Vegetation Management: Why we do what we do

Fenceline Clearance:
Railway standards require that the strip adjacent to the fence is clear of woody or tall vegetation, both at ground level and above. This strip is cleared for the following reasons:

- Inspection of boundary fences, for condition and trespass
- Enable maintenance of boundary fencing and gates
- Access / egress to track, trackside land and railway infrastructure
- Emergency escape routes should there be an incident on the track or trains.
- Prevent the encroachment of third party structures / property

Track & Cess Clearance:
Vegetation on the track and cess must be removed for the following reasons:

- Prevent vegetation fouling the railway, equipment or passing trains
- Remove the risk of fires, which could occur if dry vegetation is present
- Allow a safe route for people to walk along the track to carry out inspections, or to safely stand whilst a train passes

Structure and Infrastructure Clearance:
Vegetation must be kept clear of all structures and equipment for the following reasons:

- Allow access and egress
- Allow for inspection
- Prevent damage
- Reduce or remove the risk of heave or subsidence

Drainage Clearance:
Vegetation may be removed where it encroaches onto ditches or into drains, or where it has the potential to do so to reduce likelihood of

- flooding to 3rd party land and property,
- flooding on LUL land could result in train interruptions and damage to track infrastructure.

Non Native Invasive Species (NNIS) Clearance:
There are several species of plant which require management in line with legislation and best practice. This is generally to prevent the spread of the plant.

Tree Work:
Trees are acceptable on railway land where the space is sufficient and there is no risk to the railway. Trees will be removed for the following reasons:

- Insufficient width of trackside land to support trees in close proximity to the track
- Unsuitable tree species
- Unsuitable growth habit; trees have grown in a group and are thin with small crowns, and therefore not suited for retention or for ongoing reduction or pollarding regimes
- Continuation of an already established maintenance routine; where trees have been coppiced, reduced or pollarded, you must then

continue that work on a cyclical basis, as failure to do this makes these trees a high risk of failure at their points of regrowth
- Trees drop leaves onto the track or cess which can then cause issues with rail adhesion
- Block or obstruct the line of sight for a train driver to a signal or sign
- Encroach on a structure or third party property
- Cause or have the potential to cause damage to drainage systems
- Cause damage to structures due to heave or subsidence
- Have defects, either growth or disease, which make the tree likely to failure

Ecology:
Vegetation operatives are briefed regards ecology and nesting birds. The site is assessed before and during works, and if a nest is found the work is stopped and a buffer zone of vegetation is left in place; work will then be completed at a later date when any chicks have fledged. Due to the size of the LU estate it is necessary to work all year round.

Standards for vegetation control

Over many years, Engineering Standards have been designed and implemented By London Underground to control the maintenance of the railway infrastructure. These standards are under periodic review and are controlled by Transport for London (TfL).

The Standard relating to vegetation control on trackside land is titled Landscaping and Vegetation, which was last reviewed in 2017. There is a separate standard for vegetation growing in the track.

The Standards are categorised as mandatory, therefore adherence to them is deemed safety critical.

The standard refers to various definitions:

Fence line strip – a one metre clear of vegetation on the trackside of the boundary fence

Lineside services – this is the cable run which carries lineside cables such as power, signalling and data. This should be maintained to be clear of vegetation one metre on either side.

Structures – including but not limited to: lineside signalling and power building to bridges, underpasses, drainage infrastructure such as culverts and catch pits. All of these structures need a one metre clearance of vegetation for maintenance and inspection.

Sight lines – on curves vegetation, including trees and understorey can either:

Obscure the train operator’s view of an upcoming signal

Or hinder data transference between signal points for trains under automatic operation.

Non-native Invasive Species – these are fauna and flora that are not native to British Isles and the control of which is mandated by legislation such as the Wildlife and Countryside Act 1981 (as amended) and the Plant Health (Forestry) Order 2008 (as amended). Examples of which include Japanese Knotweed *(Fallopia japonica)*, Giant Hogweed *(Heracleum mantegazzianum)* and Oak processionary Moth *(Thaumetopoea processionea).* Vegetation clearance is needed to control and treat these species, as required by law.

Controlling leaf – fall issues.

There are significant operational issues that result from tree leaves being shed onto the track. Leaves are drawn in between the wheels and rails of passing trains. There is a very narrow area metal to metal contact between the train wheels and the crown of the rail. When there is plant material on the rails, the first train to pass over them crushes the leaves releasing a paste of plant material and chlorophyll. The paste acts as a lubricant between the rail and the train wheels which prevents rail adhesion.

- The result of this is the trains cannot gain traction when going up an incline (wheel spin) and the wheels can lock and skid under braking. The serious consequences of this are:

- Trains unable to brake and passing signals at danger.

- Skidding causes metal to metal wear which results on flat spots on train wheels. This causes a rough ride for passengers, inefficient braking and a significant cost as the train has to be taken out of service and all the wheels replacing.

Why do the lineside services need keeping clear for inspection?

There are three main reasons why the cable runs needs to be kept clear of vegetation.

In dry conditions, if there is a build up of vegetation next to the cables, this becomes a fire hazard. London Underground trains are powered by a direct current third and fourth rail at ground level, which creates sparks between the rails and the pick up shoes on the trains. This could set fire to dry vegetation next to the cable run (as can sunlight concentrated through broken glass) and the subsequent track fire could damage any of the service critical lineside services. London Underground trains “fail safe” and as such, any system failure prevents trains from running.

