# The Landscape

## Trees and Infrastructure

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INTERNATIONAL FEDERATION OF LANDSCAPE ARCHITECTS

IRISH LANDSCAPE INSTITUTE
INSTITIÚID AILTIRÍ TÍRDHREACHA NA hÉIREANN

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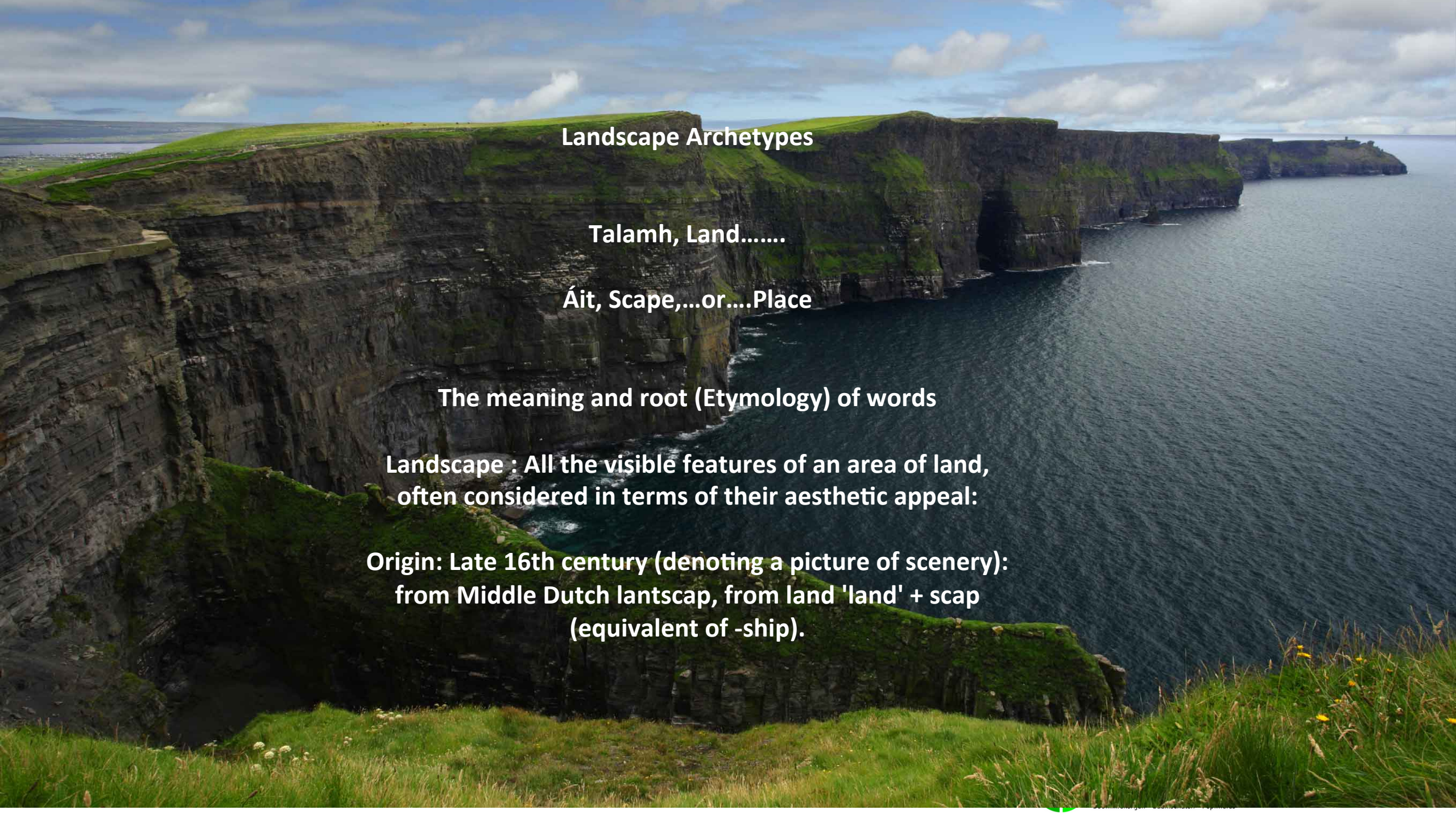


# Landscape Archetypes

Talamh, Land…….

Áit, Scape,…or….Place

The meaning and root (Etymology) of words

Landscape : All the visible features of an area of land, often considered in terms of their aesthetic appeal:

Origin: Late 16th century (denoting a picture of scenery): from Middle Dutch lantscap, from land 'land' + scap (equivalent of -ship).

Design and Landscape in an infrastructural setting

requires

Harnessing the beauty of Nature

recreating natural Landscapes

with materials including

Trees and plants
as a link to nature

Primates and trees have a long association….
we came down from the trees…….

:

What is design ? ----- A link to ‘the dreaming’ ?

Creation of artifice !

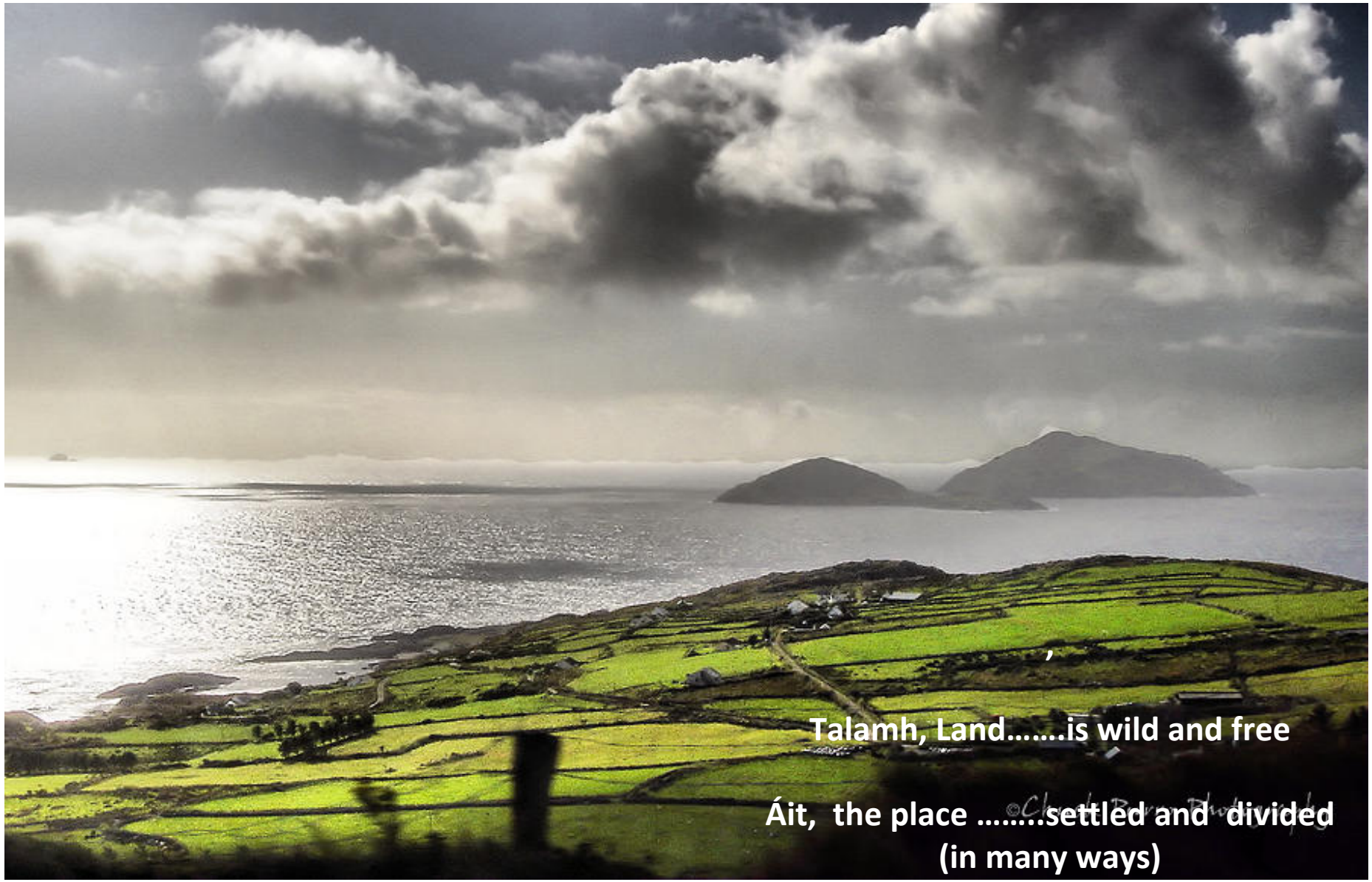

,
Talamh, Land…….is timeless
Áit, the place ……..
our land was covered in trees…the wild woodland
It is a shared memory and a spiritual link to the landscape


,

**Talamh, Land…….is mapped and named**

**Áit,  the place ……..an abstract**

**A sense of place is in all of us**


,
Talamh, Land…….is wild and free
Áit, the place ……..settled and divided
(in many ways)

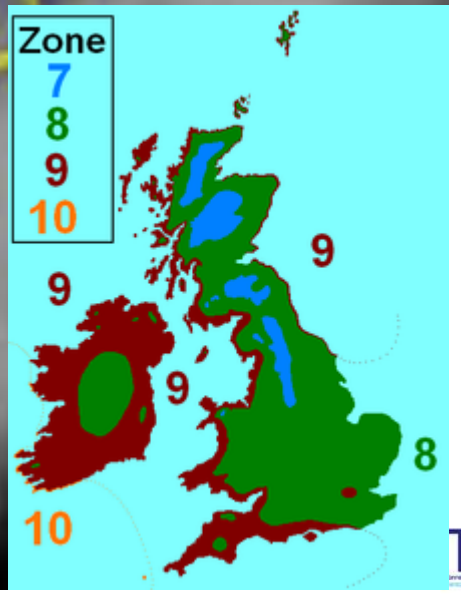

,
Talamh, Land…….and passages
Áit, the place ……..at journey’s end

# Landscape and Trees Captured in Art

Cattle under trees
Nathaniel Hone II

Choice of plants within the climatic zone

Note that maritime areas and some urban centres may have a higher hardiness zone rating



# Landscape Standards Review

## Roads and associated infrastructure

## Light Rail – LUAS Cross City Design Strategy

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Transport Infrastructure Ireland

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# Pillar Activities
## General

The main activities of TII in relation to landscape Appraisal, Design and Landscape Construction & Maintenance are under analysis and review in order to further develop their scope and content to assist in the preparation of

- Procurement documentation
- Tender and Contract Documentation including design drawings, specifications and standards
- Construction level contract management in terms of contractor compliance and quality assurance in (all) landscape outcomes

- The documentation follows '7 Pillar Activities'

# Pillar Activities

## Basis for the analysis of the standards and specifications

| | | | |
|---|---|---|---|
| 1 | General (GE) | Project Appraisal Guidelines | |
| | | Project Management Guidelines | |
| 2 | Planning & Evaluation (PE) | Environmental Assessment Guidance | |
| 3 | Design (DE) | Design Manual for Roads and Bridges | Volume 0: Introduction and Content |
| | | | Volume 1: Highway Structures: Approval procedures and general design |
| | | | Volume 2: Highway Structures: Design (Substructures and Special Structures) Materials |
| | | | Volume 3: Highways Structures: Inspection and Maintenance |
| | | | Volume 4: Geotechnics and Drainage |
| | | | Volume 5: Assessment and Preparation of Roads Schemes |
| | | | Volume 6: Road Geometry |
| | | | Volume 7: Pavement Design and Maintenance |
| | | | Volume 8: Traffic Signs and Lighting |
| | | | Volume 9: Network - Traffic Control and Communication |
| 4 | Construction and Commissioning (CC) | Manual of Contract Documents for Road Works | Volume 1 - Specification for Road Works |
| | | | Volume 2 - Notes for Guidance on the Specification for Road Works |
| | | | Volume 3 - Method of Measurement for Roads Works |
| | | | Volume 4 - Road Construction Details |
| | | Generic Works Requirements | |
| | | Environmental Construction Guidelines | |
| 5 | Operations (OP) | | |
| 6 | Asset Management & Maintenance (AM) | | |
| 7 | Research (RE) | | |

Note this is a draft version and an additional item in General (GE) has been added and is included in the following sections.

# Pillar Activities
## Design (DE)

Gap Analysis including

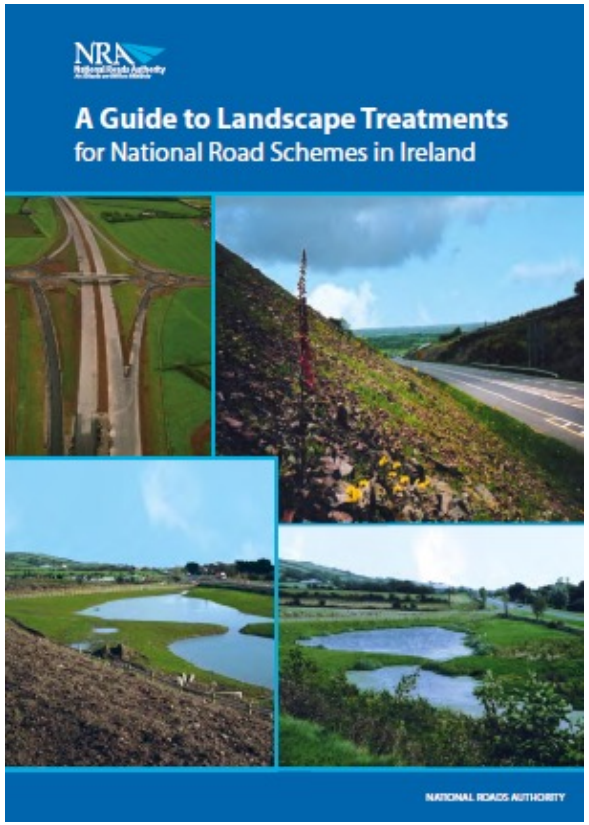
Review of UK and European Guidance in order to produce a

DMRB
Volume 10
Environmental Design

*Deliverables:*

*Technical Information Notes (TIN) for*

- *LCA (in preparation with UK colleagues _TW)*
- *LVIA*
- *Mitigation strategies (in QMS – adapt, NRA A Guide to Landscape treatments)*



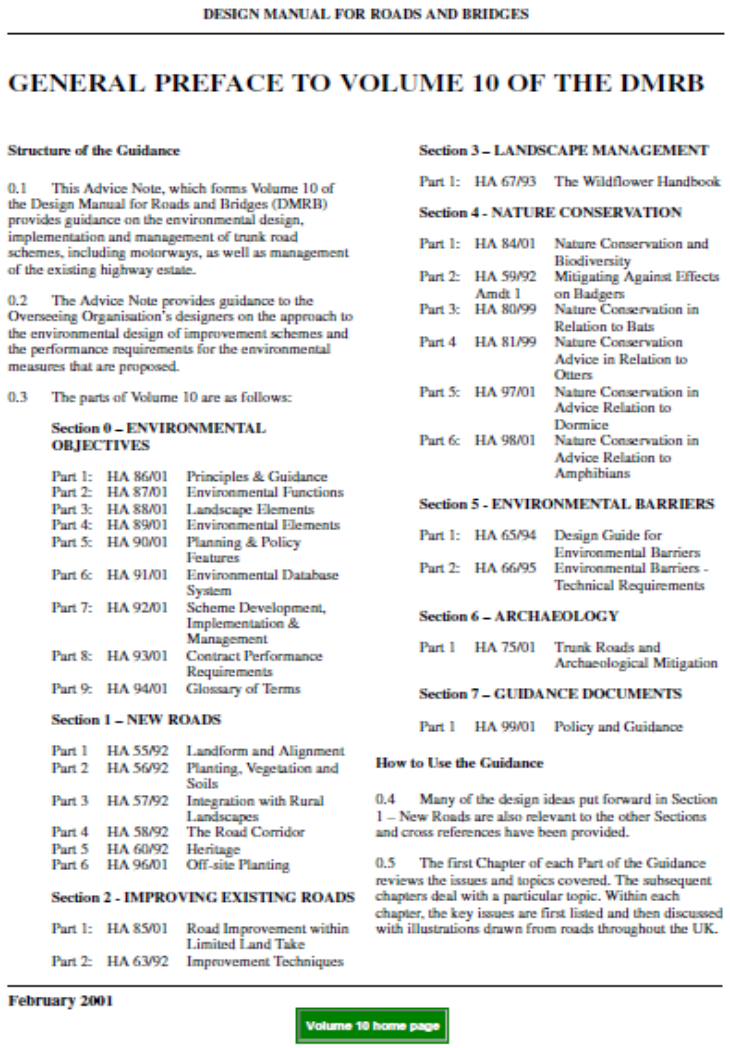
# Pillar Activities
## Design (DE)

UK Guidance

Environmental Design and Management

*Deliverables:*

*Review and preparation of Volume 10 as part of a multidisciplinary environment team*



DESIGN MANUAL FOR ROADS AND BRIDGES

**GENERAL PREFACE TO VOLUME 10 OF THE DMRB**

**Structure of the Guidance**

0.1 This Advice Note, which forms Volume 10 of the Design Manual for Roads and Bridges (DMRB) provides guidance on the environmental design, implementation and management of trunk road schemes, including motorways, as well as management of the existing highway estate.

