



## Designing with trees – Part 2: below ground challenges

Chair: **Holger Kessler**, Senior Stakeholder Manager, Atkins Réalis

### Legal rights to the subsurface

**Sarah Dodd**, Founding Director, Tree Law

### What do tree roots need and can we predict their behaviour?

**Andrew Hiron**, Director at Urban Plant Lab and a Senior Lecturer in Arboriculture and Urban Forestry at University Centre Myerscough

### Trees, SuDS and utilities can co-exist

**Katrina Wylie**, Associate Civil Engineer, Team Civic

Knowledge Partners: Chartered Institution of Highways and Transportation, Institute of Highway Engineers, Landscape Institute, Urban Design Group

NB: All recordings and presentations are on the TDAG website along with the information and links from the chat. <https://www.tdag.org.uk/past-events.html>

### SUMMARY

This is clearly a topic of great interest and concern and is reflected by the over 600 registrations and nearly 300 people attending on the day coming from all corners of the globe. While many of the issues discussed in the seminar were UK focused, many of them are universal and it is very interesting and helpful to learn more about how other countries are resolving them. So, thank you all for attending!

### QUESTIONS, COMMENTS AND SPECIFIC REFERENCES

**Sarah Dodd provided a very comprehensive review of the law in relation to trees.**

#### Issues around root severance treatments especially roadside trees:

The main purpose of using the allometric variables was to investigate a potential alternative to root pruning guidelines which use fixed root diameters, enabling practitioners to account for cumulative root loss during selective root pruning practises. In the context of this study, it is simpler to prescribe a trunk diameter-defined offset at which root loss should not occur. Since we observed physiological recovery of the 6x and 12x treatments, we conclude that linear root cutting should not be undertaken at distances closer than six times DBH in *Q. virginiana*, equating to  $\approx 25\%$  root system loss.

There have been legal cases involving utility tree root severance affecting Highways trees.

Would be good if Streetworks UK actually fed down to operatives. The latest (NJUG) updates 2023 and, 2026 particularly, now includes a generic arboricultural method statement. But I

have had to ask for these, generally after the fact when damage has been done. Science would indicate a 6 x diameter exclusion zone rather than the 1m in Vol 4 to avoid 'harm'.

- Is there a question of training needed for operatives?
- Extract from Streetworks: At a minimum, “reasonable steps” include notifying the Local Authority Arboriculturist (LAA) of intended works and adhering to the procedures and best practices outlined in this document. Some Local Authorities may also require an Arboricultural Method Statement (AMS) for approval before work begins.

How can the impact of undertaking works to the roots of a neighbour’s tree be protected?

Doesn’t the UK have a requirement to install utility conduits below the freeze / thaw depth which is typically 1 metre?

- UK identifies varying depths from 450mm BGL and lower for differing utilities. In addition, trenchless technologies are rarely utilised, particularly for repair and renewal.
- <http://streetworks.org.uk/wp-content/uploads/2024/07/Updated-SWUK-Guidance-on-the-Positioning-and-Colour-Coding-of-Underground-Utilities-Apparatus.pdf>

### **Tree rights:**

Thank you Sarah!! Perhaps slightly off-topic, but do you have any thoughts about including trees' rights in this rights overview when elements of nature have been recognized as legal persons?

- In terms of trees, etc. having legal rights, why not look at what other countries have done in terms of formulating and executing applicable legislation.
- Yes, as Sarah implied, this is a developing area of jurisprudence. The COP16 in Cali had a lot of discussions about rights of nature. The COP17 in Yerevan in October will probably be a good place to learn more about rights of nature.

SJ: A quick search came up with the following:

<https://theconversation.com/trees-rivers-and-mountains-are-gaining-legal-status-but-its-not-been-a-quick-fix-for-environmental-problems-211542>

I gather that trees have been granted rights in Ecuador (in 2008!), New Zealand , Colombia and Spain – meaning that the trees and other natural entities can be represented in court and have their interests protected legally. [Sarah – this would be interesting to explore further!]

