

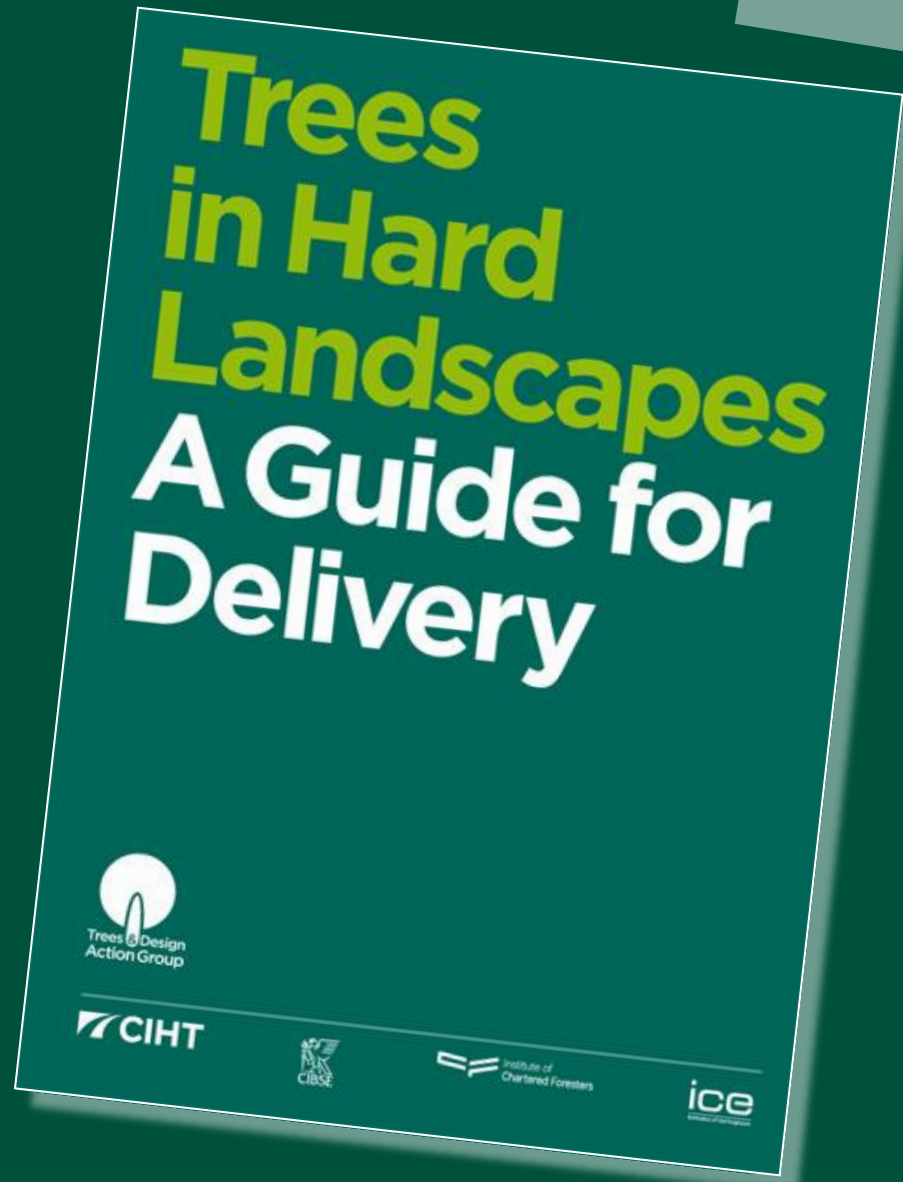


# Trees in Hard Landscapes

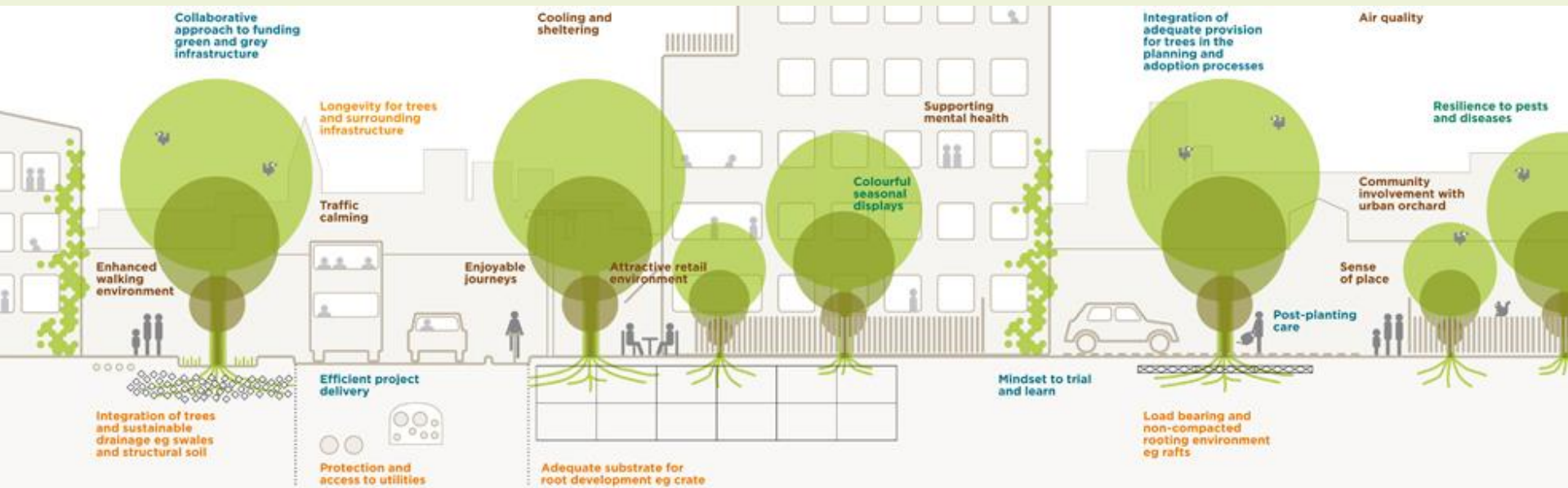
## What's in it for Scottish Cities?