0.2 The Advice Note provides guidance to the Overseeing Organisation's designers on the approach to the environmental design of improvement schemes and the performance requirements for the environmental measures that are proposed.

0.3 The parts of Volume 10 are as follows:

**Section 0 – ENVIRONMENTAL OBJECTIVES**

| | | |
|---|---|---|
| Part 1: | HA 86/01 | Principles & Guidance |
| Part 2: | HA 87/01 | Environmental Functions |
| Part 3: | HA 88/01 | Landscape Elements |
| Part 4: | HA 89/01 | Environmental Elements |
| Part 5: | HA 90/01 | Planning & Policy Features |
| Part 6: | HA 91/01 | Environmental Database System |
| Part 7: | HA 92/01 | Scheme Development, Implementation & Management |
| Part 8: | HA 93/01 | Contract Performance Requirements |
| Part 9: | HA 94/01 | Glossary of Terms |

**Section 1 – NEW ROADS**

| | | |
|---|---|---|
| Part 1 | HA 55/92 | Landform and Alignment |
| Part 2 | HA 56/92 | Planting, Vegetation and Soils |
| Part 3 | HA 57/92 | Integration with Rural Landscapes |
| Part 4 | HA 58/92 | The Road Corridor |
| Part 5 | HA 60/92 | Heritage |
| Part 6 | HA 96/01 | Off-site Planting |

**Section 2 - IMPROVING EXISTING ROADS**

| | | |
|---|---|---|
| Part 1: | HA 85/01 | Road Improvement within Limited Land Take |
| Part 2: | HA 63/92 | Improvement Techniques |

**Section 3 – LANDSCAPE MANAGEMENT**

| | | |
|---|---|---|
| Part 1: | HA 67/93 | The Wildflower Handbook |

**Section 4 - NATURE CONSERVATION**

| | | |
|---|---|---|
| Part 1: | HA 84/01 | Nature Conservation and Biodiversity |
| Part 2: | HA 59/92 Amdt 1 | Mitigating Against Effects on Badgers |
| Part 3: | HA 80/99 | Nature Conservation in Relation to Bats |
| Part 4 | HA 81/99 | Nature Conservation Advice in Relation to Otters |
| Part 5: | HA 97/01 | Nature Conservation in Advice Relation to Dormice |
| Part 6: | HA 98/01 | Nature Conservation in Advice Relation to Amphibians |

**Section 5 - ENVIRONMENTAL BARRIERS**

| | | |
|---|---|---|
| Part 1: | HA 65/94 | Design Guide for Environmental Barriers |
| Part 2: | HA 66/95 | Environmental Barriers - Technical Requirements |

**Section 6 – ARCHAEOLOGY**

| | | |
|---|---|---|
| Part 1 | HA 75/01 | Trunk Roads and Archaeological Mitigation |

**Section 7 – GUIDANCE DOCUMENTS**

| | | |
|---|---|---|
| Part 1 | HA 99/01 | Policy and Guidance |

**How to Use the Guidance**

0.4 Many of the design ideas put forward in Section 1 – New Roads are also relevant to the other Sections and cross references have been provided.

0.5 The first Chapter of each Part of the Guidance reviews the issues and topics covered. The subsequent chapters deal with a particular topic. Within each chapter, the key issues are first listed and then discussed with illustrations drawn from roads throughout the UK.

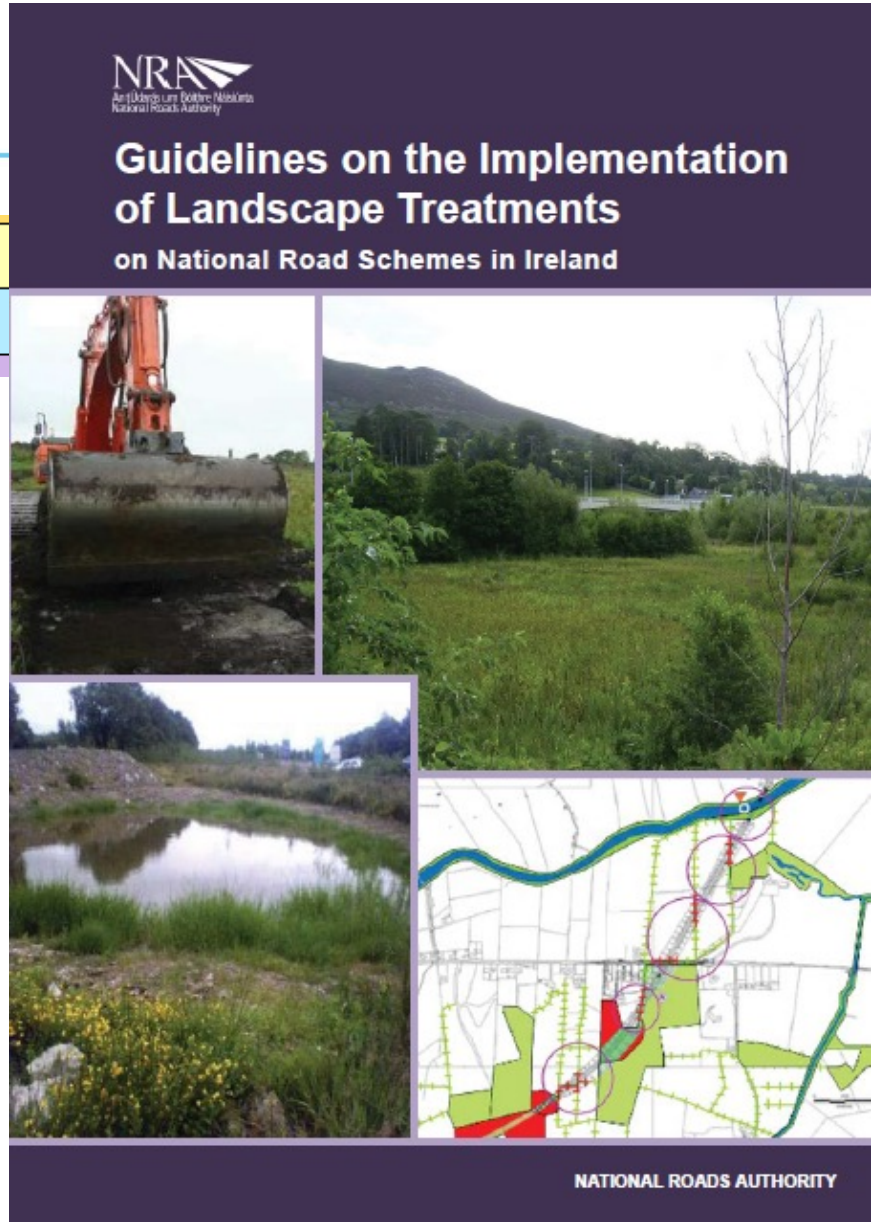
**February 2001**

Volume 10 home page

# Pillar Activities

## Asset Management and maintenance (MM)

| | |
|---|---|
| Operations (OP) | |
| Asset Management & Maintenance (AM) | |



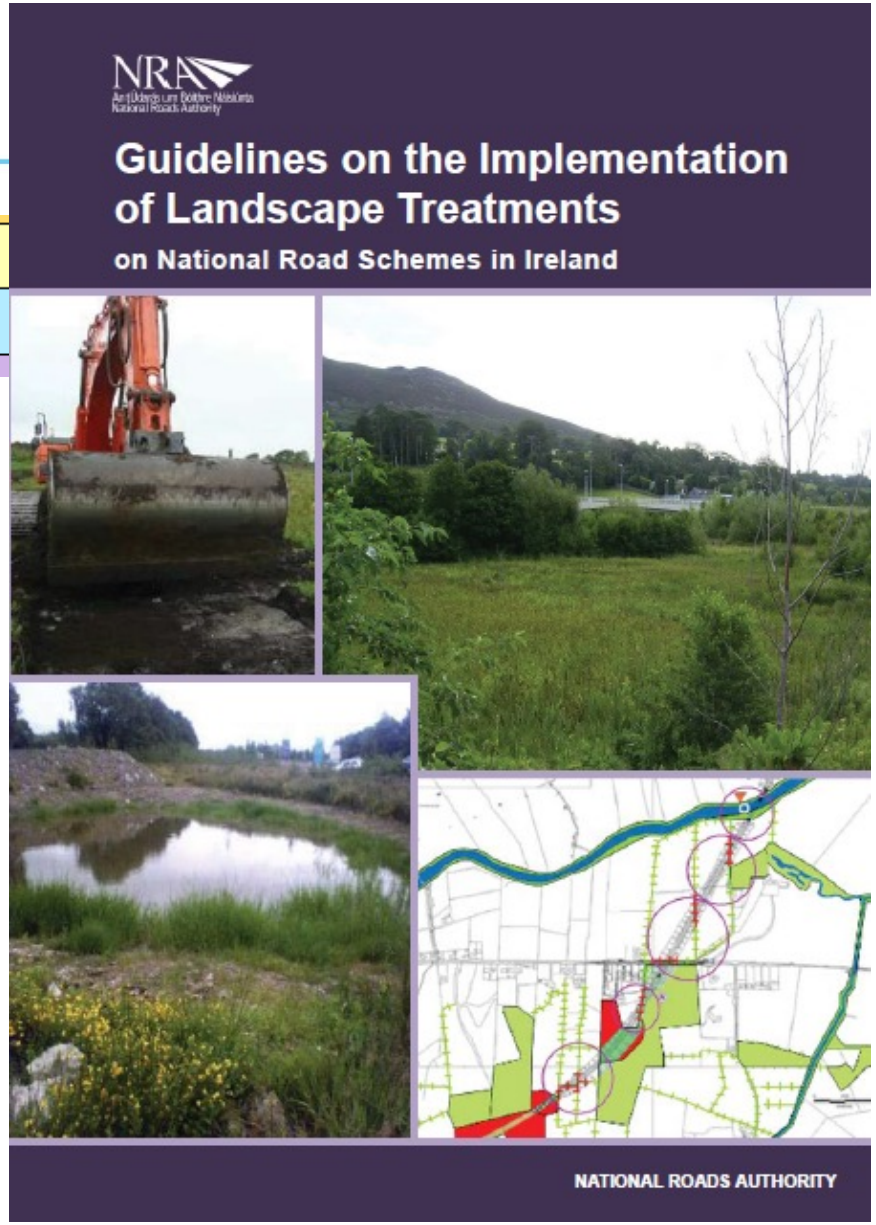

5. Operations(OP)
6. Asset Management and Maintenance (AM)

***Requires***

*Contract documents for all landscape works ( under different forms of contract including Client Design, Design and Build, Public Private Partnership)*

# Pillar Activities
## Asset Management and maintenance (MM)

| | |
|---|---|
| Operations (OP) | |
| Asset Management & Maintenance (AM) | |




5. Operations(OP)
6. Asset Management and Maintenance (AM)

***Deliverables***

*Review and incorporate landscape specifications and environmental typical details such as*

- *Maintenance specification and asset management*

# Pillar Activities
## Research(RE)


7. Research

*Deliverables*

*Review Research programme and provide landscape centred research*

- *Integration of the infrastructure within the landscape (rural, urban and peri urban)*
- *best practice for invasive species management*
- *bees and pollinator – increase in habitat provision through the development of landscape design principles (new and in operation)*
- *Flood attenuation and water management*
- *Barriers and boundary treatments (hedgerows, fence styles etc)*

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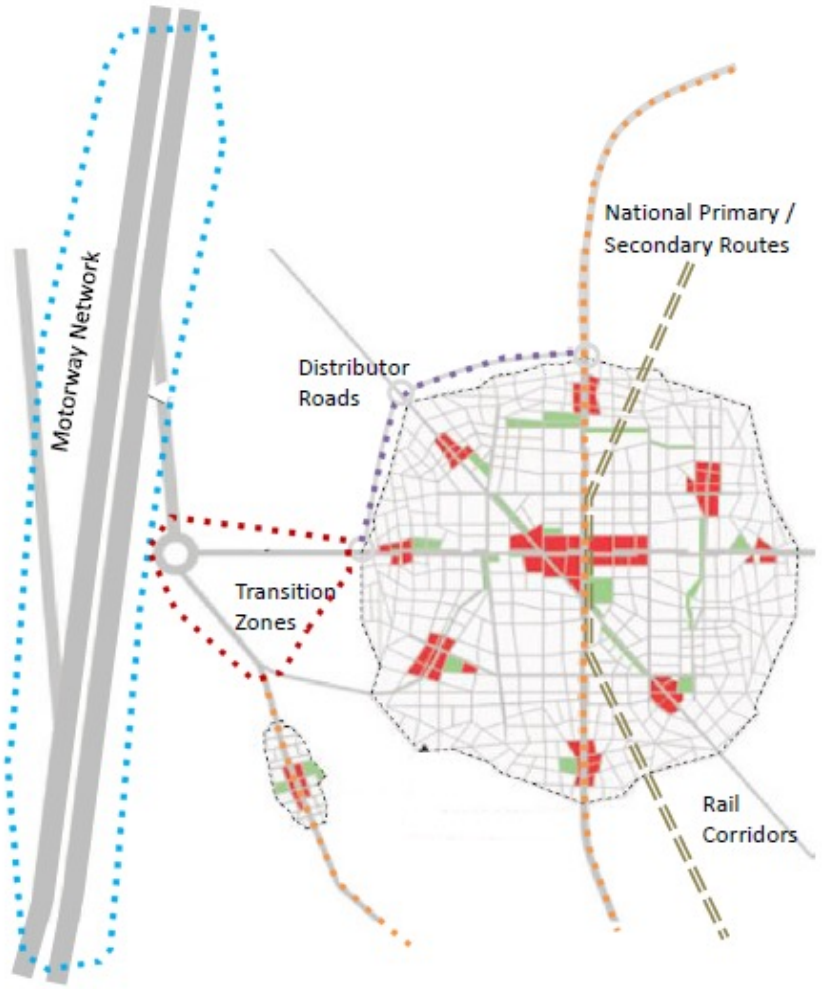
# Landscape Design methodology
## Research(RE)




TII Transport Landscape Typologies

1) Motorway Network
2) National Primary and Secondary Routes through both rural and town and roadside villages
3) Distributor Roads/Roundabouts
4) Transition areas between route types often gateways to settlements
5) Light Rail Corridors