- Legal position for proposed trees near utilities

### **Tree protection – rooting zones:**

The visual of a protected tree is not providing an accurate visual of the underground. Roots should be extending 2-3x the width of the crown instead of re-emphasizing the incorrect understanding of where roots really are. If roots were only where the visual displays them, the tree would not be able to remain standing. The tree requires that root plate in order to have the structural integrity to remain vertical. Visuals have power mores that words!!!

You mention that 90% of tree roots are within top 600mm of the subsurface - does this not depend on the size/age and species of tree?

- Not really - there are some trees with taproots but even then, the majority rest of the roots are in that 600mm
- If the tree was field grown and harvested with a tree spade, the chances of it regrowing the tap roots are all but nil.

- Yes, you're better starting with small cell grown stock.
- Thanks for your responses. So, even with mature trees like these (8 Auriol Rd - Google Maps) which are about 20m (?) tall, the roots would still be predominantly within the top 600mm?
- They do in when grown in natural conditions, however in the urban environment, they will often grow much more compactly.
- Well, no, they don't. It depends on how wide the crown is. A tall fastigate oak or a large cypress (or any number of large narrow crown trees) will have a crown radius of only a couple of metres, but a root system that extends maybe 20m

How can we "reserve" space for street trees - it seems to be whichever utility/use grabs a subsurface space first

- It's my opinion that taking the city centre as an example designers put the buildings and utilities in and then try to squeeze trees in what inadequate space is left. Or say there's no room (because they didn't make any)
- IMHO talking and coordination isn't really the problem; it's the inflexibility and risk averse attitude of Stats companies that is the biggest issue.

Should we push SUDS instillation in closer proximity to existing trees? Is it worth any potential risk?

Is the highway authority a "statutory undertaker"? And if so, in what circumstances have they the right to act in relation to legally protected trees not in their ownership?

- Yes, they are the Highways Authority. They manage their own trees and issue licences for street works
- I'm taking about trees that are not in their ownership
- If the highways authority undertakes works to the highway and there are roots from privately-owned trees that have grown into the public highway, then yes
- section 41 of the Highways Act, it reads:  
*(1)The authority who are for the time being the highway authority for a highway maintainable at the public expense are under a duty, subject to subsections (2) and (4) below, to maintain the highway.*  
*[F211(1A)In particular, a highway authority is under a duty to ensure, so far as is reasonably practicable, that safe passage along a highway is not endangered by snow or ice.]*

I cannot see anything about safety, and certainly nothing about trees.

I have had a look as Section 154 as well, but this is all about getting other people to cut their trees. I have also had a look at Section 130.

I suppose section 3 is a little helpful:

*Without prejudice to subsections (1) and (2) above, it is the duty of a council who are a highway authority to prevent, as far as possible, the stopping up or obstruction of— (a)the highways for which they are the highway authority,*

But it does not really clarify what preventing an obstruction means.

They aren't in most circumstances. A landowner has an exemption if the highway authority has served a 154 notice on them. And if the tree is actually obstructing the highway or about to then there is an exemption under 130 as you say - but its grey no doubt.

- Presumably the exemption is only for the minimum works necessary to provide the safe passage of user of the highway, rather than to fell a tree which has a failed branch or low hanging canopy?

Local Authority Highways are required to make TPO applications to the Planning Authority for pruning and felling operations. There are exemptions where trees are in a Conservation Area but not covered by a TPO

**From Sarah Dodd:** It's going to depend on whether their works are reasonably required to discharge a statutory function and there are no alternatives to the work that are being carried out.

**Tree protection:**

Having had to push for supervision and indeed ram of TPO'd tree with local water company doing works to a Cat A in the national collection, and been met with little support - what can we do to strengthen the practice in PD when statutory powers are used. The utility dug up systematically through a LWS of TPO'd trees.

So far, I have been unable to find anything that clearly says the county council are exempt from the need to submit an application for works to a TPO'd tree.