23.06.2015 | Heriot-Watt University | Edinburgh

WHY?

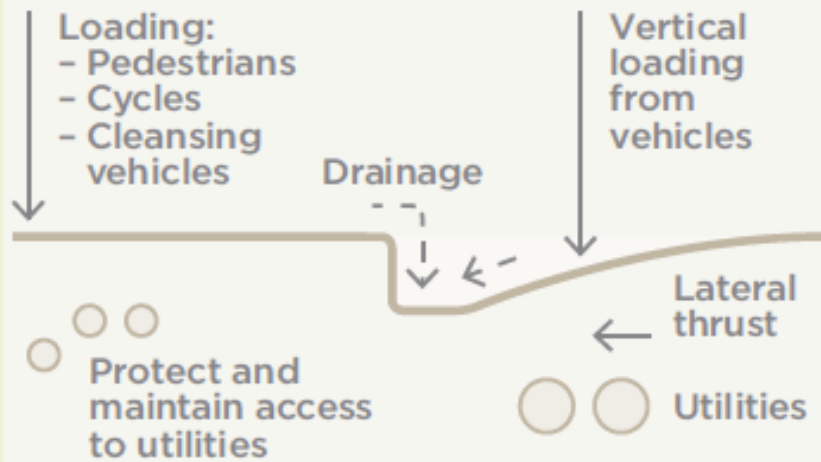




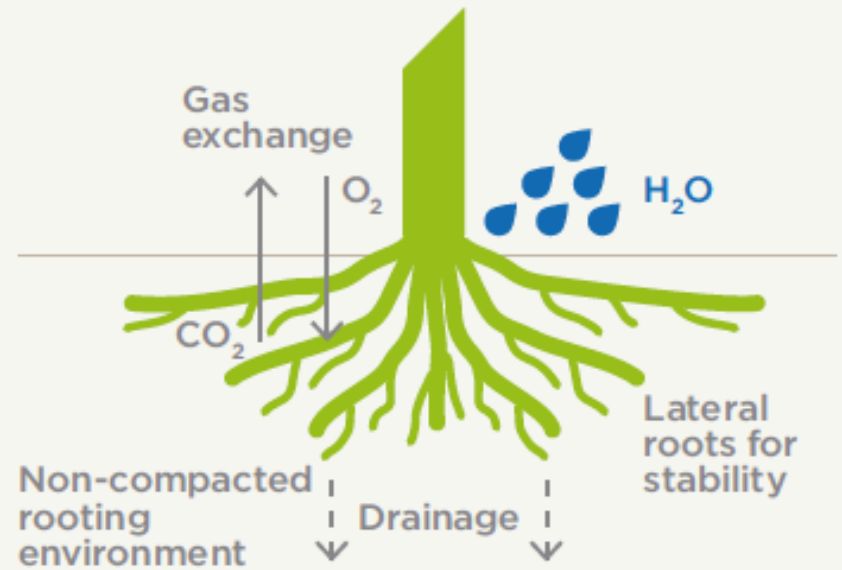


# Designing below-ground

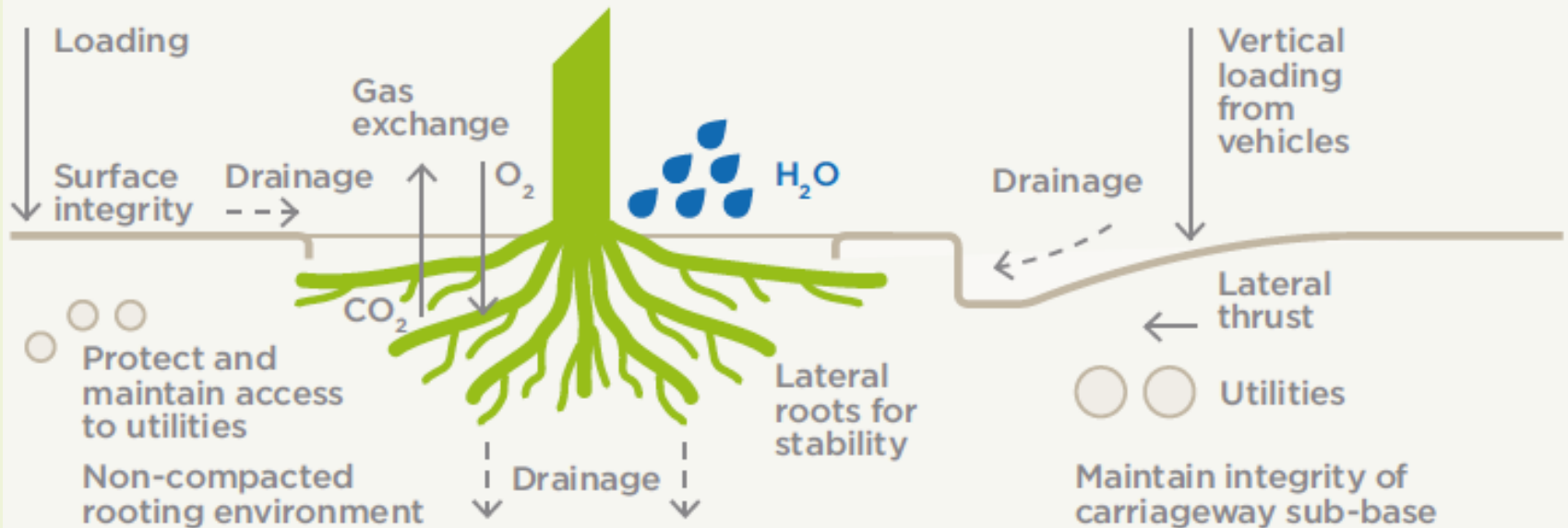
## Highway needs



## Tree needs



## Setting the brief



# Technical Design Solutions





**Working solutions:**  
Skeleton soil installation process for existing trees



Excavations start on Kornhamnstorg a public square in Stockholm's old town where lime trees show early sign of decline.