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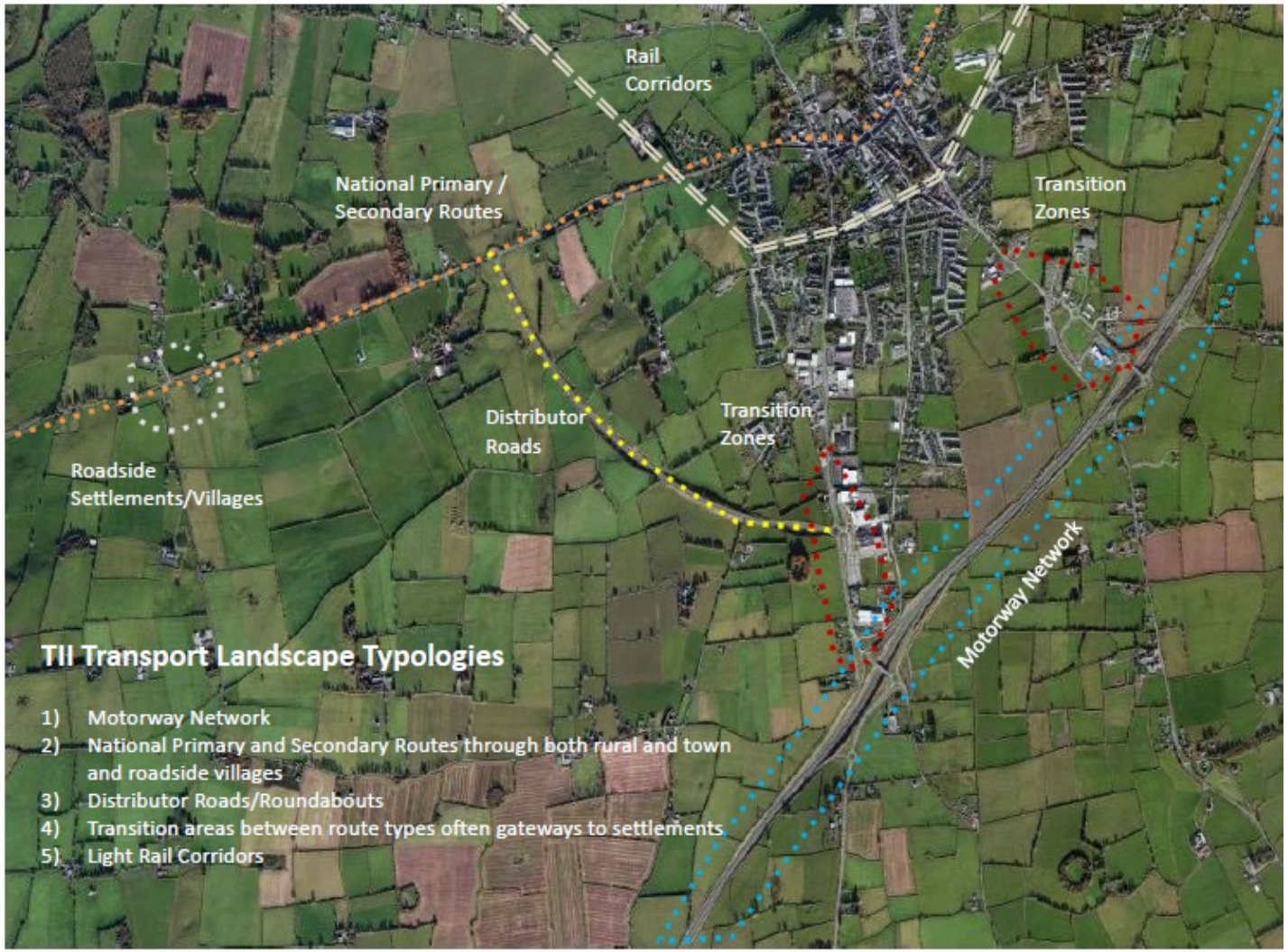
# Landscape Design methodology

## Research(RE)

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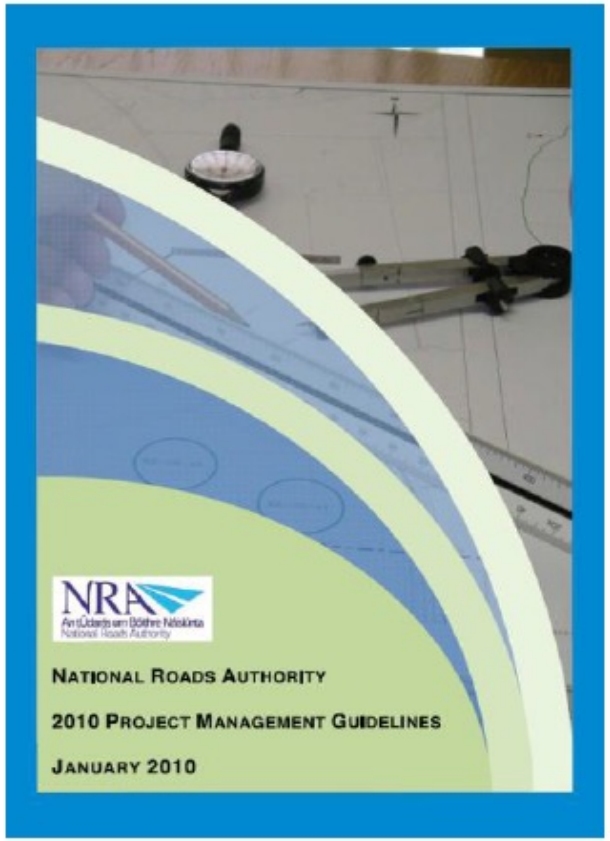
# Landscape Design methodology
## Research(RE)

**TII Transport Landscape**

Requires an analysis of landscape inputs into each phase of future Road/Public Transport projects and ensure sufficient guidance available or relevant standards developed



# Luas Cross City

## Existing and Proposed Trees – Strategy

Landscape Architects:
Tony Williams and Eimear Fox. (TII ) Laura Flynn (RPA)
Fergal Parlon – (Brady,Shipman,Martin)

Arborists:
Planning Stage-Ciarán Keating
Enabling Works (for GMC) -Felim Sheridan
Infrastructure Works (for TII) –Felim Sheridan
Infrastructure Works (for SSJV) –John Morgan
Environmental Co-ordinator – Colin Wilson

And the design and site team

LUAS Cross City (LCC)
DAWSON STREET, Dublin, Ireland (Éire)

# STREET ELEMENTS


**Dawson Street –** Existing London Planes to be retained

LCC (BXD)

# Trees - existing

## Existing Trees – Strategy

### Not without its difficulties

•Challenge to adjust utility layouts in order to avoid impacting existing street trees

•Each trees footprint varies and needs to be designed for its unique position within the new streetscape and kerb lines

•Full aboricultural advice obtained to allow individual street tree details be developed.

•Trees removed only when necessary

•Requirement for aftercare and monitoiring

•Hand over to city and operator

LCC (BXD)

# Trees - existing

LCC (BXD)

# Trees - existing

**Criminal Courts–** successfully retained London Planes with bound gravel detail in highly trafficked areas

**O'Connell Street–** Bound gravel used to new trees in highly trafficked area

### Existing Trees- Proposed Treatment

•Paving and kerb lines to be adjusted to allow a bound gravel opening whilst taking into account pressures of pedestrian movement and adjacent uses such as bus stops etc.

•Bound gravel used as fill to allow irregular tree base and root flares be accommodated with minimal damage

LCC (BXD)

# Tree Planting - existing

LCC (BXD)
DAWSON STREET

# Tree Planting - proposed

**New Trees**

•Challenge to adjust utility layouts in order to fit new street trees

•Tree grille proposed with infill to match surrounding paving

•Structural soils used as part of build up

•London Plane tree type used to match existing

•But not always.
•We are aiming to increase the range of species used


**West Street, Drogheda–** infill tree grille used as part of streetscape

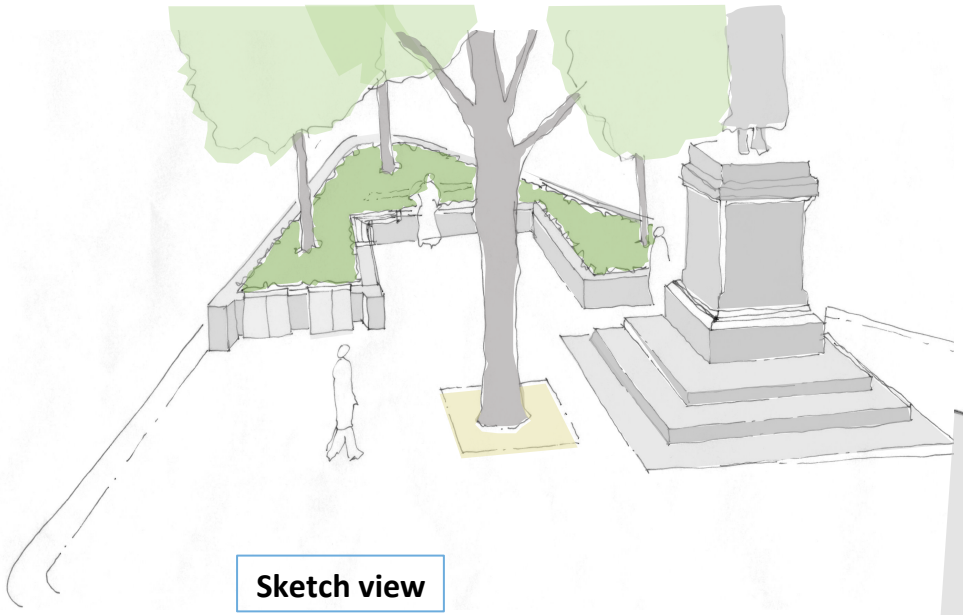
LCC (BXD)
DAWSON STREET

# Tree Planting - proposed

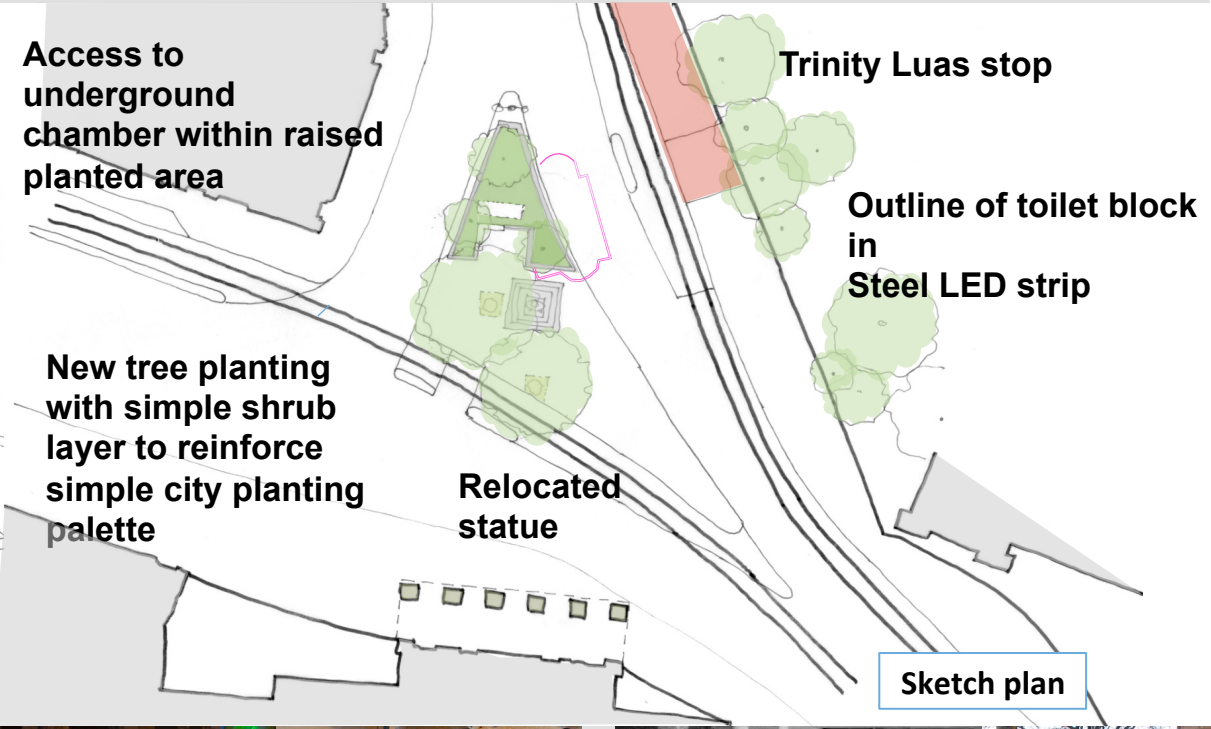
# Luas Cross City

## Urban Design Strategy

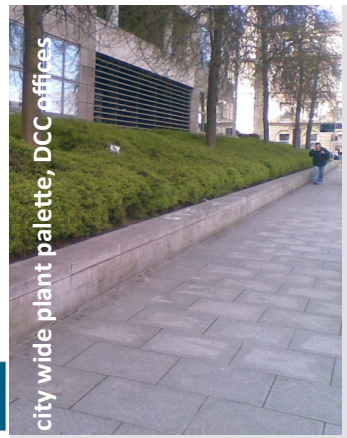
Thomas Moore LCC Project Public Realm Improvements



Sketch view




Sketch plan









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# Luas Cross City

## Urban Design Strategy

Proposed planting palette

**Proposed street tree palette**

**Tree species to be generally London Plane or Lime to be consistent with existing planting in the city. Pruning regimes will be developed where trees adjoin carriageway or OCS / tram infrastructure**




**Proposed shrub palette**

**Shrub layer to be generally Lonicera pileata to be consistent with existing planting in the city and so develop a LCC /DCC simple city plant palette.. But this is being reconsidered and the planter may be viewed as an**



?

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# Luas Cross City (LCC)

## Overview of LCC Trees Strategy

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# Luas Cross City

## Proposed Trees – Species choice

Proposed planting palette


2,500 trees **(25%)** were identified as **'street trees'**

- **79%** of Dublin city centre's 2,500 street trees belong to just **3** species – Lime (38%); London Plane (27%); Maple (14%).
- Mirrors situation in Lyon in 1994.

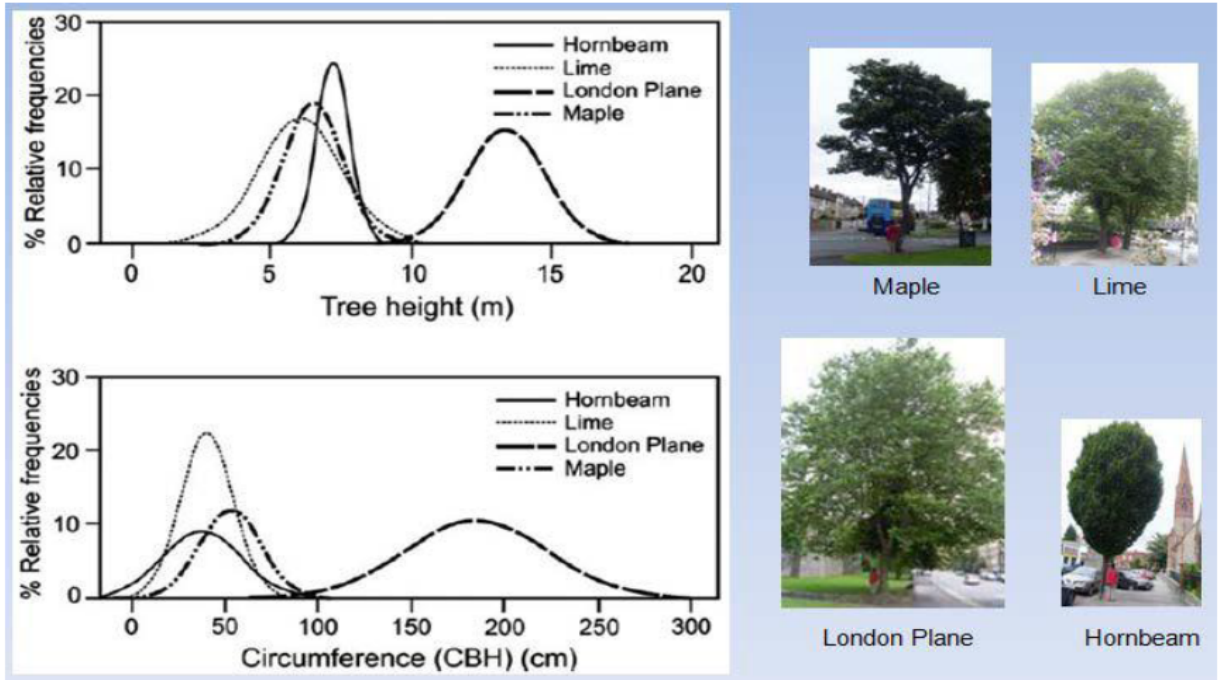
*Source https://dublintrees.wordpress.com/*

# Luas Cross City

## Proposed Trees – Species choice

Proposed planting palette

### Example: City centre database




A few species dominated the street tree population: Lime (38%), London Plane (27%), Others (16%), Maple (14%), and hornbeam (5%). The city tree canopy cover is dominated by the London Plane and Lime. Although Lime has the highest number of tree stands (970), it covers just 18% of canopy area while London Plane has the largest canopy cover of 68%, although it has a total of 697 trees.