Guidance - Tree Preservation Orders and trees in conservation areas:

<https://www.gov.uk/guidance/tree-preservation-orders-and-trees-in-conservation-areas>

Did anyone mention the Right of Support of one property on another - similarly Rights of Light could impact legal aspects of trees near property boundaries in UK

- The right to light is a right to enjoy natural light that enters a building through a defined aperture. The most obvious example of an aperture is, of course, a window, although a right to light could similarly be acquired through a skylight or a window set in a door. Although rights of light can be expressly granted, this is rare. Most are acquired under section 3 of the Prescription Act 1832; that is, by the enjoyment of the light for at least 20 years before the time that legal proceedings are commenced, without interruption and without written consent. This is sometimes referred to as the 'right to light 20-year rule'. This right could only be obtained by pursuing the matter through the courts.
- The Rights of Light Act 1959 builds on the Prescription Act his Act and provides a framework for addressing disputes over light obstruction. It means that a notice can be served on the property owner, preventing the creation of a physical obstruction (such as a tall fence or a building) that prevents a neighbouring property receiving light. This notice is registered as a local land charge which will show up on a local search. In theory a case could be made for large trees blocking light However, trees are rarely implicated because they grow slowly, and it is difficult to be precise about when the loss of light occurred.

It's a common misconception that a homeowner can acquire a right of light in their garden. But the law provides no such right regarding land not built on. You may however have express rights to light created by your property deeds. If so, the official copy of your title from the Land Registry will confirm that. Also, your deeds may contain mutually enforceable covenants restricting both you and your neighbour from planting trees or high hedges.

BRE 209 2022 (Daylight and Sunlight) is key here, most broadleaves would not be a consideration for right to light due to the broken nature of light interference

**Andy Hiron outlined issues relating to tree roots from a tree biology perspective**

Andy when they talk about 30 cubic metres of rooting environment, does this mean 'soil' or opportunity for root growth?

- At Southwark we are advising all new trees in hard landscape provided by development shall meet minimum soil volumes m<sup>3</sup> and utilise soil cells

*Planting beds in the city of Stockholm – A Handbook.* Bjorn Embren et al (2017)

Available here: <https://www.tdag.org.uk/resources.html> Scroll down the page. We

- One of the advantages of the 30 cube Stockholm tree pits is that the structural soils can't be compacted so should be specified in high traffic event spaces for example. Protection zones become irrelevant.

- Unfortunately following the Stockholm tree planting strategy for how structural soil should be used is not as beneficial as it could be.

Structural soil was designed to replace compacted substrate underneath paved surfaces NOT as the planting medium. The experience is that structural rural soils, be they Amsterdam, CUsoil or Stockholm soil\*, favour fibrous roots development over woody structural roots. When you use structural soil as the planting medium, the structural roots remain underdeveloped which can lead to structural problems as trees grow into maturity.

The planting medium needs to be a good planting soil, preferable a loam that includes a clay component which would support the development of aggregates and the same recipe should also be the used for the soil that forms the soil component of the stone matrix of the structural soil to avoid interface issues and encourage root and water crossover.

\*I don't think that CU Soil and Stockholm soil are the same in composition.

- See <https://www.landscapeperformance.org/case-study-briefs/central-wharf-plaza>  
A success story in sand based structural soil

SJ: this needs further investigation as neither structural soils nor the use of cellular systems have had the advantage of time in terms of the long life of trees. Early results (20-25 years) on the work in Stockholm look promising and equally so with tree cells. It is something to watch and monitor over time – a review in 2050?

- Effective use of structural soils and case studies - now that's a worthwhile presentation in the making! I've heard lots of comments on this but would love to see the examples. I'm sure there are lots of good learnings there  
SJ: good suggestion!

**Back to root protection areas:**

In your example of the root protection area and removing so much root...surely the impacts are significant so how did the RPA get so established

- Worth noting that the RPA illustrates an area of soil volume, not the area where all tree roots are contained
- You're right that roots extend well beyond the RPA — BS 5837 acknowledges this. The RPA doesn't map root extent; it defines a minimum soil volume linked to survival, which tends to be most root-dense centrally. Wide lateral spread represents additional resource capacity, not a reason to reduce the protected zone. Where roots are known to

extend further and works encroach on those areas, that's a legitimate additional consideration — but it doesn't undermine the RPA as a baseline

- The important thing is to anticipate the mature size of the species one is planting and it is that knowledge that can inform the needed soil volume

Standard compliance is not grossly inadequate. A healthy tree can tolerate significant root loss. The key is the extent of root loss, and how close to the tree. it's very rare that a cut is made around an entire RPA.