Large stones for the skeleton soil layer are being positioned and compacted in the newly created continuous trench.



Some roots have been pruned. Excavation and soil clearing near the root ball is carefully conducted with non-invasive tool.



High quality soil is applied around the pruned/dead root balls. Notice the root deformations caused by deep concrete casing used in the earlier planting hole design.



Root balls with new soil under protective cover and irrigation (notice the green watering bag around each tree). More soil is being flushed into the skeleton soil.

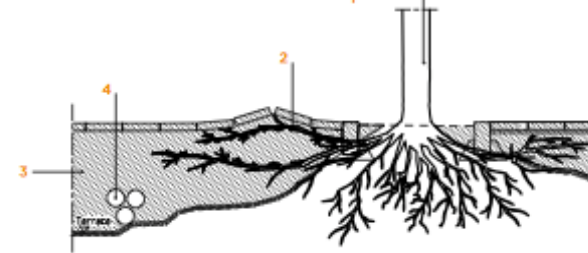


It includes an aeration well, to be capped with a grate sitting flush with the paving.

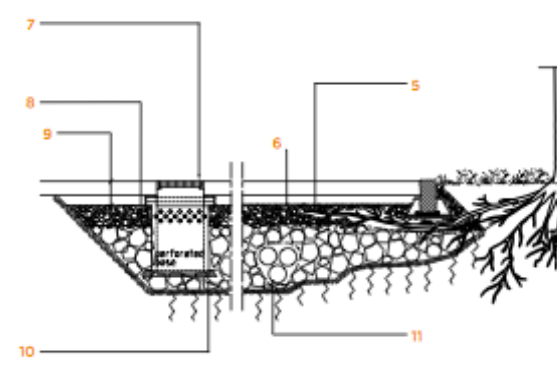


Following spring, regular watering is needed. Inlet between the two foreground trees.

Section for excavation around an existing tree



Section backfilling with structural soil



- 1. Existing tree
- 2. Vacuum excavation 2-3 m radius from tree trunk
- 3. Existing superstructure excavation to 1m
- 4. Existing pipes
- 5. Pruning tree roots:
  - big roots protected with crushed rock 32-90mm
  - roots in structural soil protected with geotextile
- 6. Geotextile
- 7. Air and water supply
- 8. Aerated bearing layer
- 9. Surfacing superstructure
- 10. Structural soil with planting soil and fertiliser
- 11. Pipes in structural soil protected with geotextile

# Visualising solutions

Images: Björn Embrén

Tree with shallow roots and shallow bearing layer. This tree is showing the same approach is used. Image: Municipality of Stockholm



**Working solutions:**  
Installation process for various crate systems



Placing the crates, accommodating the water main (see Case study 9, p38).



Filling the crates with tree soil.

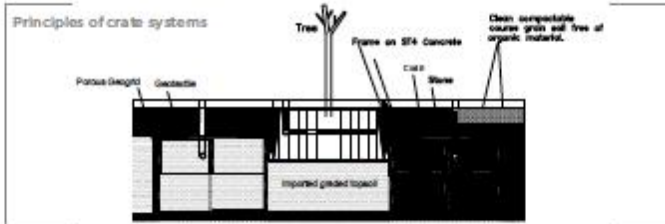


Image: Monson and DeepRoot

Two above images:  
Martin Gammie



Positioning concrete crates on prepared island base at Apeldoorn station square (see Case study 24, p127).



Excavation is starting along Ocean Road (see Case study 2, p31).



Compacting base and placing crates.



Placing cellular units around concrete crates.



Island ready for soil fill.



# Understanding options



# Whiteladies Rd, GBBN, Bristol

Case study 12, p72



Bus patronage +40% (2008/09 - 2012/13)  
User satisfaction 27% -> 81% (2008 - 2012)  
Cyclist count +13% (2007 - 2012)