*Source https://dublintrees.wordpress.com/*

# Luas Cross City

## Proposed Trees – Species choice

Proposed planting palette

| In brief: what needs to be done |
| --- |
| Create or contribute to a diverse tree population, following the 5 or 10% rule at the population scale. |
| Consider using species with different growth rates and life expectancy. |

*Source - Trees in Hard Landscape a Guide to Delivery by the Trees and Design Action Group (TDAG)*

The 5-10% rule is based on research that indicates that no single species should account for more than between 5-10% of any single population.

This is reflected in the recommendations made in BS 8545:2014.

http://www.tdag.org.uk/

# Luas Cross City

## Proposed Trees – Species choice

Proposed planting palette

**An Example - Lyon**

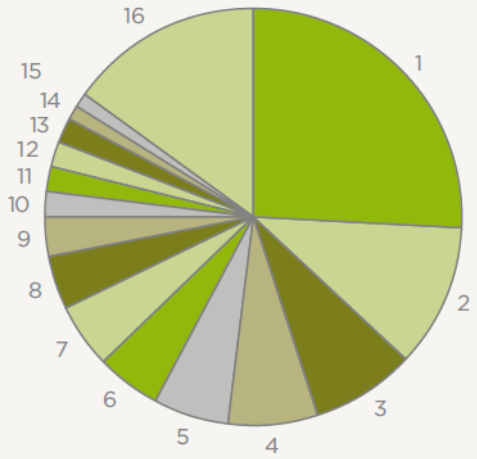
In 1994 **75%** of Greater Lyons city street trees belong to just 3 species.

Trees in Hard Landscape a Guide to Delivery by the Trees and Design Action Group (TDAG)

http://www.tdag.org.uk/

**In Greater Lyon, 254 different tree species grow in hard landscapes (+69% compared to 10 years ago)**

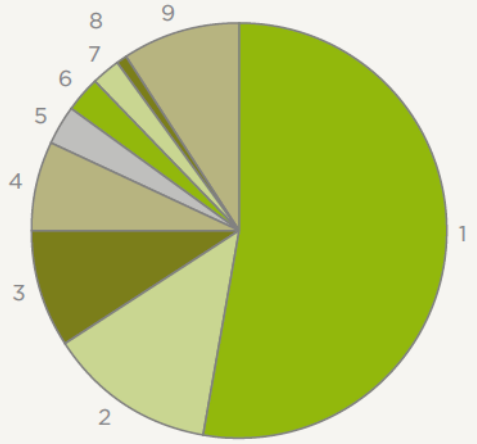
Species distribution in 2013 (%)




| | | % |
|---|---|---|
| 1 | Platanus | 26 |
| 2 | Acer | 11 |
| 3 | Tilia | 8 |
| 4 | Celtis | 7 |
| 5 | Fraxinus | 6 |
| 6 | Quercus | 5 |
| 7 | Prunus | 5 |
| 8 | Pirus | 4 |

| | | % |
|---|---|---|
| 9 | Sophora | 3 |
| 10 | Corylus | 2 |
| 11 | Gleditsia | 2 |
| 12 | Aesculus | 2 |
| 13 | Ulmus | 2 |
| 14 | Malus | 1 |
| 15 | Zelkova | 1 |
| 16 | Other | 15 |

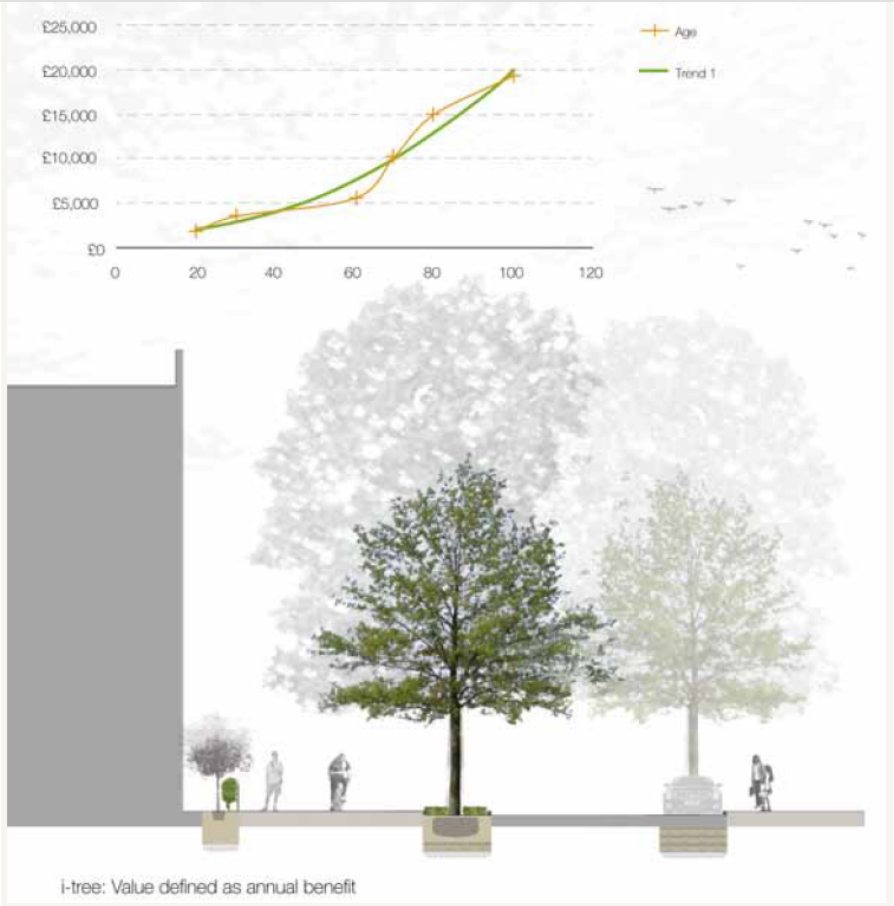
Species distribution in 1994 (%)




| | | % |
|---|---|---|
| 1 | Platanus | 53 |
| 2 | Acer | 13 |
| 3 | Tilia | 9 |
| 4 | Robinia | 7 |
| 5 | Aesculus | 3 |
| 6 | Prunus | 3 |
| 7 | Celtis | 2 |
| 8 | Populus | 1 |
| 9 | Other | 9 |

# Luas Cross City

## Proposed Trees – Green Infrastructure benefits




Source - Trees in Hard Landscape a Guide to Delivery by the Trees and Design Action Group (TDAG)

http://www.tdag.org.uk/

The 'Green Infrastructure' concept can be defined as

***'an interconnected network of green space that conserves natural ecosystem values and functions and provides associated benefits to human populations'.***

For example the Dublin Tree Inventory estimated that the street trees in Dublin convert about 42,000 kg of carbon each year (equivalent to over 40,000 car trips in the city centre), and store approximately 1 million kg of carbon at any given time.

Recommend that the overall tree asset along the tramlines requires evaluation under the i-tree system to demonstrate their carbon/health benefits.

Free evaluation that should soon be available for Ireland.

# Luas Cross City

## Proposed Trees – Green Infrastructure benefits

### What is i-Tree?

www.itreetools.org

**Purpose: Guide management decisions with best available science and local data**

- Designed to easily engage managers and general population
- Data are being used in innovative ways to make a difference:
- Management plans, advocacy, education, tree planting goals, etc.


i-Tree is a Cooperative Initiative

DAVEY

Arbor Day Foundation

ISA

ESF

i-Tree Eco

i-Tree Streets

i-Tree Design

**A series of FREE tools to quantify ecosystem services and values from trees (free support also)**

*Source : David J. Nowak, US Forest Service, Syracuse, NY*

# Luas Cross City

## Proposed Trees – Maintenance Requirements – Overhead Line Electrification (OHLE)

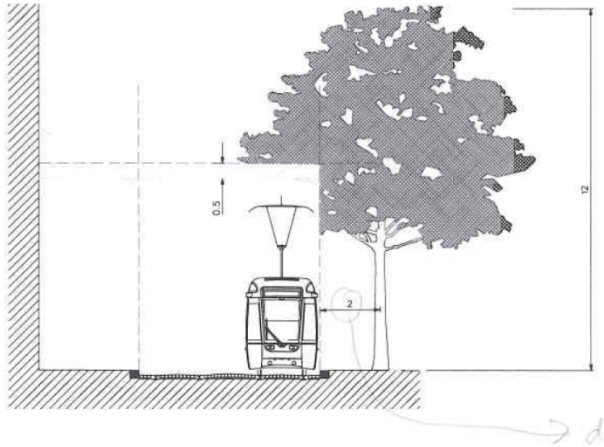



Fig.3 - OCS AND SWEPT PATH CLEARANCES TO MATURE TREES IN SECTION

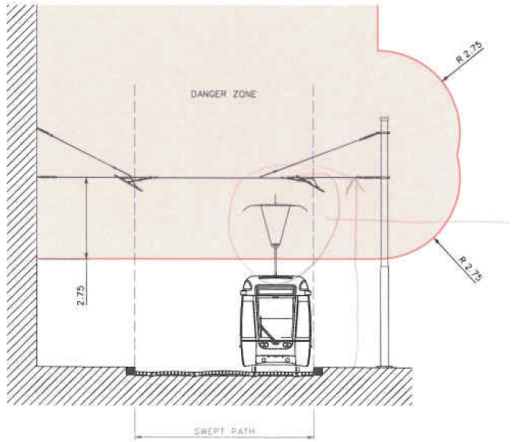



Fig.1 - OCS DANGER ZONE - PERMIT REQUIRED TO WORK

Top and bottom image: Winter and spring along the Cours de la Liberté's avenue of trees in Lyon, France. Image: Anne Jaluzot (winter) and Sophie Barthelet (spring)

# Luas Cross City

## Urban Design Strategy

Existing varied planting strategy to Luas Lines

# Luas Cross City

## Urban Design Strategy

Proposed planting palette

**Proposed trees**

**As a result of works associated with LCC (core city to Broadstone)**

**120 trees have been removed**

**290 trees to be planted**

# Luas Cross City

## Urban Design Strategy

Proposed planting palette

**Proposed street tree palette**

In some area LCC constrained in its approach to planting where there is **existing planting** in the city and species are chosen for **consistency** or when an alternative species would be discordant in the streetscape.

Tree species used for **street trees** in the core city include

- Platanus orientalis
- Platanus acerifolia
- Tilia Cordata Greenspire‘

Pruning regimes will be developed where trees adjoin carriageway or OCS / tram infrastructure

Alternatives

Consider Zelkova or Acer rubrum

# Luas Cross City

## Urban Design Strategy

Proposed planting palette

**Tilia cordata / Lime** is proposed at the following locations

- To match existing at St Stephens Green
- O'Connell street in the median as it relates to the Limes in the GPO square

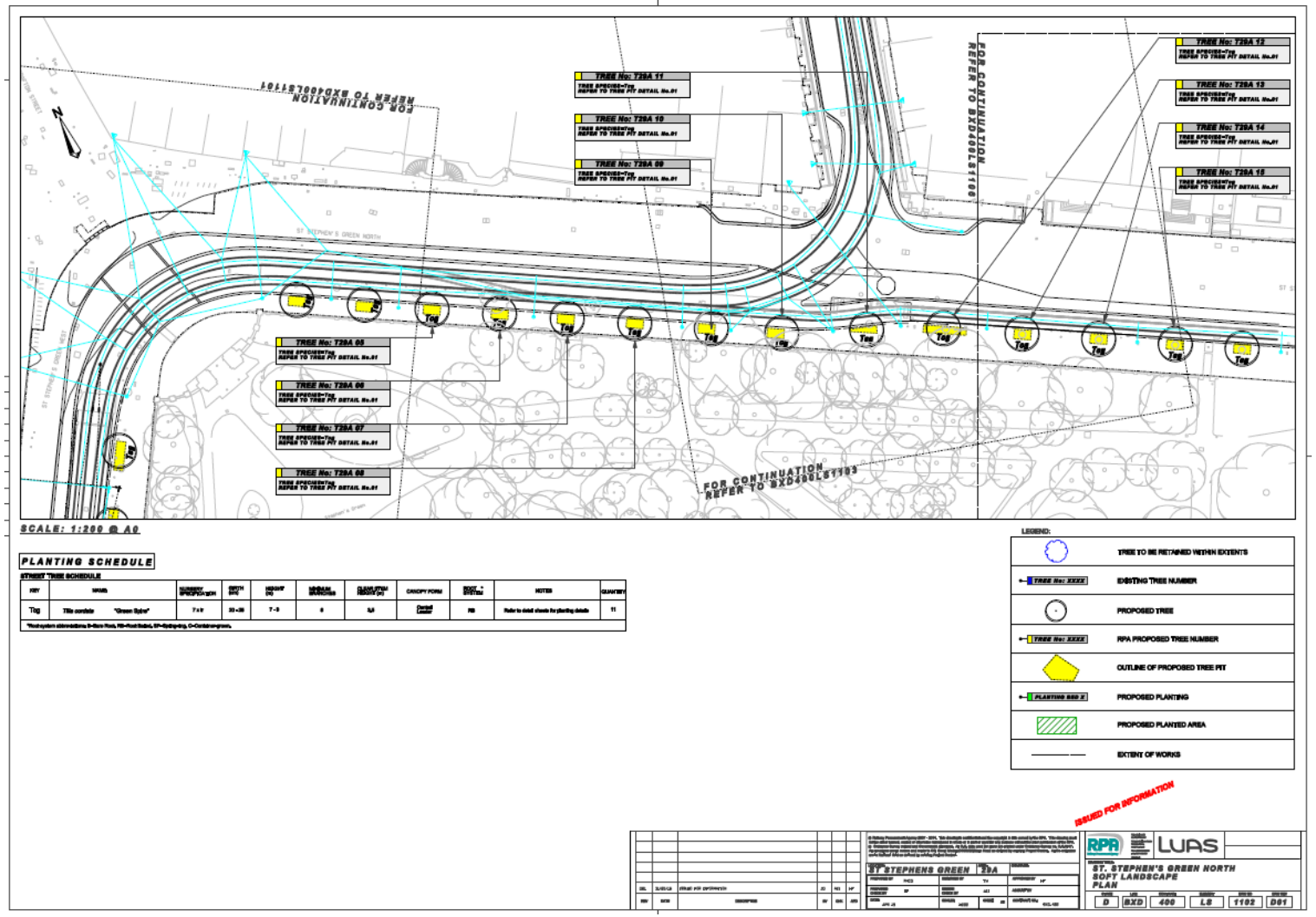
**Tilia henryiana** may be an appropriate species outside the fire restaurant in Dawson street as it can be clipped /maintained as appropriate beside the tramway and in addition, from consultations with professional nurseries, it is know to have a fragrant and attractive foliage which may be particular appropriate given the cultural characteristics of this part of Dawson street

**Tilia cordata, St. Stephens Green**

# Luas Cross City

## Urban Design Strategy

Proposed planting palette



# Luas Cross City

## Proposed Trees – Species choice

Proposed planting palette

### 2. Evaluating ecosystem functions
### b. Air Quality

| | |
|---|---|
| COMMON LIME *Tilia x europaea* |  |
| Heart shaped with unequal sides. Tufts of whitish hairs in vein axils on underside of leaf. | |
| 15 cm | |
| SMALL LEAVED LIME *Tilia cordata* |  |
| Heart shaped, underside matt. Tufts of brown hairs between vein angles. | |
| 9 cm | |

The residue deposited on leaves can be examined through a process known as saturation isothermal remanence (**SIRM**). This process identifies the concentration of magnetic materials on leaves which can be correlated with the emissions from vehicles that are mainly responsible for particulate matter (PM) pollution.