- But does the RPA suggest that it would be OK if it did?
- It suggests that the tree will continue to function healthily yes. I'm not saying that's correct always, but it can be. Depends on the tree.
- Defo the RPA in the BS gives impression one can routinely encroach.
- On an Arb Association course a couple of years back, I was told that if you dig a pit at some distance from a tree and cannot find any roots you can assume that tree roots are present but just not visible without a microscope. My understanding was that roots of less than a fraction of a millimetre thickness would not extend more than a few millimetres beyond a visible point, at best. Any thoughts?
- I do think we need to allow a balance between competing priorities to exist, or we will never be heard.
- The majority of severe issues that I find with trees are related to misguided works done to them decades before, principally over-pruning of wood and roots. The RPA is an artificial construct that has no basis in research. It's a massive compromise at best.
- Is there not also the factor of delayed consequences? Trees with pruned root systems to BS standards often don't show symptoms for years even decades after the event. Too often I see established and properly protected trees on development sites fail years later but long before they should, indicating those protections are inadequate
- Yes, particularly in mature trees, between 1 and 7 years. The 6 x diameter rule along with chord length assessments of RPA impact are good tools in ensuring that root loss is well below 24%

### **Trees like to be with other trees**

One aspect that really worries me is the fact that trees support each other and communicate biochemically with each other, especially below ground. This is a fact that could support urban tree growth, but still hasn't been considered in urban design much. How can we promote more multi-tree plantings and changing planning away from single tree pits to "small woodlands", even if there are only groups of 5-10 trees?

- In our municipality, we try to provide incentives to developers to plant new trees to form future groves (Washington State, USA)

### **Street trees**

Many of the illustrations do not consider the urban kerb side situation. It is essential to remember that roots are opportunistic. The path that roots try to take is instigated by the presence of oxygen first and moisture second.

### **Guidance?**

Many thanks Andrew for your depth of knowledge. As practices in building integrated greening develop and mature, we are seeing more integration of trees on facades and roofs. Do you have any special advice or thoughts about risks and failure points to be cognizant of? ...or can you suggest sources of guidance?

Andy - if you had some succinct advice to undergraduate engineers to improve their working practice around trees, what would it be?

... or older professionals who never really picked up on this back in the 90's

**Katrina Wylie offered practice advice to show that trees and utilities can coexist and demonstrated this through the report that Civic have prepared for the GLA – *Dig Once, Green Twice***

What's the best way to bring utilities "on the journey". I've had conversations with utilities where I've been told "no trees within 4m of a utility". Which basically excludes tree planting anywhere in my whole city centre

- There isn't a legal basis for these 'requirements'
- Unless they own the rights 4m either side this isn't a valid consideration
- Utility providers take a very risk averse position. not sure how this can be addressed
  - There is no incentive for utilities companies to accept ANY kind of risk to their asset

S96 of the Highways Act empowers LAs to plant trees. It's the Law, utilities guidance is just that, guidance and if you follow Thames Water for instance, we would be prohibited from planting ANY street tree

...without prejudice to sub-paragraph (a)(ii), the felling or lopping of a tree or the cutting back of its roots by or at the request of, or in accordance with a notice served by, a licence holder under paragraph 9 of Schedule 4 to the Electricity Act 1989(4) (other powers etc of licence holders - felling and lopping of trees etc

Hi Katrina, from a practical perspective, how flexible are utility providers usually in working around proposed street tree planting, particularly in constrained footways where underground space is always limited?

Question for Katrina: I'm currently checking a tree-on-SuDS design for new link road located on a Greenfield site. The SuDS feature is a swale with a perforated pipe and a French Drain system since the ground has poor infiltration however the Designer wishes to install the trees over the top of perforated pipes. What features can we use to prevent the roots entering the perforated pipes?

- Standard filter fabric socks over the perf pipe, and then also a root barrier on top of the aggregate-filled trench that the perf pipe sits inside of...