# Glen Innes, Self-explanatory Road

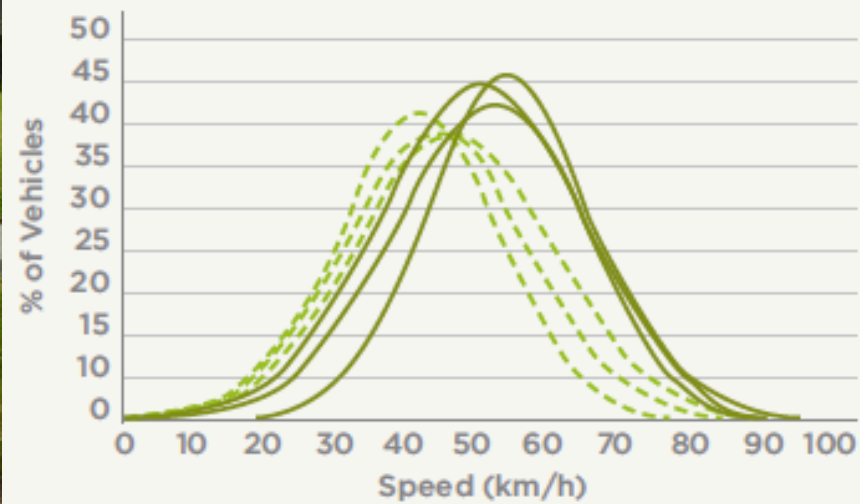
Case study 13, p73



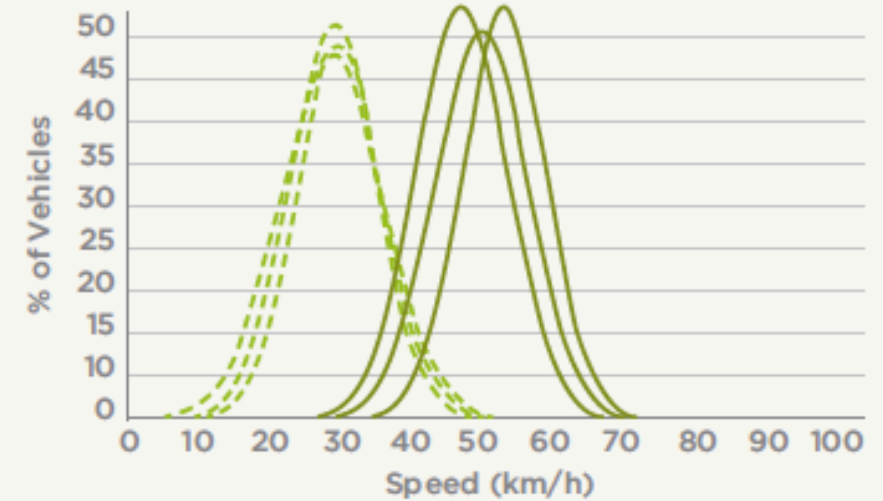
## Speed reduction curves

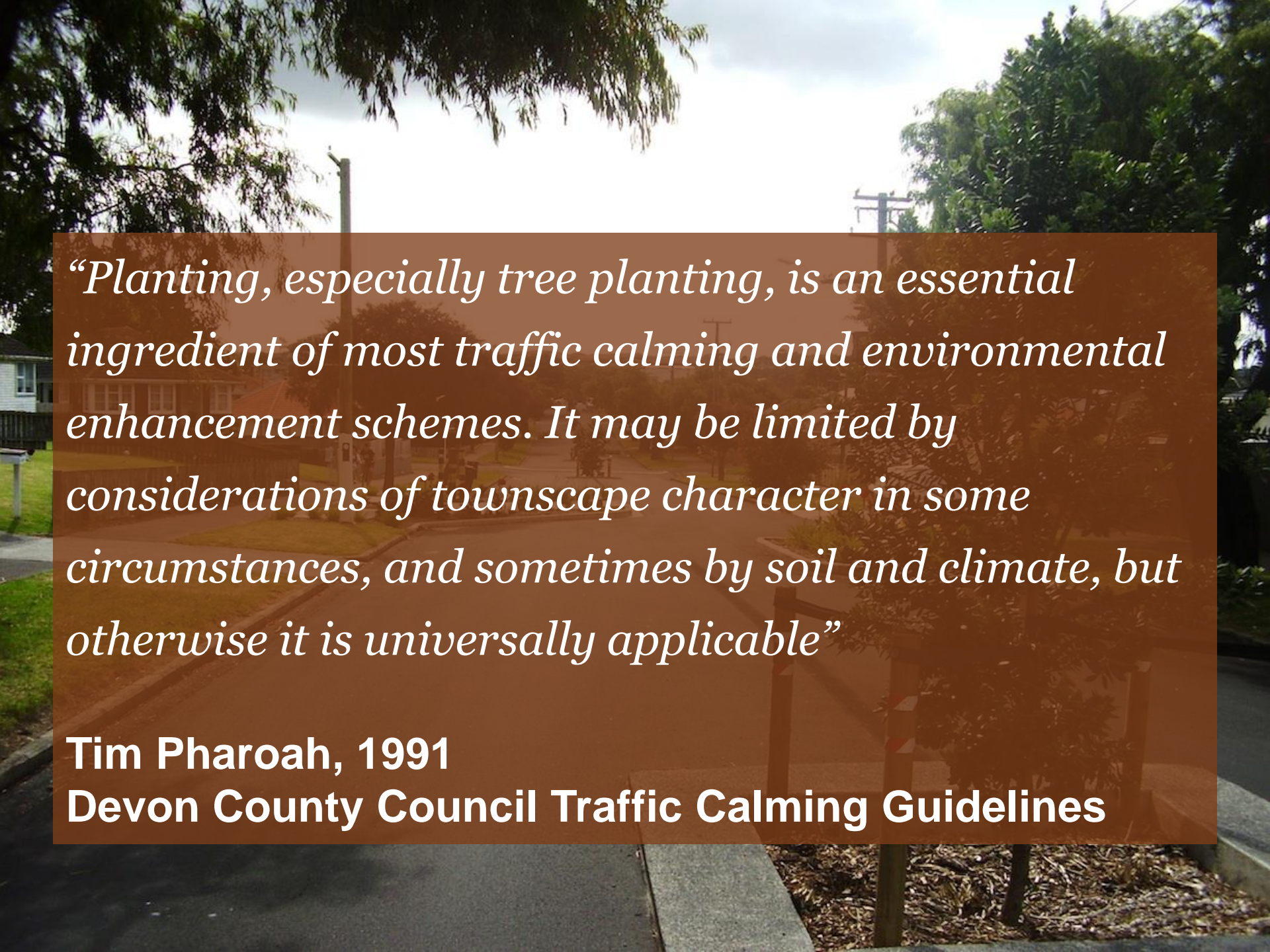
--- Local Road    — Collector Road

### Pre-Treatment



### Post-Treatment





*“Planting, especially tree planting, is an essential ingredient of most traffic calming and environmental enhancement schemes. It may be limited by considerations of townscape character in some circumstances, and sometimes by soil and climate, but otherwise it is universally applicable”*