Source https://dubIintrees.wordpress.com/

# Luas Cross City

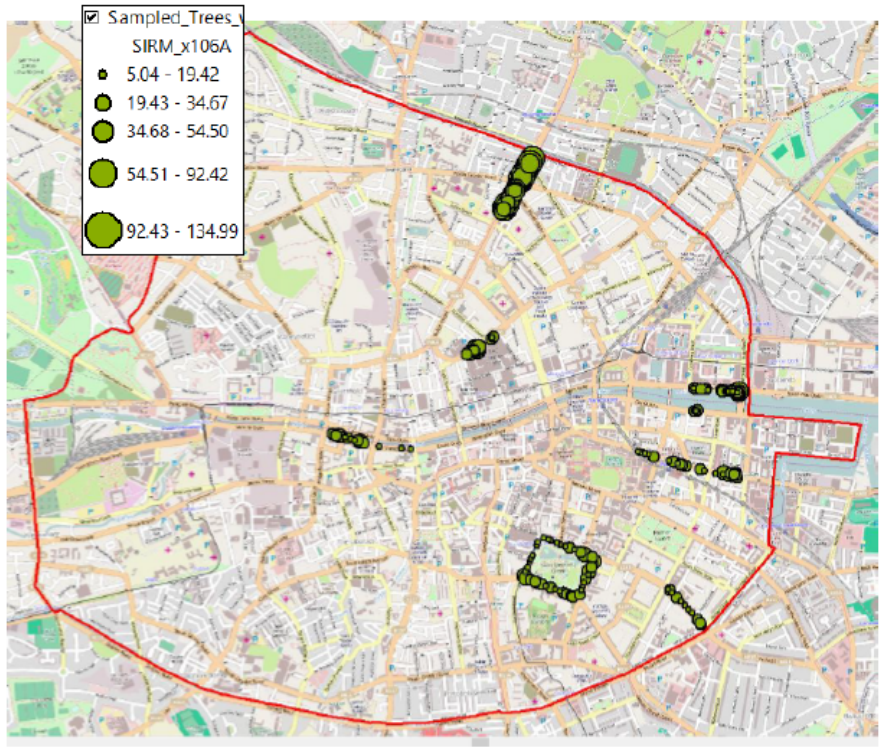
## Proposed Trees – Species choice

Proposed planting palette

## 2. Evaluating ecosystem functions
## b. Air quality

In this study a sample of leaves of trees were gathered after a dry spell during 2013. The leaves were selected close to the level of pedestrians at a number of sites around Dublin.

Leaves were sent to the Centre for Environmental Magnetism and Palaeomagnetism (CEMP) at Lancaster University (UK) for analysis. This work was completed with Barbara Maher & Rob Clarke (U. Lancaster).




Source https://dublintrees.wordpress.com/

# Luas Cross City

## Proposed Trees – Species choice

Proposed planting palette

### 2. Evaluating ecosystem functions
### b. Air quality


Source https://dublintrees.wordpress.com/

# Luas Cross City

## Urban Design Strategy

Proposed planting palette

**Platanus x acerifolia 'Pyrimidalis'** is proposed at the following locations

- To reflect Planes retained in Dawson Street but Pyrimidalis chosen as a cultivar that remains narrower and smaller than the species.
- 'Pyramidalis' has a narrow pyramidal crown that later turns vase-shaped and attains a height of 15 - 20 m

**Alternatives**

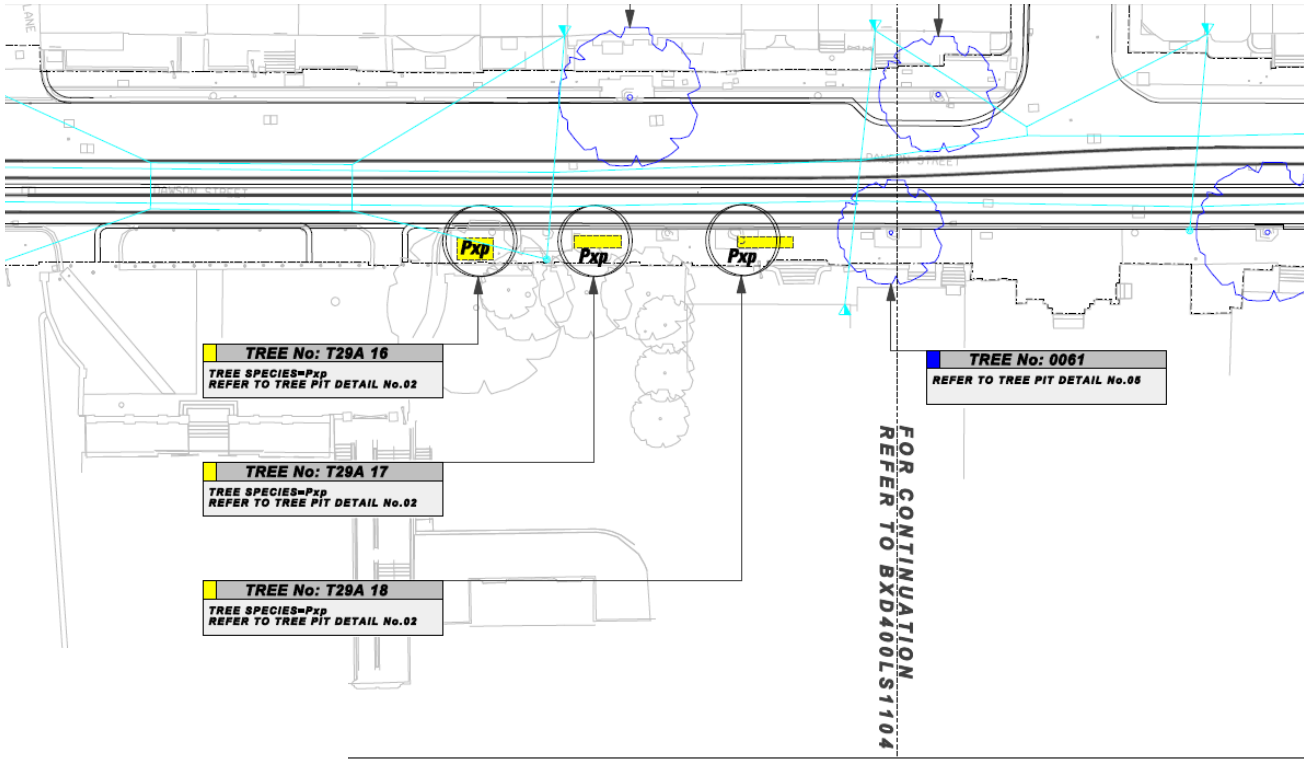
Consider also using Platanus hispanica 'Trimona'

**Tilia henryiana** may also be an appropriate species outside the fire restaurant in Dawson street as it can be clipped /maintained as appropriate beside the tramway and in addition, from consultations with professional nurseries, it is know to have a fragrant and attractive foliage which may be particular approropraite given the cultural characteristics of this part of Dawson street

# Luas Cross City

## Urban Design Strategy

Proposed planting palette




### PLANTING SCHEDULE

**STREET TREE SCHEDULE**

| KEY | NAME: | NURSERY SPECIFICATION | GIRTH (cm) | HEIGHT (m) |
|---|---|---|---|---|
| Pxp | *Platnus x acerifolia* "Pyramidalis" | 4 x tr | 18 - 20 | 5m |

*Root system abbreviations: B=Bare Root, RB=Root Balled, SP=Spring-ring, C=Container-grown.

LEGEND:

| | |
|---|---|
| | TREE TO BE RETAINED WITHIN EXTENTS |
| TREE No: XXXX | EXISTING TREE NUMBER |
| | PROPOSED TREE |

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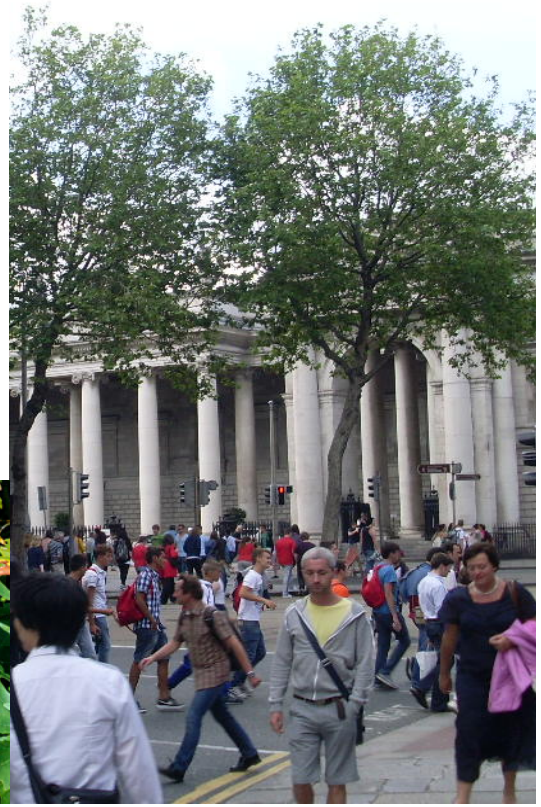
# Luas Cross City

## Urban Design Strategy

Proposed planting palette

**Platanus orientalis /** Oriental Plane is proposed at the following locations

- To replace those Plane trees removed at Thomas Moore Island and College Green
- The bark is yellow, and the green (sometimes grey) bark flakes off in small pieces, giving the tree a speckled appearance when viewed by passing Dubliners.
- A hardy, drought tolerant, tree suitable for street planting
- Tolerant of urban conditions, differing soils and atmospheric pollution. Responds well to heavy pruning and exhibits good disease resistance

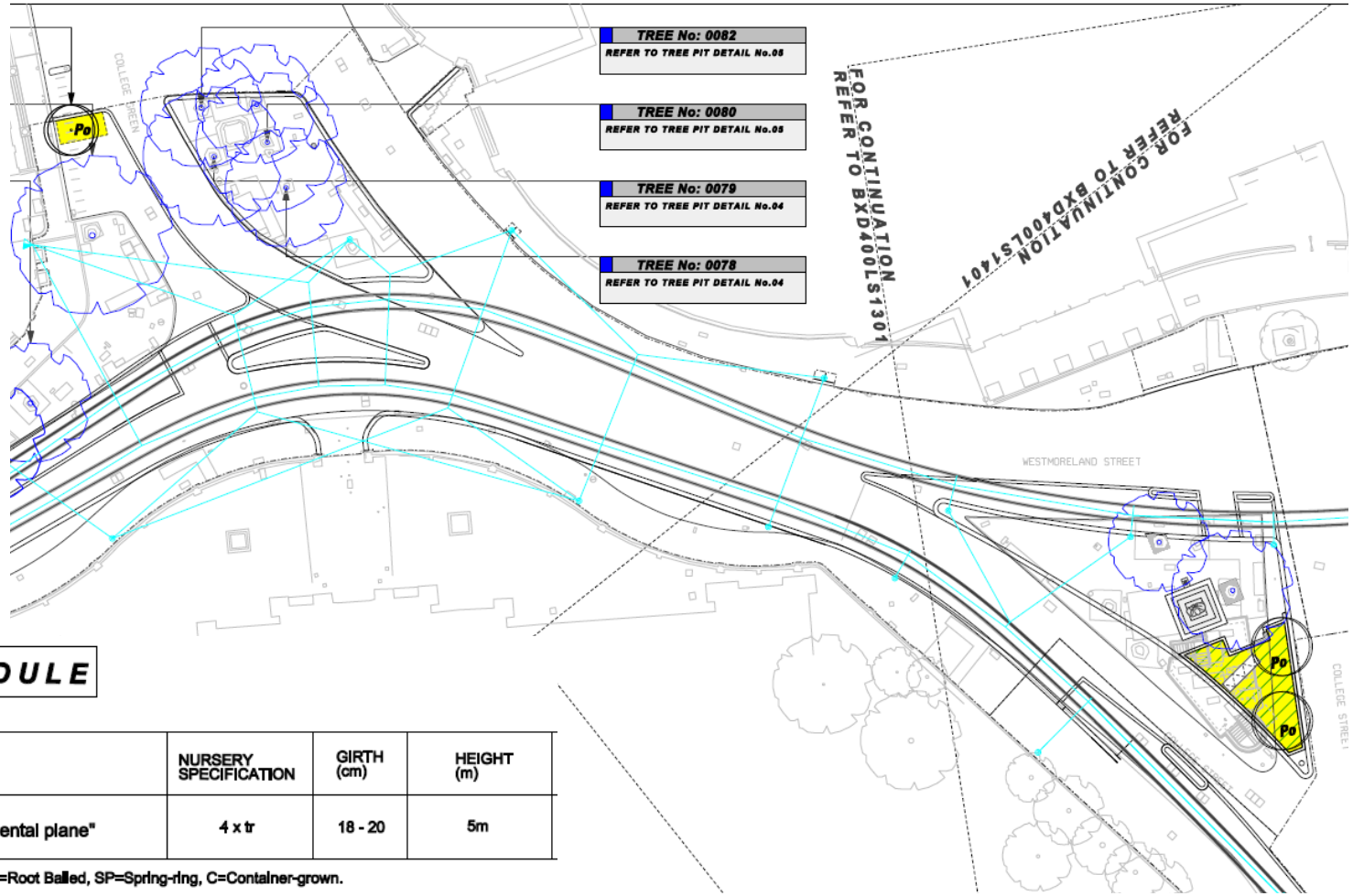


Consider also using Platanus hispanica 'Trimona'

# Luas Cross City

## Urban Design Strategy

Proposed planting palette




**PLANTING SCHEDULE**

**STREET TREE SCHEDULE**

| KEY | NAME: | NURSERY SPECIFICATION | GIRTH (cm) | HEIGHT (m) |
|---|---|---|---|---|
| Po | *Platanus orientalis* "Oriental plane" | 4 x tr | 18 - 20 | 5m |

*Root system abbreviations: B=Bare Root, RB=Root Balled, SP=Spring-ring, C=Container-grown.

# Luas Cross City

## Urban Design Strategy

Proposed planting palette



Median planting ……..witness trees or were they ?