Faults can also occur in the lineside cabling due to various other factors, such as age or rodent damage. Following a failure in lineside services, an engineer will need to undertake a fault tracing exercise which will not be possible if the cable are congested with vegetation.

Lastly, if routine maintenance is not undertaken, the natural succession of vegetation will take place and easy to maintain grasses will be replaced with woody vegetation such as bramble which will then be replaced by scrub species and small trees. The woody vegetation grows up through the cables and exerts hydraulic pressure on the cables, thus causing faults and service outages.

The cess: This area is between the shoulder of the ballast on which the rails sit and the trackside land – named because it was designed to allow the track bed to drain to lower ground and for water to be carried away by the trackside drainage. Often, the cable run is immediately adjacent to the cess. This area is safety critical for operational staff walking and working on the track as it is frequently a place of safety for staff to stand when trains are passing. As such, this area has to be kept clear of vegetation, particularly as trackside vegetation such as brambles, can easily encroach into it creating trip hazards right next to the trains and current rails.

Need to access for maintenance

The fence, cable and cess strips need to be kept clear of vegetation so that staff can access all areas of the track and trackside land without encumbrance. It should be noted that on London Underground, specialised training is needed for staff to go with two metres of any rail on land that is not protected by a physical barrier (such as a cable run). The rule on Network Rail is any area within three metres of any rail.

Therefore, wherever there is a cable run between trackside land and the rails uncertificated staff may access the area via gates in the fence. If there is no physical barrier, then routine maintenance can only be undertaken with trains running by certificated staff who are protected by other specialist staff with higher levels of track training – this greatly increases maintenance costs as there will be at least person present who's sole task is to warn to the productive staff of that trains are coming.

Keeping the fence line strip clear of vegetation allows access for staff and prevents customer complaints concerning TfL vegetation encroaching into their property. In addition, it allow access for TfL's pest control operatives to put down rodent control baiting stations to assist in preventing Rat infestations from London Underground property to neighbours, and vice versa.

Emergency actions

There are many gates in the fences alongside London Underground Lines. Emergency planners have this information available.

In the case of a major incident, such as a catastrophic infrastructure failure or a derailment, it may be necessary to detrain passengers via the nearest exit point, which may be a fenceline gate. It is essential that all safe walking routes to these gates are kept clear to allow safe evacuation for passengers in extreme circumstances.

Similarly, keeping safe access routes clear allow emergency services to access the track via the shortest possible route – traction current and train movement can be stopped should be necessary to access a train in between stations.

Tree maintenance

British trees are subject to many new challenges, such as Ash die-back. TfL have in place a three monthly, documented inspection regime of all trees on trackside land and other associated property.

Where diseased or dangerous trees are identified during the inspection regime, it is essential that they are felled or made safe as quickly as possible. However, it is possible that the treatments required may require "taking possession of the track", which means stopping trains and turning off the power until the job is done. There have been occasions in recent years where London Underground lines have been suspended due to just this issue.

Tree survey output is classified as to urgency and where urgent line closures are needed, this work is added into the "Possession plan".

The tree and vegetation inspection teams are specialist arborists / ecologists, who are qualified to undertake risk assessments. The hazard/risk dynamic next to a running railway is significantly greater than in the wider environment. Therefore, a tree with significant defects could be retained for wildlife habitat if growing in a field with few targets, but would be recommended for urgent treatment if growing next to a railway.

It should be noted that trackside land is within the definition of "Operational Land" in accordance with Section 262 of the Town and Country Planning Act 1990 (as a Railway Company, London Underground Ltd is classed as a "Statutory Undertaker". This means that trees between the operational boundary fences of London Underground property are exempted from the Tree Preservation Orders and Conservation area legislation; therefore there is no need to seek planning permission or consultation before felling a potentially dangerous tree.

Non native invasive species (NNIS)

As a landowner, TfL has responsibility under the Wildlife and Countryside act 1981 (as amended) to not “to knowingly cause to grow” the plant species listed in Section 14, Schedule 9 part II. There are three main NNIS plants that are found on the railway infrastructure.

Japanese Knotweed on TfL property can have a significant adverse effect on the value of neighbouring property. This species forms an extensive underground rhizome, which can cause Whilst it highly unlikely that NNIS originated from TfL property (unless via fly tipping), it is possible that TfL could be held responsible for NNIS invading their neighbour’s land.

Giant Hogweed poses a risk to human health as the sap contains a caustic agent that reacts with sunlight.

Himalayan Balsam spreads rapidly by seed and clogs watercourses and shades out native species on river banks.

In addition to the plants, TfL is also has responsibilities under the Plant Health (Forestry) Order 2008 (as amended) to notify the presence of Oak processionary Moth and to implement treatment regimes where mandated under a Forestry Commission Statutory Plant Health Notice. Oak processionary larvae are covered in thousands of microscopic urticating hairs, which are a hazard to human health.

TfL has for many years maintained a risk register database of all known NNIS on its land. TfL’s tree and vegetation inspectors check for the presence of NNIS during their three monthly inspections and update the NNIS risk register. The output from this risk register is sent to TfL’s specialist vegetation control contractors so that treatments can be undertaken and the treatment details are also added to the database.

Staff training

All staff working on the underground system must undertake training and pass an exam before they are permitted to enter. This basic “entry permit” is stored in the Network Rail Sentinel system. Additional rigorous training is required before staff are permitted to access the track. DBS checks are required before staff are able to enter sensitive areas such as sub-stations.

Staff involved in vegetation control must have specialist NPTC certifications before using either chainsaws or applying plant protection products. All staff using other powered tools will have been informed, instructed and trained in their use.