**Tim Pharoah, 1991**

**Devon County Council Traffic Calming Guidelines**



Leonard Circus, Hackney  
Case study 15, p75

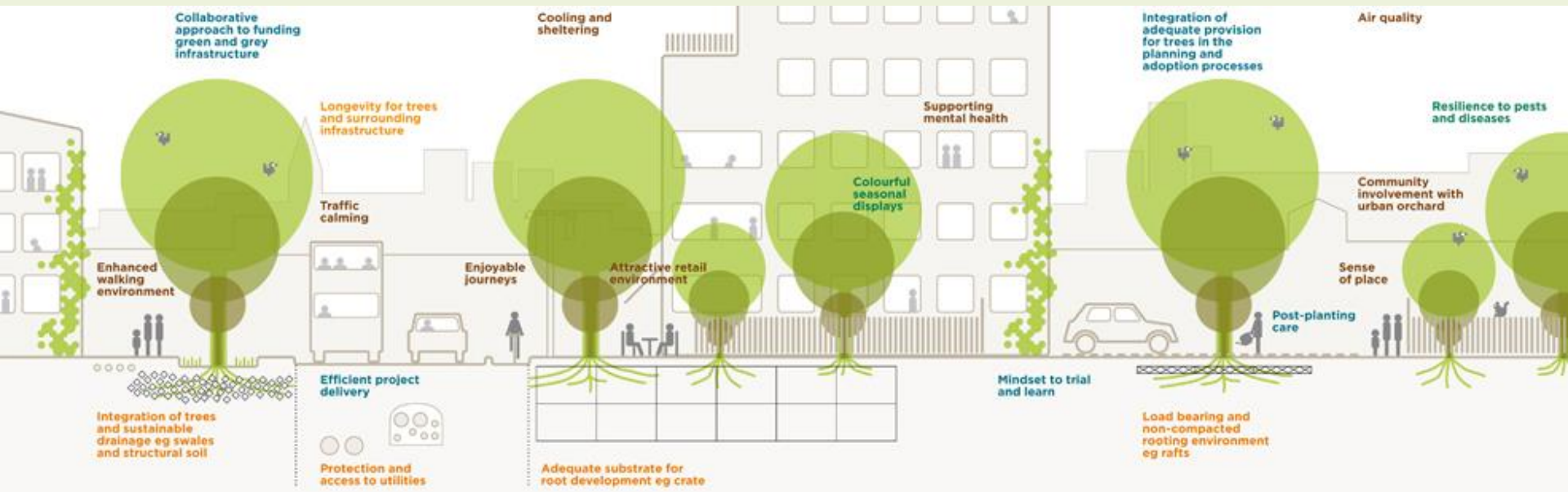


Leonard Circus, Hackney  
Case study 15, p75









# Enabling factors

# Designing with Trees





Garibaldi Street, Lyon, France  
Case study 17, p77

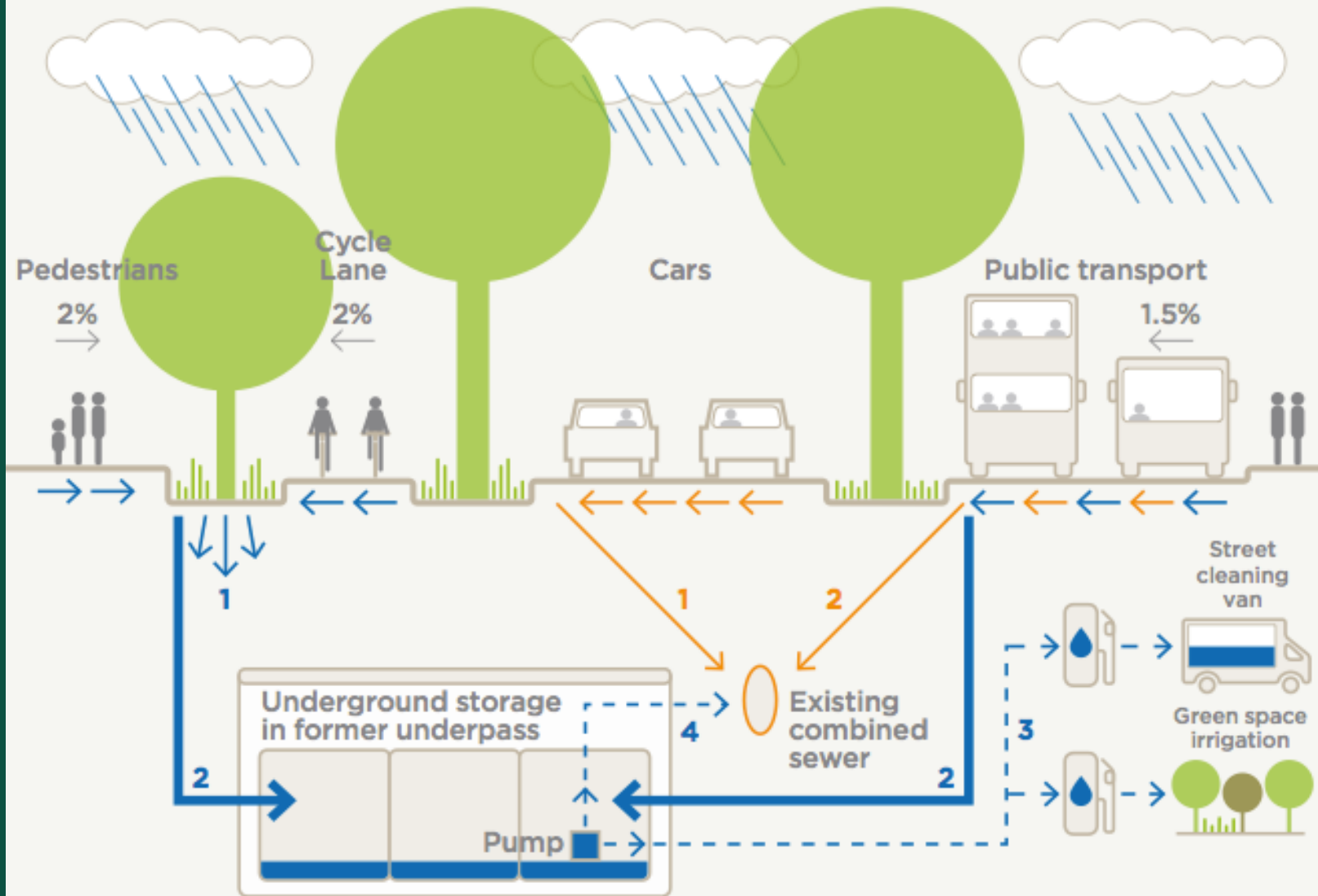






# Water management strategy for Garibaldi Street refurbishment

— Polluted surface water runoff  
— Non-polluted surface water runoff



1. Surface water runoff infiltration
2. Overflow and/or storage of surface water runoff