# Luas Cross City

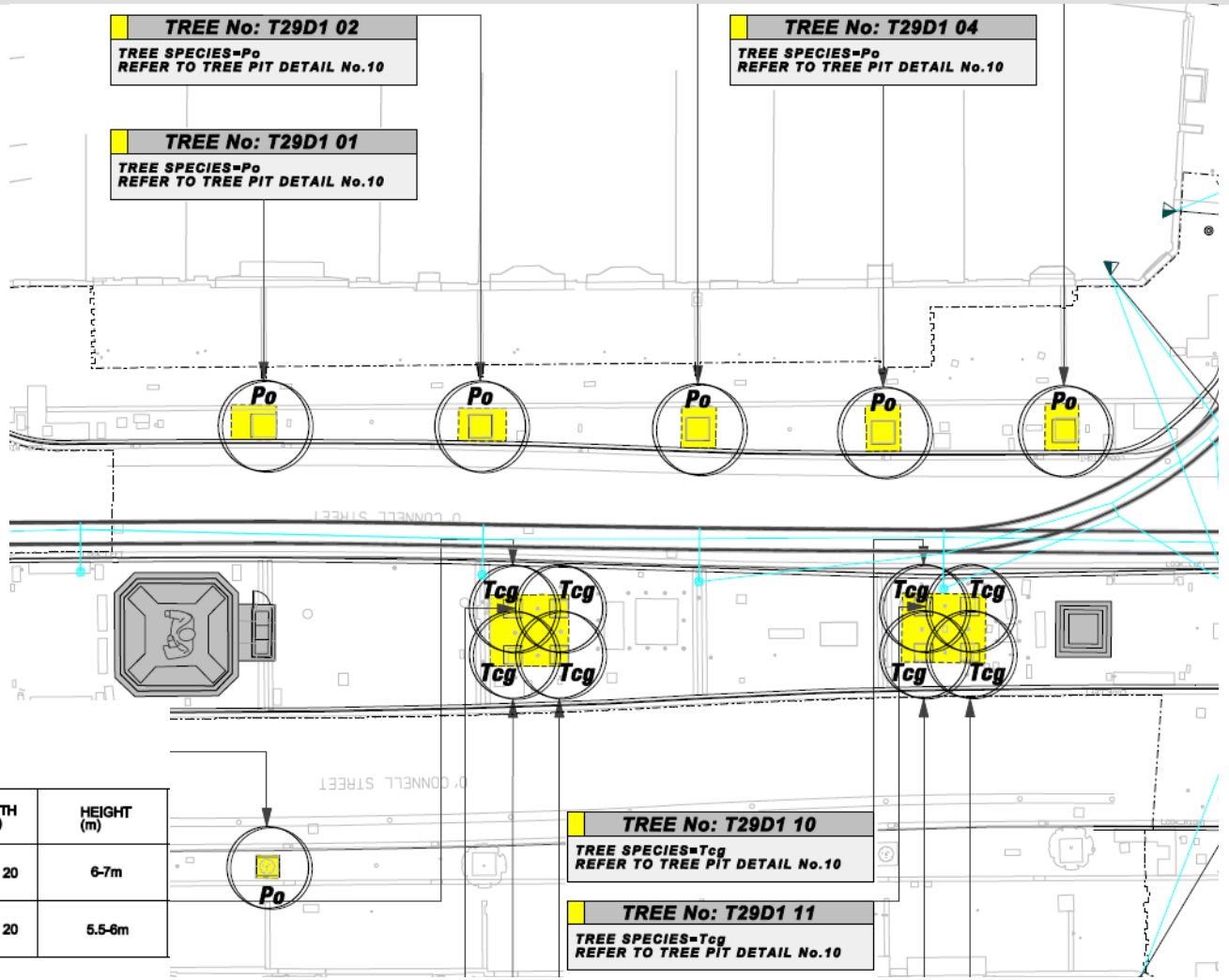
## Urban Design Strategy

Proposed planting palette

# Luas Cross City

## Urban Design Strategy

Proposed planting palette




**PLANTING SCHEDULE**

**STREET TREE SCHEDULE**

| KEY | NAME: | NURSERY SPECIFICATION | GIRTH (cm) | HEIGHT (m) |
|---|---|---|---|---|
| Po | *Plantanus orientalis* "Oriental plane" | 4 x tr | 18 - 20 | 6-7m |
| Tcg | *Tilia corata* "Green Spire" | 4 x tr | 18 - 20 | 5.5-6m |

*Root system abbreviations: B=Bare Root, RB=Root Balled, SP=Spring-ring, C=Container-grown.

# Luas Cross City

## Urban Design Strategy

Proposed planting palette

**Platanus orientalis** is also proposed at the following locations

- To match existing at O'Connell Street

**Platanus orientalis, O'Connell Street**

# Luas Cross City

## Urban Design Strategy

Proposed planting palette

Pleached limes for O Connell Street

# Luas Cross City

## Urban Design Strategy

Proposed planting palette

**Proposed feature tree palette**

However to vary the species used in selected locations in Dublin **feature trees** are proposed where

- They do not fi t in to an existing street tree palette
- There is an opportunity to plant a future landmark tree
- Are suitable for particular site conditions
- Apply 5-10% principles

# Luas Cross City

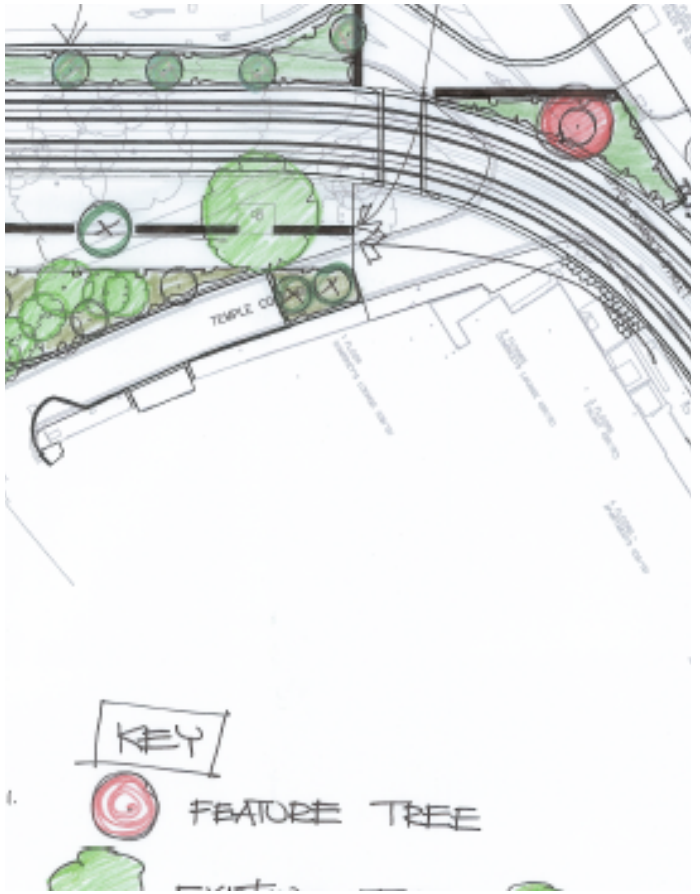
## Urban Design Strategy

Proposed planting palette

**Feature Tree**

example – Top of Dominick Street

- Consider exposed climatic conditions
- Consider size of available pit
- Consider context
- Apply 5-10% principles

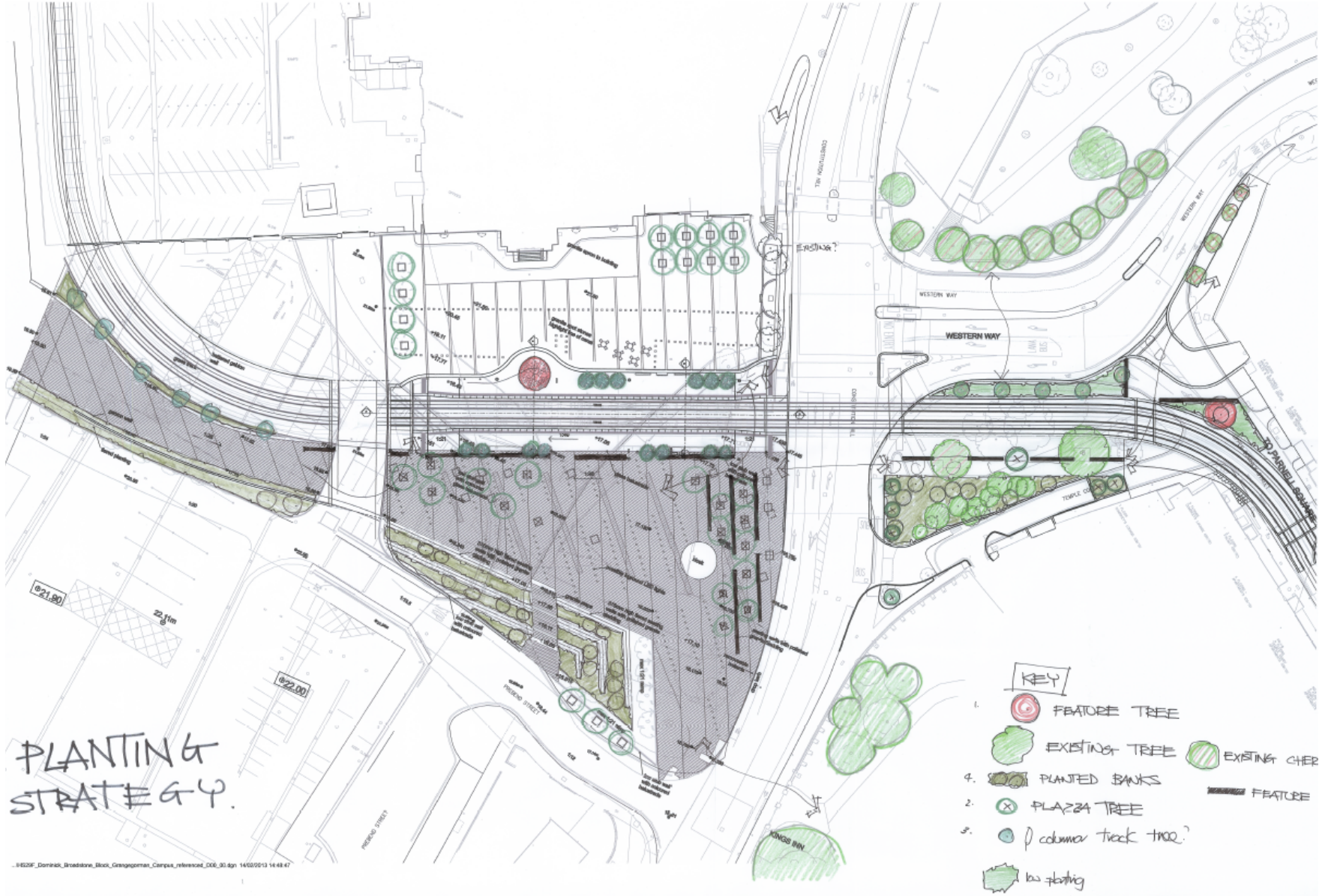



**Pinus nigra** chosen

- Can take exposed location
- Evergreen for all year interest and taking into account seasonal student population
- Available in large sizes
- highly resistant to air pollution
- Proven to capture atmospheric pollution.
- Evergreen carbon catching function in Dublin during winter months.


**LCC Example - Broadstone**

Survey site context and considered species doing well in the locality.

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**Dublin Example - Glasnevin**

Pine at a key junction provides a local landmark and feature tree

Proven health benefits of pines at traffic junction according to i-tree as they are very effective at capturing heavy metals and atmospheric pollution

**Example - London**

Deciduous and evergreen mix for ecological resilience and year round interest in Stoke Newington, Hackney, London. Image: Rupert Bentley-Walls, London Borough of Hackney

# Luas Cross City

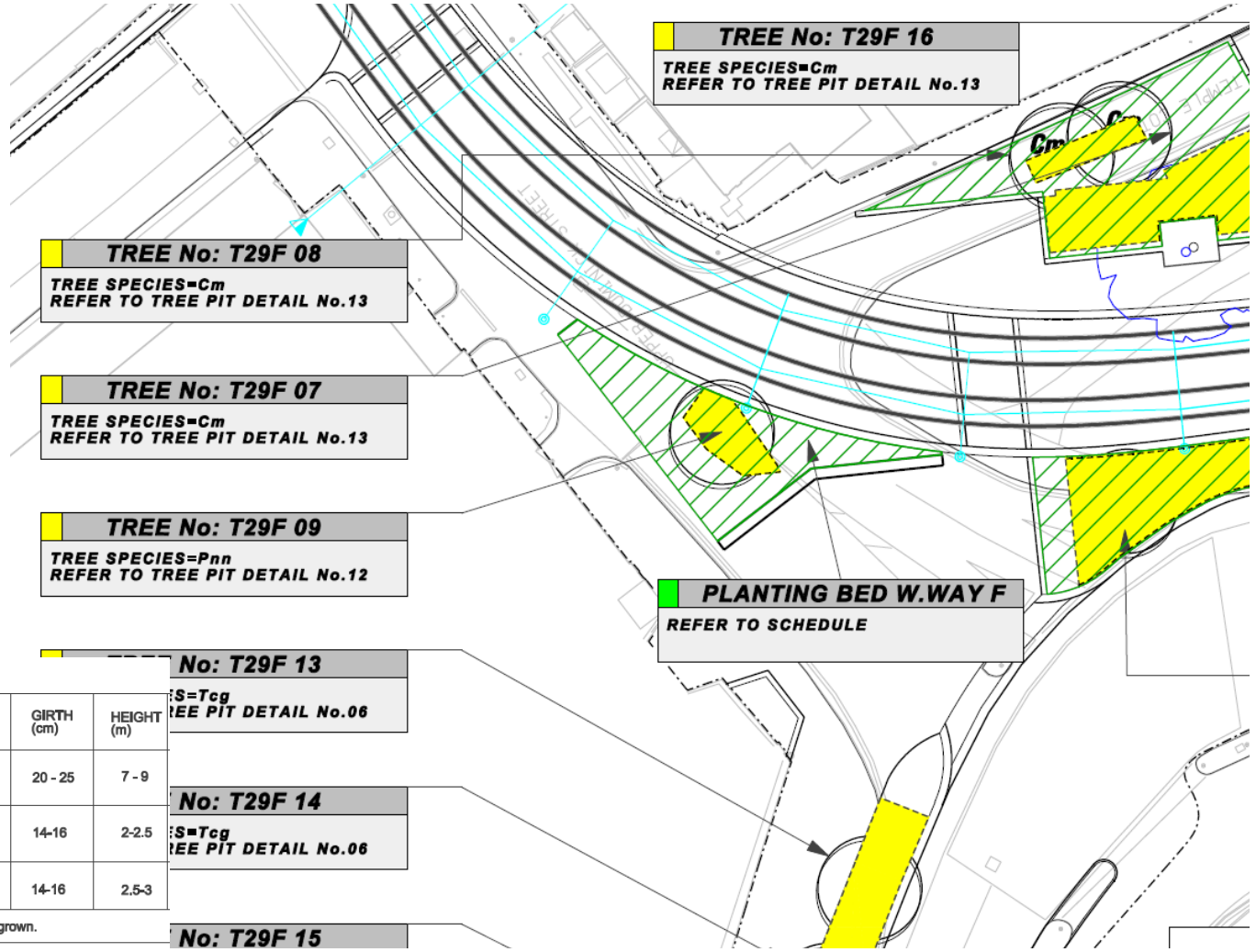
## Urban Design Strategy

Proposed planting palette

Top of Dominick Street

- Can take exposed urban location
- Evergreen for all year interest
- Available in large sizes
- highly resistant to air pollution

**Pinus Nigra** chosen




**STREET TREE SCHEDULE**

| KEY | NAME: | NURSERY SPECIFICATION | GIRTH (cm) | HEIGHT (m) |
|---|---|---|---|---|
| Tcg | *Tilia cordata* "Green Spire" | 7 x tr | 20 - 25 | 7 - 9 |
| Pnn | *Pinus nigra nigra* | 5 x tr | 14-16 | 2-2.5 |
| Cm | *Crataegus monogyna* | 3 x tr | 14-16 | 2.5-3 |

*Root system abbreviations: B=Bare Root, RB=Root Balled, SP=Spring-ring, C=Container-grown.