Rhys Williams is a chartered civil engineer and associate director based in Civic's London studio. Rhys talks through the new GLA guide that is being delivered for Retrofitting Green Infrastructure in Utility Constrained Streets. He discusses why the guidance is being produced, what it says about trees, SuDS and utilities, how to use it in project planning, design and construction and what it means for coordinated street works.

<https://www.youtube.com/watch?v=XzaYmPFd46k>

Is it correct to say "rain gardens" are expensive to maintain

- I'd say no - not when you consider that any maintenance is likely to be cheaper than the maintenance of below-ground drainage systems, and that you are also reducing the maintenance required of other assets.

- No. Experience from places like Sheffield and Mansfield is that good design using stress tolerant plants with limited needs for pruning means a single cut at the start of the growing season. An issue can be litter being trapped, and fines blocking drains, but again, using the right grade of material will help which in itself dictates plant choice.
- They can be time consuming to maintain, if you prioritize keeping them weed free, pruned, aesthetically pleasing, etc.
- It depends. Compared to a gully, it will always be more expensive. If you're going for a full-on planter, then it needs to be maintained by a proper landscaping firm, but that doesn't need to be much more expensive than any other planter you install. You can install more simple raingardens which require only a little maintenance (like the Mansfield example already mentioned).

On a related point - street lighting often fights with trees. The East Riding Live Lab has just reported 1. Low level 3 metre lighting can be used in heavily treed locations ... versus 10-12 metre columns forcing light through canopy. #2. Low voltage system 24V DC can mean power is easily achieved by a thin cable which just goes just below the surface (why? because the impact of a strike is not going to cause the fatality risk!)

<https://www.eastriding.gov.uk/environment/roads-streets-traffic-and-parking/roads-pavements-and-traffic/live-labs-2/>

### Shared service ducts

Shared services ducting is regularly used in UK military bases but only as far as the gate.

- Interesting to hear this. Is this something they have specifically set out to deliver?
- Interesting. what is the motivation for making it happen here but not elsewhere? Is it risk, or because it is easier to get it through decision-making processes?
- If the Government is going forward with New Towns, surely this is the opportunity to introduce utility corridors and establish the principle.

Is there still a move towards less services being overhead (power, telecommunications, and broadband etc) but instead underground?

### TDAG Guides

Seems like a good time to be sharing some TDAG guide

- Urban Water - focus on treating water as a resource, rather than a problem  
<https://www.tdag.org.uk/first-steps-in-urban-water.html>
- Urban Heat <https://www.tdag.org.uk/first-steps-in-urban-heat.html>

I wish the government was building new towns, rather than in-filling every bit of green space within urban areas and increasing urban sprawl with high density housing schemes.

- Yes. but then there's the tension between the desire of people on the outskirts to build on brownfield infill rather than on their green fields, and those in the city centre arguing the opposite...

### Commuted sums

s.278 allows for commuted sums but rarely utilised and for not long enough (3 years v 25 years). Consequently, this will require a sequential drawdown which most LAs are not set up for and then become a liability for the LA.

- Another issue with commuted sums is do they get utilised for the item that they were taken for? Also does the Asset Team understand what unusual asset they now have to

look after or the experience to deal with said asset. Most of the time I would think that they don't

How about a dream from the webinar participants? I would love to see a webinar dedicated to building integrated trees. I think you may have had one a few years ago, but maybe time for a repeat?

- My dream: highway contractors realise trees are living things and treat them as well as they'd treat their grannies or their pets.
- Incorporate trees into CSCS certification. Engineers don't build out their schemes, contractors do

### Call for papers for World Green Infrastructure Congress

Call for papers/abstracts for World Green Infrastructure Congress 2026 in Barcelona October 27th - 29th closes on April 30th. We need more tree people there!

<https://www.wgic26.barcelona/speakers>

### Events by others

**Climate Resilient Streets.** Wednesday 3rd June in Walthamstow.

<https://www.landorlinks.uk/crs-2026>

This is a charged all day event.

### GENERAL REFERENCES

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Association of British Insurers - 'Protecting Your Home from Subsidence Damage':

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