3. Surface water runoff re-use
4. Controlled rate outflow into combined sewer (during heavy storms)

1. Remains directed to existing combined sewer
2. Only directed to combined sewer when winter treatment is applied to the bus lanes

**Water management strategy for Garibaldi Street refurbishment**

— Polluted surface water runoff  
— Non-polluted surface water runoff



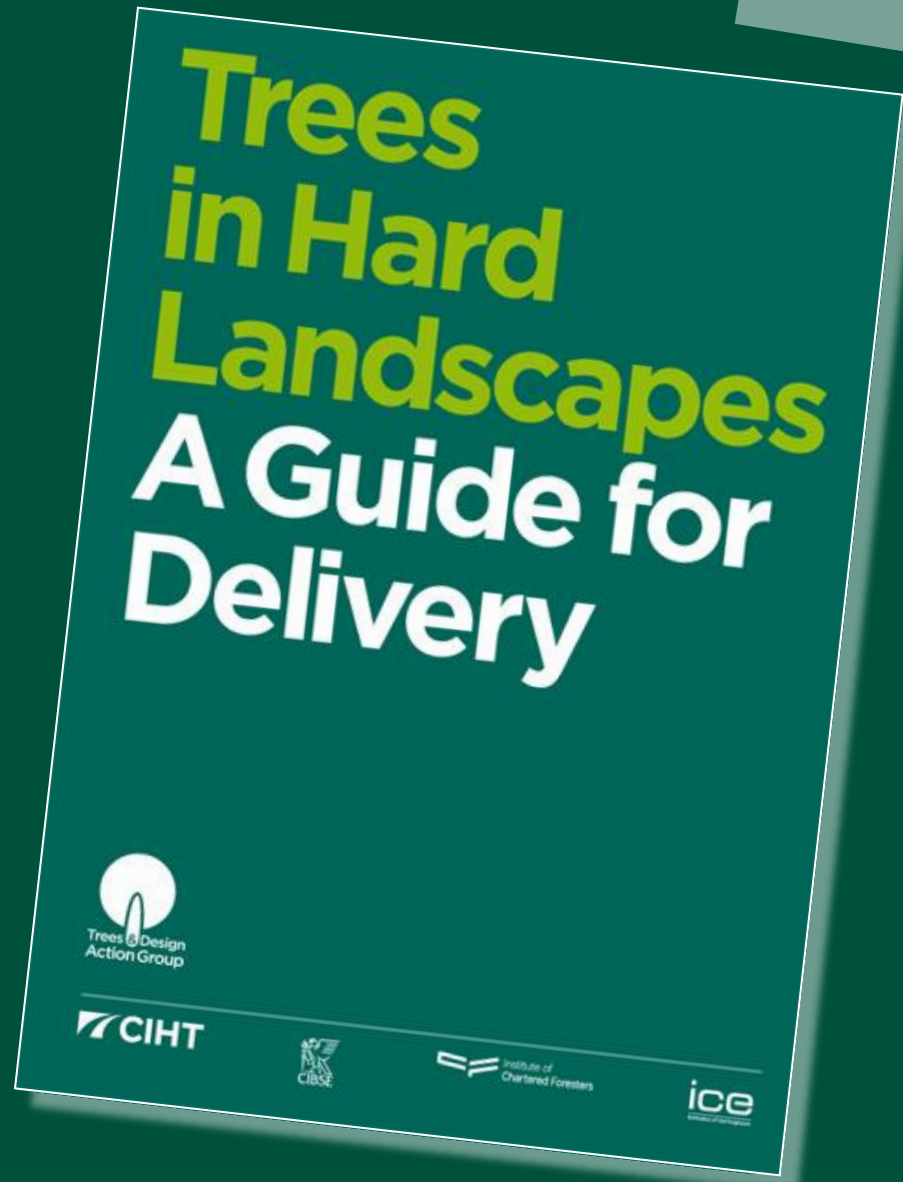
POLLUTION	Lower	Higher, incl. salt
HUMIDITY	Wetter	Drier
MAINTENANCE	More manicured	Limited: once a year
FUNCTIONS	Water management & ecological functions	