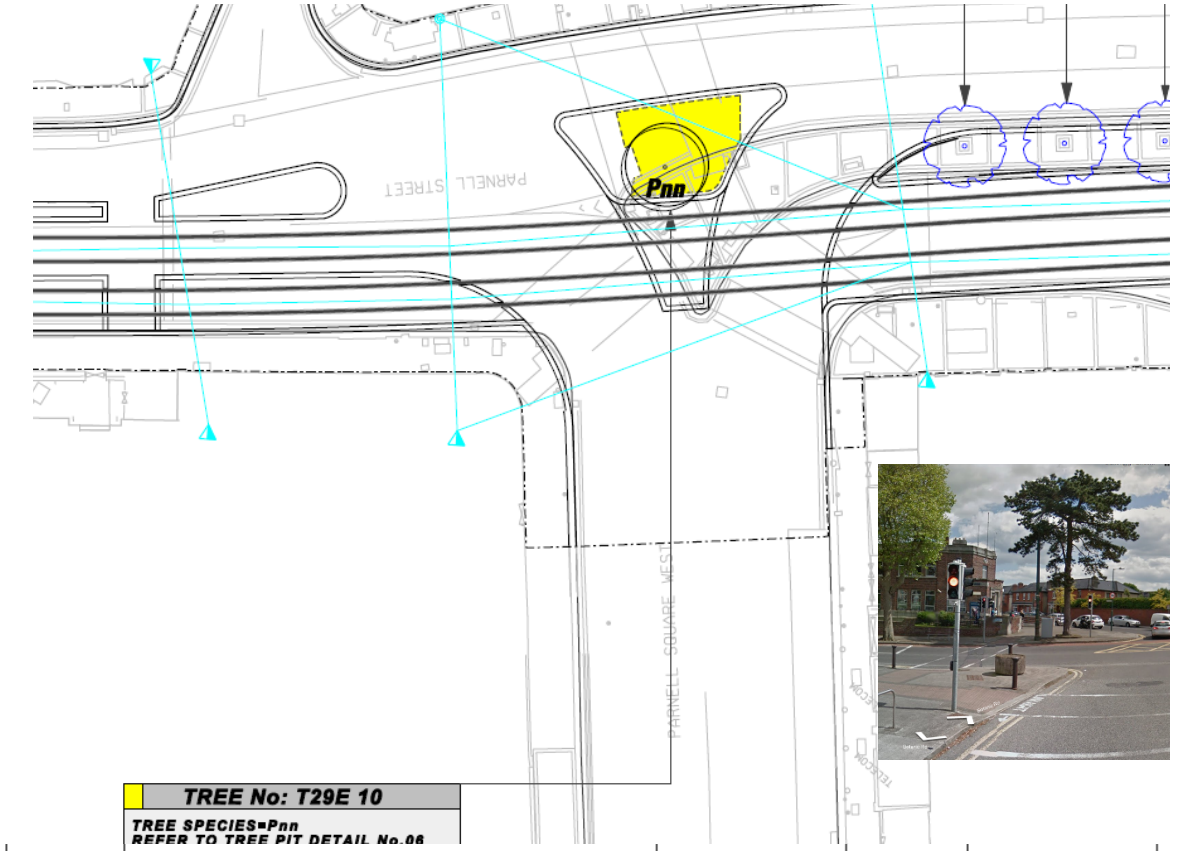
# Luas Cross City

## Urban Design Strategy

Proposed planting palette

Rotunda Island

- Can take exposed urban location
- Evergreen for all year interest
- Available in large sizes
- highly resistant to air pollution




**TREE No: T29E 10**

**TREE SPECIES=Pnn**
**REFER TO TREE PIT DETAIL No.06**

| | | | | |
|---|---|---|---|---|
| Pnn | *Pinus nigra nigra* | 6 x tr | - | 6 |

*Root system abbreviations: B=Bare Root, RB=Root Balled, SP=Spring-ring, C=Container-grown.

# Luas Cross City

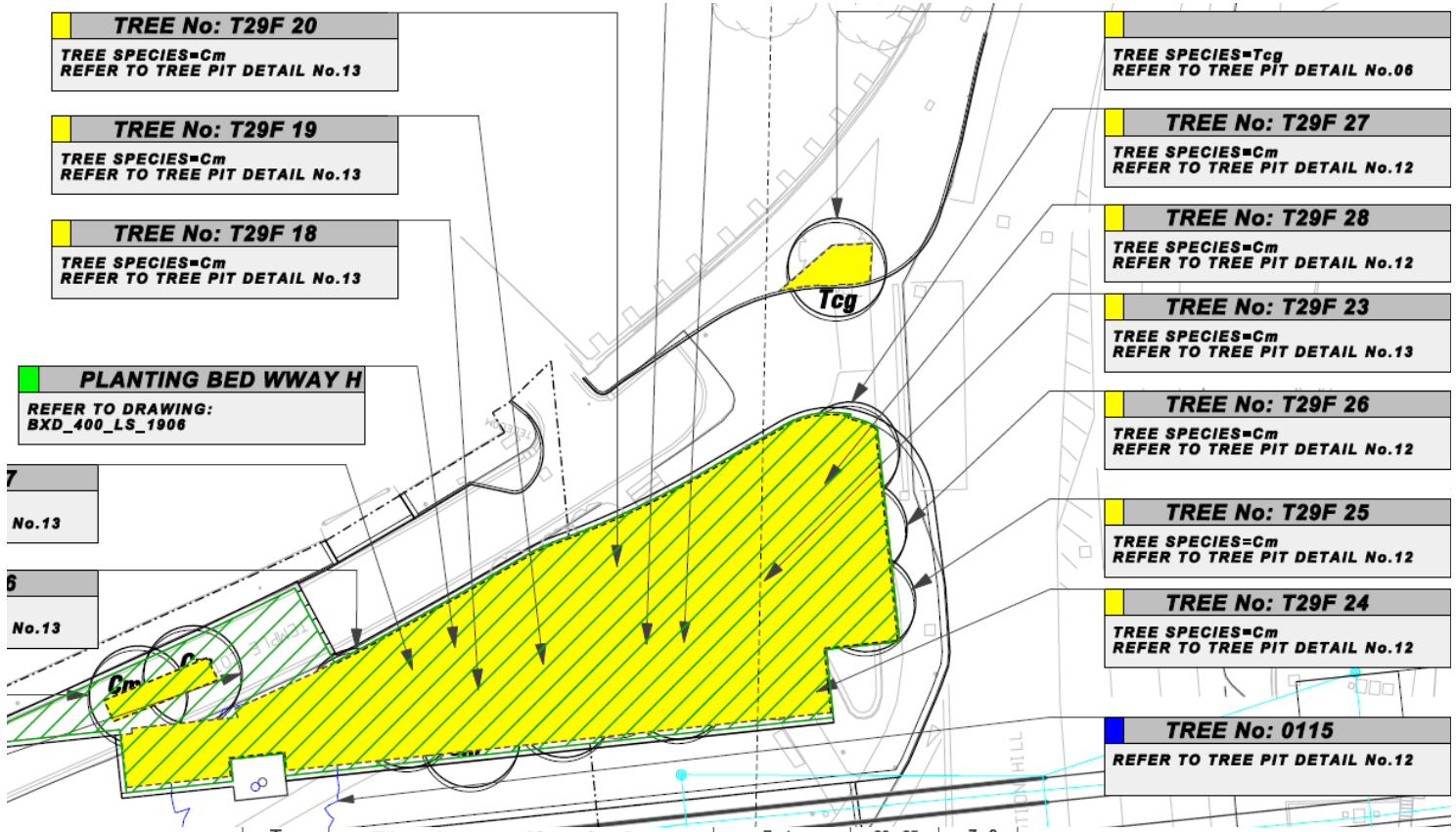
## Urban Design Strategy

Proposed planting palette

**Constitution Hill**

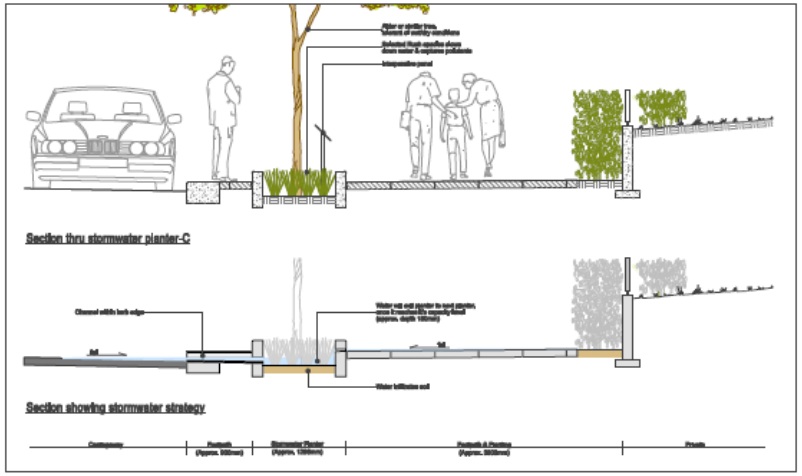
- Look to surrounding landscapes
- Native species
- Green Infrastructure
- highly resistant to air pollution

**Hawthorn** chosen to match existing and to contribute to native planting and habitat value

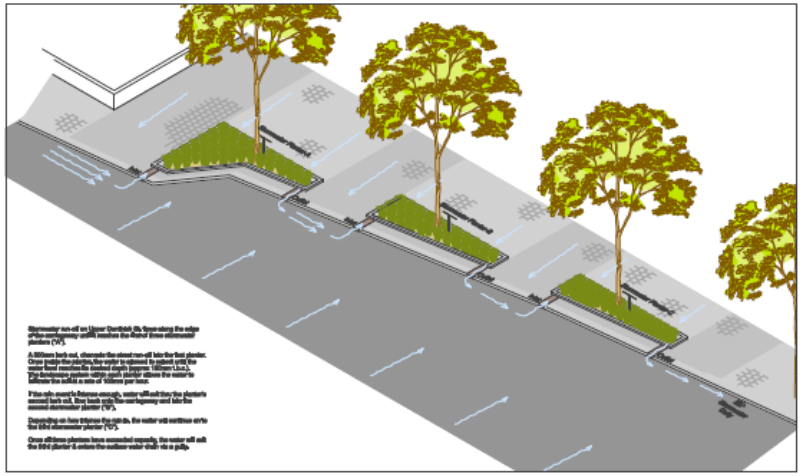



| | | | | |
|---|---|---|---|---|
| Tcg | *Tilia cordata* "Green Spire" | 7 x tr | 20 - 25 | 7 - 9 |
| Pnn | *Pinus nigra nigra* | 5 x tr | 14-16 | 2-2.5 |
| Cm | *Crataegus monogyna* | 3 x tr | 14-16 | 2.5-3 |

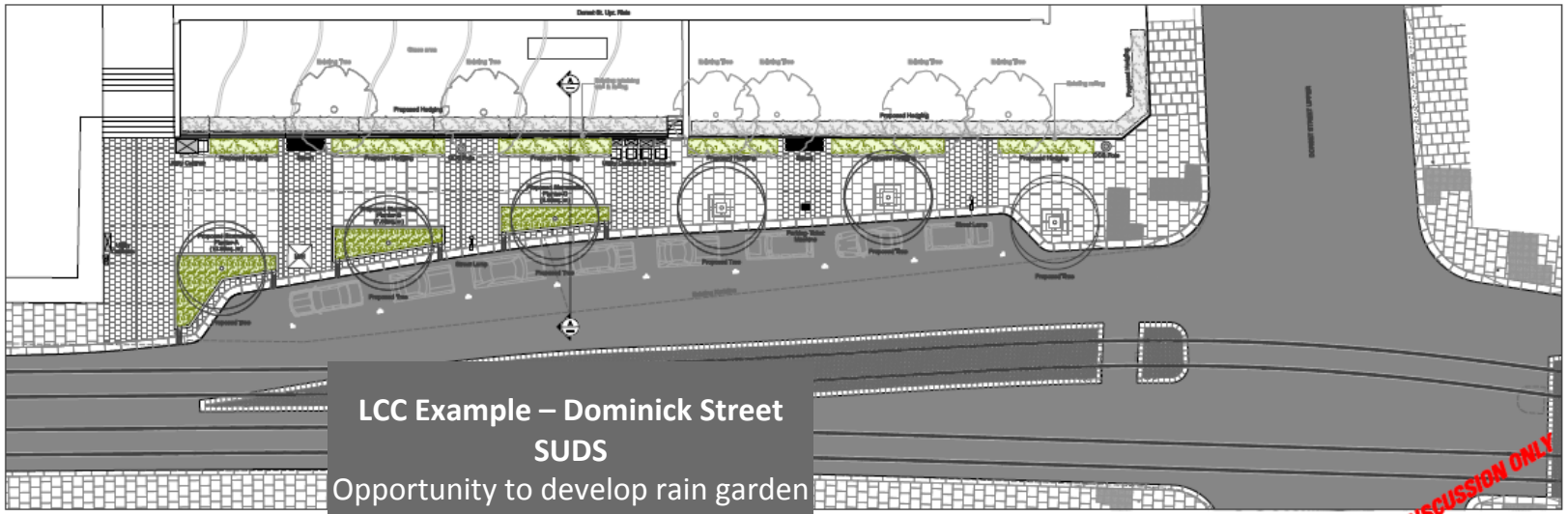
*Root system abbreviations: B=Bare Root, RB=Root Balled, SP=Spring-ring, C=Container-grown.




SECTION A-A - Scale 1:20 @ A0



ISOMETRIC, SCHEMATIC VIEW - Not to Scale



LOCATION PLAN - Not to Scale

**LCC Example – Dominick Street SUDS**

Opportunity to develop rain garden as part of green infrastructure

FOR DISCUSSION ONLY

PROPOSED HS ON DOMINICK ST. UPPER– LUAS CROSS CITY

# Luas Cross City

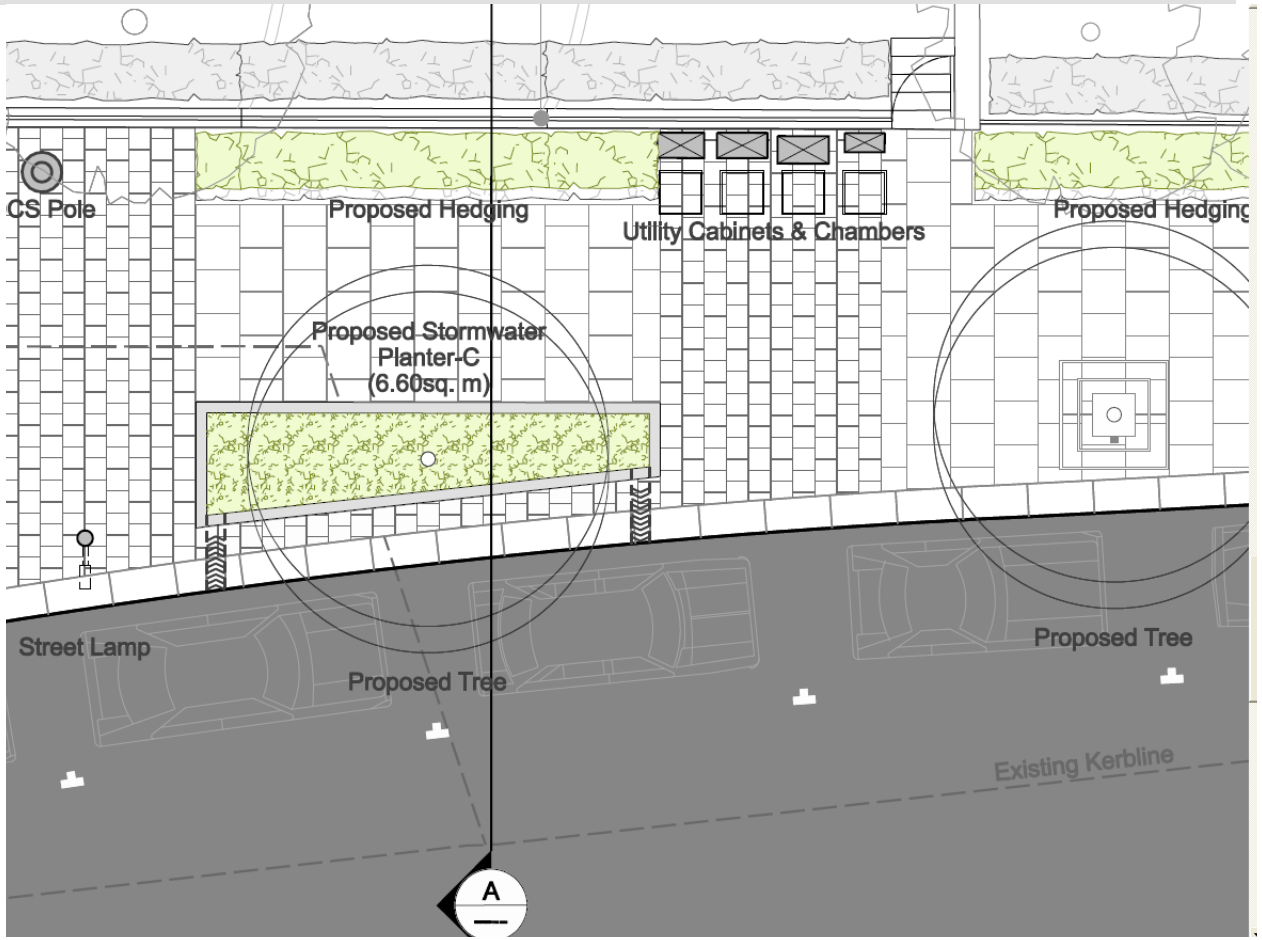
## Urban Design Strategy

Proposed planting palette

Feature Tree- an example – Dominick Street Rain garden

**Alnus glutinosa** chosen

- The context of the open space means it can take alternative species as not part of an avenue
- Common alder will grow easily in full sun or partial shade in almost any landscape setting since the trees are able to "fix" nitrogen, or take it out of the soil atmosphere, enabling these trees to grow in the poorest and wettest soils where other trees might fail.
- it is tolerant of moderate drought, compaction, and urban stress
- Native to Ireland



