Rail at Barking) Neighbours and passengers throwing rubbish over bridge parapets and fences
Flooding Thunderstorms	Very heavy rain concentrated in one area	Weather forecasts warn in advance of event, cleaners on stand-by to clear up water Routine maintenance of drainage and pump systems Track renewals generally include drainage improvements (Details in heavy rain and flooding plan)	Warnings sometimes insufficient in detail and timing to get staff to site No where to put water if it overwhelms the public sewers Not all locations adequate sumps for unexpected flooding