See also case study 31, p149





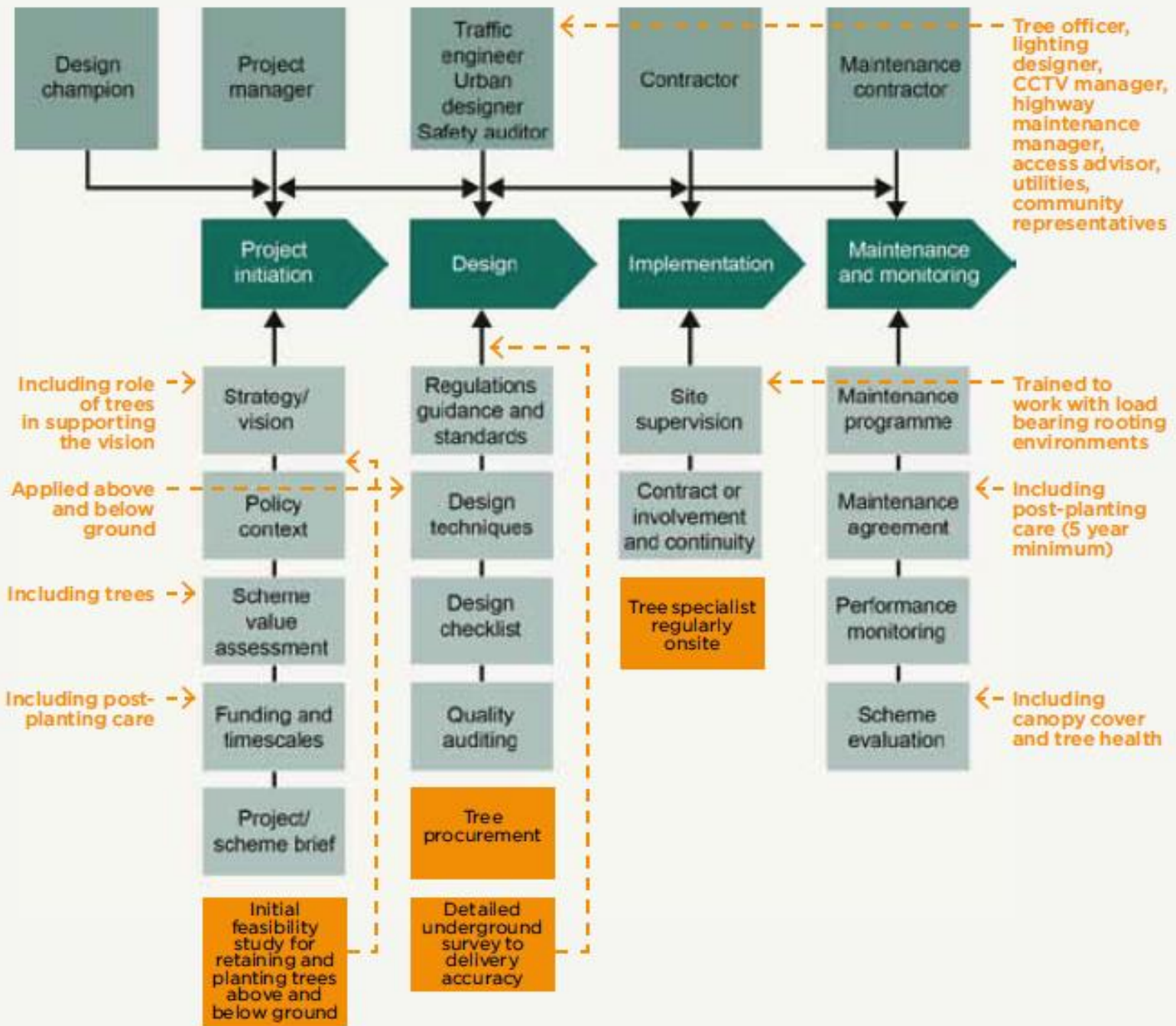
WHY?



# Collaborative Process



# Integrating trees into the LTNI/08 design process, flow, inputs and outputs





## 1.1 A good start: leadership, project team and funding

In brief: what needs to be done	Who does it
Have clear policies for the protection, care and planting of trees and commit to their enforcement.	- Planner/policy officer - Design champion/Client representative(s) - Tree officer/specialist - Project manager
Articulate the value of existing and proposed trees in the scheme value assessment.	- Design specialist(s) - Tree officer/specialist - Project manager
Articulate the benefits of existing and proposed trees bring to achieve the project vision and objectives.	- Design specialist(s) - Tree officer/specialist - Project manager
Secure access to the right skills for the team, including, where needed, expertise on soils, veteran trees, young trees, arboriculture, urban forestry.	- Design specialist(s) - Tree officer/specialist - Project manager
Incorporate five years of post-planting care in capital project costs.	- Project manager - Client representative(s)
Take a partnership approach to funding.	- Project manager - Client representative(s)

### 1.1.1 The need for vision and leadership

Whether in private or public organisations, establishing a culture of collaboration where there is pride in the inclusion and preservation of trees requires leadership and vision (see *Trees in the Townscape* Principle 9, pp56-61).

In practical terms, this requires:

- Clear standards for the protection, care and planting of trees in the local plan and/or other key policy documents, including local transport plans, highway design guides and supplementary planning documents addressing trees in new developments. Such standards may equally be set by private organisations in corporate policy documents (see the examples of Land Securities on p23 and Tor Homes on p25 in *Trees in the Townscape*).
- Personal commitment from the elected and/or executive team to the policies and standards set.

In high profile schemes to transform an area, top-level leadership will likely rely on the vision brought by local politicians. In standard schemes, the director of planning or the director of highways will have a key role to play.

And, in at least, ensuring the managing director of the client's account, or the managing director of the company building or overseeing construction, is also critical. This is to ensure the messages to convey to members of the client's team.

- Adhere to design and construction practices to facilitate successful tree growth and retention.
- Have funds available for **post-planting care**.

Beyond robust policies and executive commitment, integrating trees in hard landscapes also relies on leadership at staff level, including:

- Arboricultural or design staff who actively engage in policy work to articulate the relevance of trees within broader strategic policy or business agendas.
- Arboriculture and highway staff who are confident and collaborate in overseeing operational and construction work.
- Arboriculture and highway staff who share an interest in and appetite for innovation and learning. Flexibility in the use of specifications featured in local design guides in response to project circumstances and new techniques becoming available is critical. This ensures that contemporary approaches such as those designed to enhance the tree-rooting environment beneath load-bearing hard surfaces (see 3.2) can be explored and, if appropriate, trialled locally and accepted.

As the LTN 103 document demonstrates, an important element in delivering successful projects is to have a single project champion who takes the project from concept to completion.

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Take a partnership approach to funding.	- Project manager - Client representative(s)

# Action oriented



## Quick Check

### Are all key parties engaged in the collaboration required for success?

#### Design champion/Client representative(s)

##### Have you...

- Got clear policies for the protection, care and planting of trees and are committed to their enforcement?
- Communicated to the team the importance of the inclusion of environmental improvements, especially trees, for your vision of the project?
- Ensured the project brief, the team composition and the budget allocations will effectively support this vision?
- Before signing off design, checked that a consensus has been reached among the team on a detailed solution for successful integration?

#### Local authority planner

##### Have you...

- Sought expert guidance (from both a tree specialist and relevant references, such as *Trees in the Townscape*) to draft/update tree policy?
- Communicated tree protection, planting and care policies as well as associated site-specific requirements right from pre-planning meetings?
- Put conditions in planning approval to require survey proof confirming that the planting scheme is deliverable?
- Ensured effective enforcement of tree-related requirements?

#### Project manager

##### Have you...

- Ensured the vision for the contribution trees make to the project objectives is well articulated as well as the value of using i-Tree Eco during consultation with members, other decision-makers and the wider public for project sign-off – making use of tree valuation and visualisation techniques, as appropriate?
- Ensured the right tree specialists and soil scientist have been commissioned?
- Facilitated a collaborative approach to funding tree-related enhancements, exploring all potential sources as described in this guide?
- Budgeted five-year aftercare for newly planted trees as part of the capital investment programme?
- Explored advanced procurement with the design specialist(s) (in this case the landscape architect) to secure precisely the right tree species and specimen?
- Ensured the team composition includes the right tree expertise – this might mean a short-term dedicated team for large projects?
- Conducted the right underground surveys at the right time: initial survey from site visit and utility asset database at project initiation, and delivery accuracy survey at the beginning of the design phase?
- Ensured all necessary negotiations with statutory authorities have been carried out?

# Checklists to recap

			Context					Design objectives							Use of load-bearing or load-spreading tree planting solutions			
			Arterial street	High street	Residential street	Public square	Car park	Provide a setting for regeneration and growth	Slow vehicular traffic	Enhance the walking environment	Extend the cycle network	Enhance public transit	Remedy conflict between trees and surroundings	Manage or recycle surface water runoff	Reduce urban temperatures	Structural growing medium: sand	Structural growing medium: medium-size aggregate	Structural growing medium: large stones (Stockholm system)
Case study reference	Location	Page																
1	Melbourne's urban forestry programme	Melbourne, Australia	30	•	•	•	•	•					•					
2	Supporting retail on Ocean Road	South Tyneside, England	31		•													•
3	New trees at Chobham Manor Phase 1	Stratford, England	32			•												•
4	Stockholm system in the USA	Minneapolis, MN, USA	33			•												
5	Specimen trees in Dortmund Square	Leeds, England	34				•											•
6	The Angel Building - unlocking planning	Islington, London, England	35	•														
7	Wiral Green Streets Programme	Birkenhead, England	36	•		•												
8	Bath Road integrating trees and highway	Bristol, England	37	•														
9	Trees in public car park, Hanley-on-Thames	Hanley-on-Thames, England	38															•
10	Green-grey-blue infrastructure in Lyon	Lyon, France	39	•														
11	Reclaiming road space for trees	Lyon, France, London, England	71	•	•	•	•	•										
12	Enhancing road safety and bus journeys	Bristol, England	72	•	•													
13	Improving safety in Glen Innes	Auckland, New Zealand	73			•												
14	Linear orchards for cycling route	Hackney, London, England	74			•												
15	Shared space and trees in Leonard Circus	Hackney, London, England	75			•												•
16	Revitalising retail	Bristol, England	76	•	•													
17	Rainwater harvesting for irrigation	Lyon, France	77	•														
18	Tree-lined boulevard in Swansea	Swansea, Wales	122	•														
19	Trees and resilient footways, Slaney Road	Walsall, England	123			•												
20	Existing and new trees in skeleton soil	Stockholm, Sweden	124	•	•													
21	Tree-lined gateway to Aberystwyth	Aberystwyth, Wales	125	•														
22	St George's Street plaza	Norwich, England	126			•												•
23	Retrofitting tree-lined cycle lane	Hangab, The Netherlands	126	•														
24	A pine forest for Apeldoorn station square	Apeldoorn, The Netherlands	127	•														•
25	Managing roof runoff with trees	New Forest, England	128															•
26	Improving the environment, Hornsgatan	Stockholm, Sweden	129		•													
27	Strengthened green links, East Waltham	London, England	131	•	•	•												
28	Green Streets, Gateshead	London, England	131	•	•	•												
29	Green Streets, St Albans	St Albans, Hertfordshire, England	132	•	•	•												
30	Tree choices to suit microclimate, Cheapside	City of London, England	148															
31	Tree diversity and local identity	Lyon, France	149	•	•	•	•	•										
32	Climate resilience in Church Street	London, England	150	•														

Case study finder p154-155







YOU can make  
a difference