# Luas Cross City

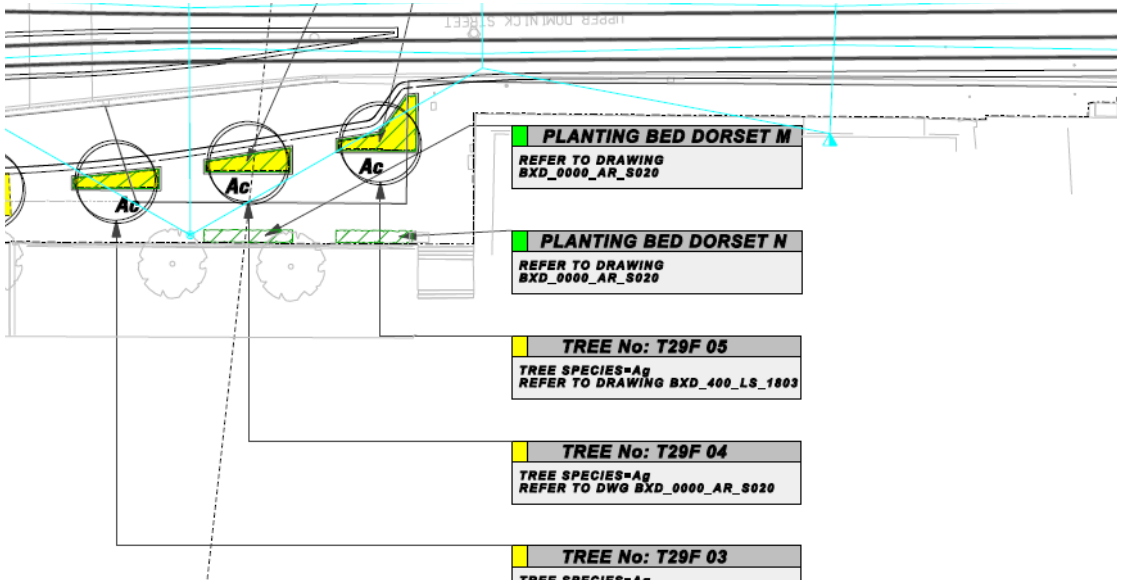
## Urban Design Strategy

Proposed planting palette

Marlborough Rain Garden

- Consider wet climatic conditions
- Consider size of available pit
- Consider context
- Apply 5-10% principles

**Alnus glutinosa** chosen
chosen




**PLANTING SCHEDULE**

**STREET TREE SCHEDULE**

| KEY | NAME: | NURSERY SPECIFICATION | GIRTH (cm) | HEIGHT (m) |
|---|---|---|---|---|
| Ag | *Alnus Glutinosa* | 6 x tr | 18 - 20 | 7 - 9 |

*Root system abbreviations: B=Bare Root, RB=Root Balled, SP=Spring-ring, C=Container-grown.

# Luas Cross City

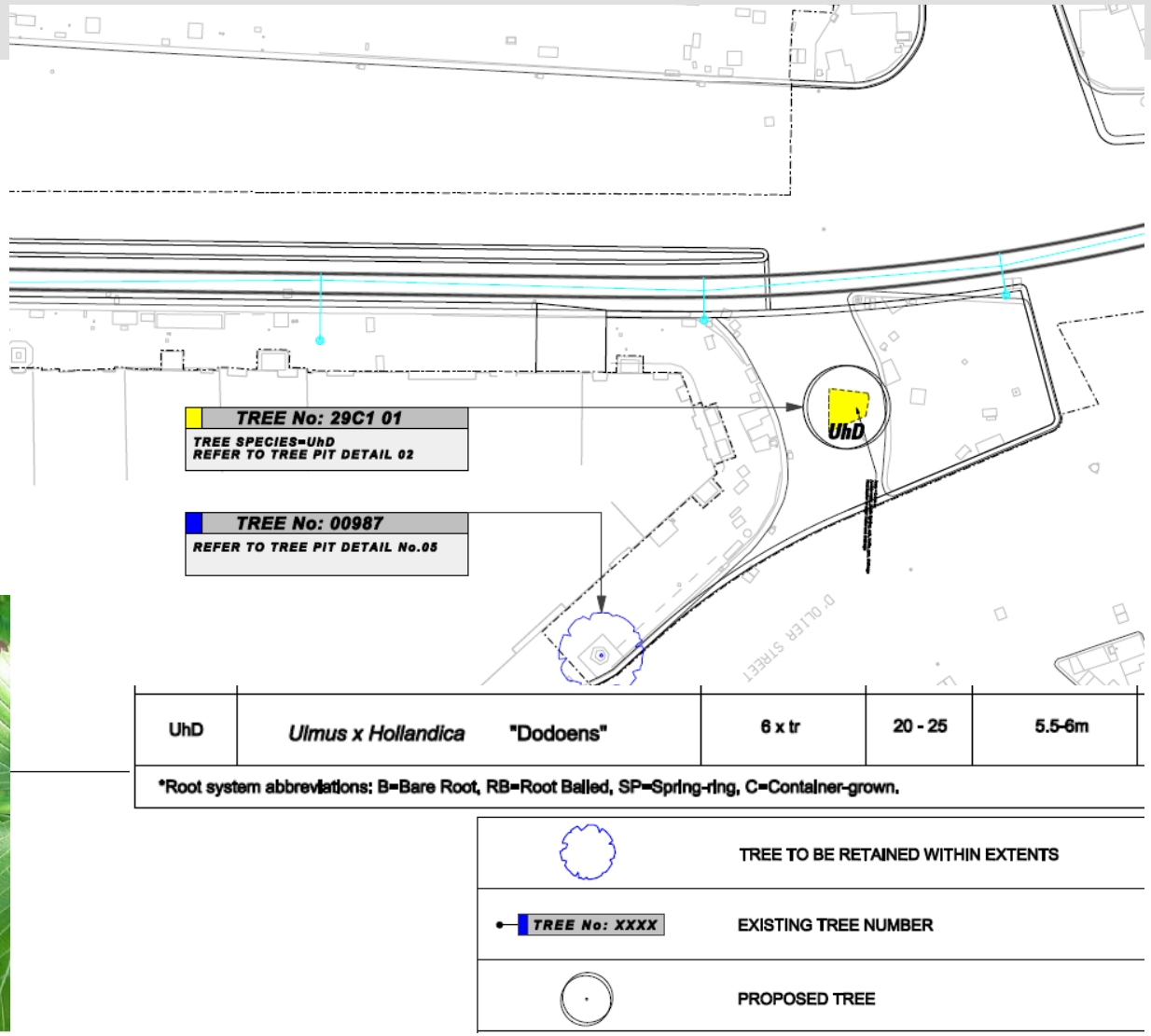
## Urban Design Strategy

Proposed planting palette

Feature Tree- Peoples Island

- Consider exposed site
- Consider size of available pit
- Consider context
- Apply 5-10% principles

**Ulmus x Hollandia 'Dodoens'** chosen



# Luas Cross City

## Urban Design Strategy

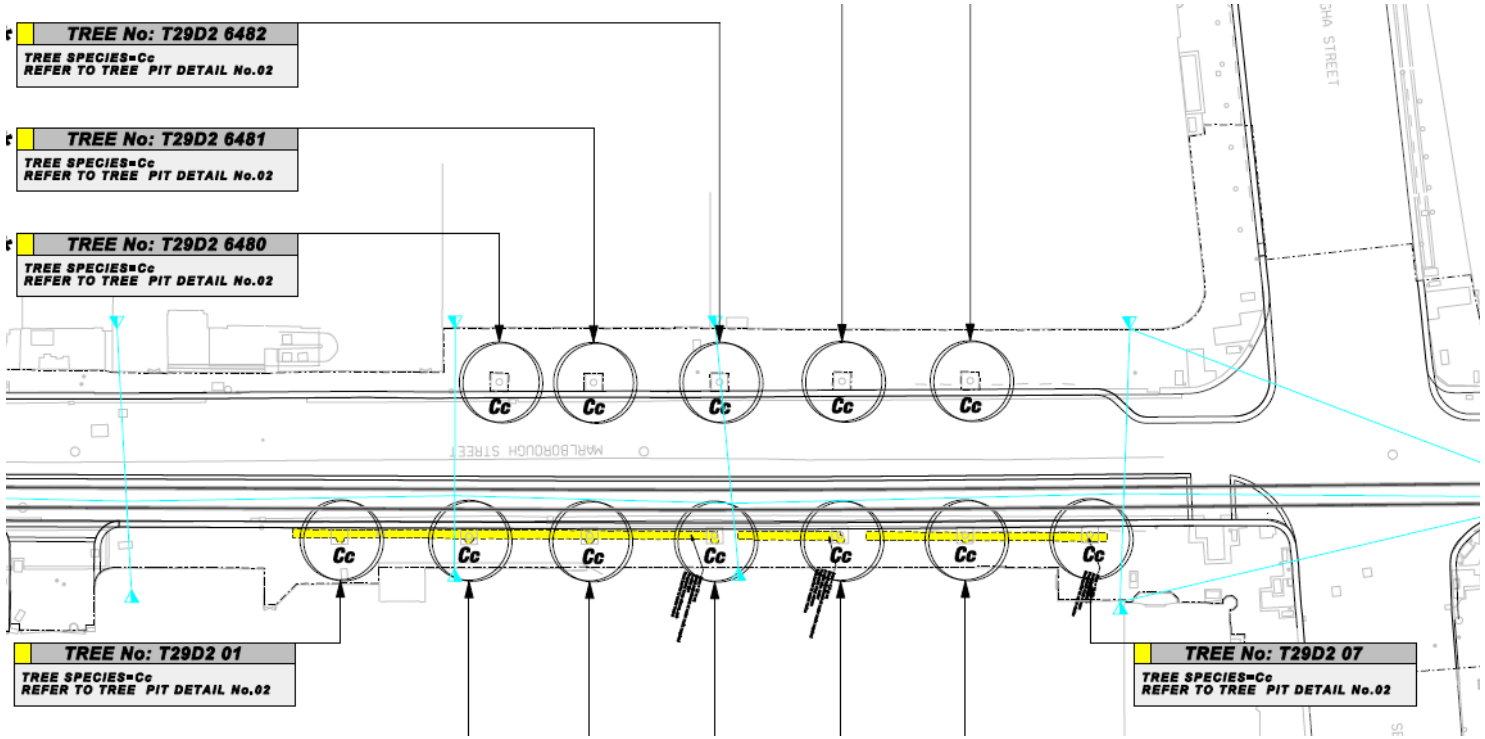
Proposed planting palette

New Avenue Marlborough St

- extremely tolerant of heat , drought and urban sites
- New Avenue

**Corylus Colurna or Quercus robur**

Q,r. chosen by L.Authority Afetrcare and maintenance to them !




**STREET TREE SCHEDULE**

| KEY | NAME: | NURSERY SPECIFICATION | GIRTH (cm) | HEIGHT (m) |
|---|---|---|---|---|
| Cc | *Corylus columa* "Turkish hazel" | 3 x tr | 18 - 20 | 5 |

*Root system abbreviations: B=Bare Root, RB=Root Balled, SP=Spring-ring, C=Container-grown.

# Luas Cross City

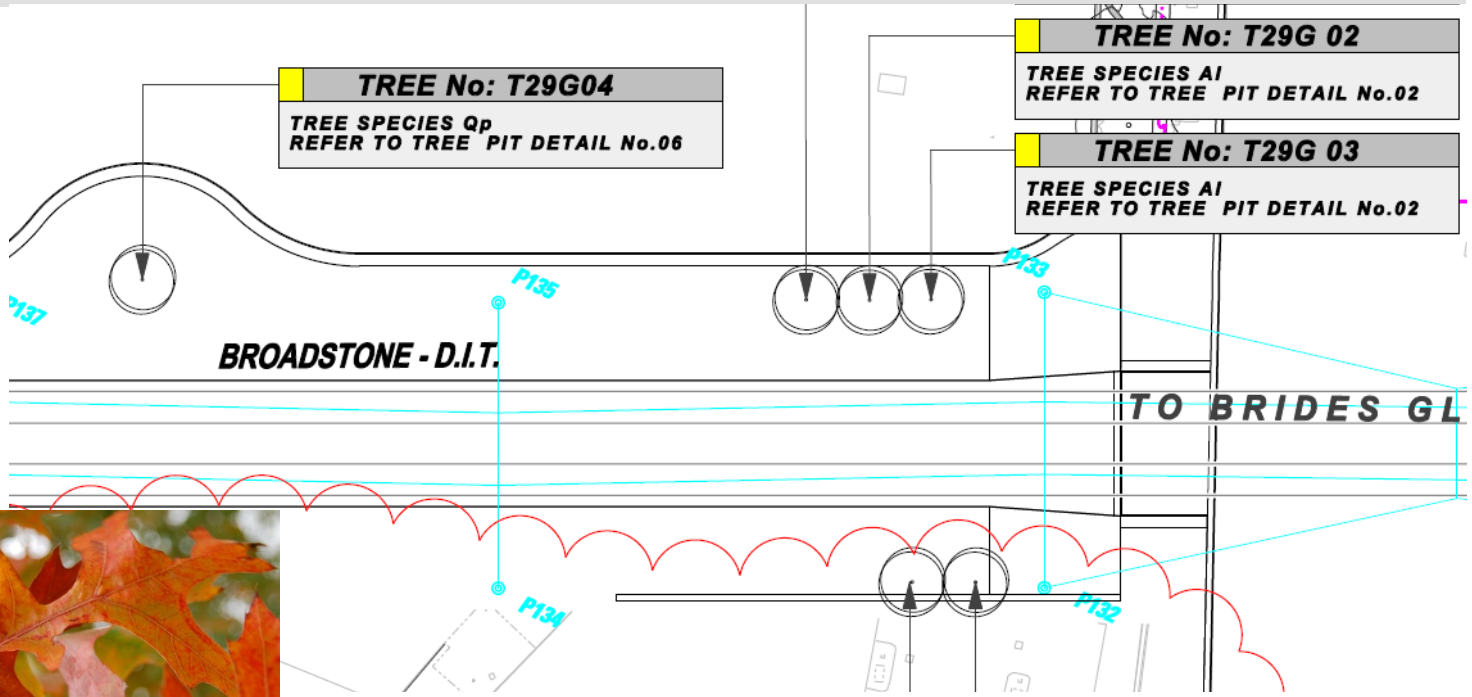
## Urban Design Strategy

Proposed planting palette

Broadstone Stop

- High profile location
- Ensure seasonal interest
- Form - a straight textured main trunk and handsome horizontally growing branches as seen against the retaining wall
- Vibrant autumn colour
- Tolerates pollution

**Quercus Palustris** chosen as specimen




TREE SCHEDULE

| KEY | NAME: | NURSERY SPECIFICATION | GIRTH (cm) | HEIGHT (m) |
|---|---|---|---|---|
| Qp | Quercus palustris | 4x | 25-30 | 4.5 min |
| Al | Amelanchier lamarckii | 3x | 18-20 | 4.5-6.5 |

*Root system abbreviations: B=Bare Root, RB=Root Balled, SP=Spring-ring, C=Container-grown.

# Luas Cross City

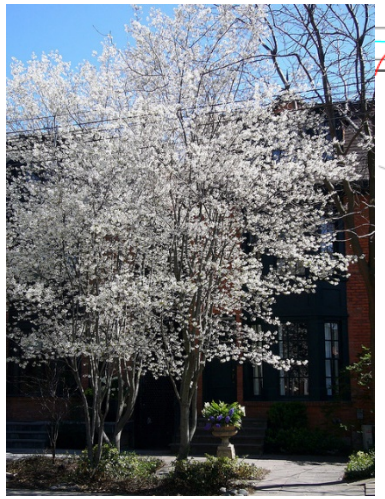
## Urban Design Strategy

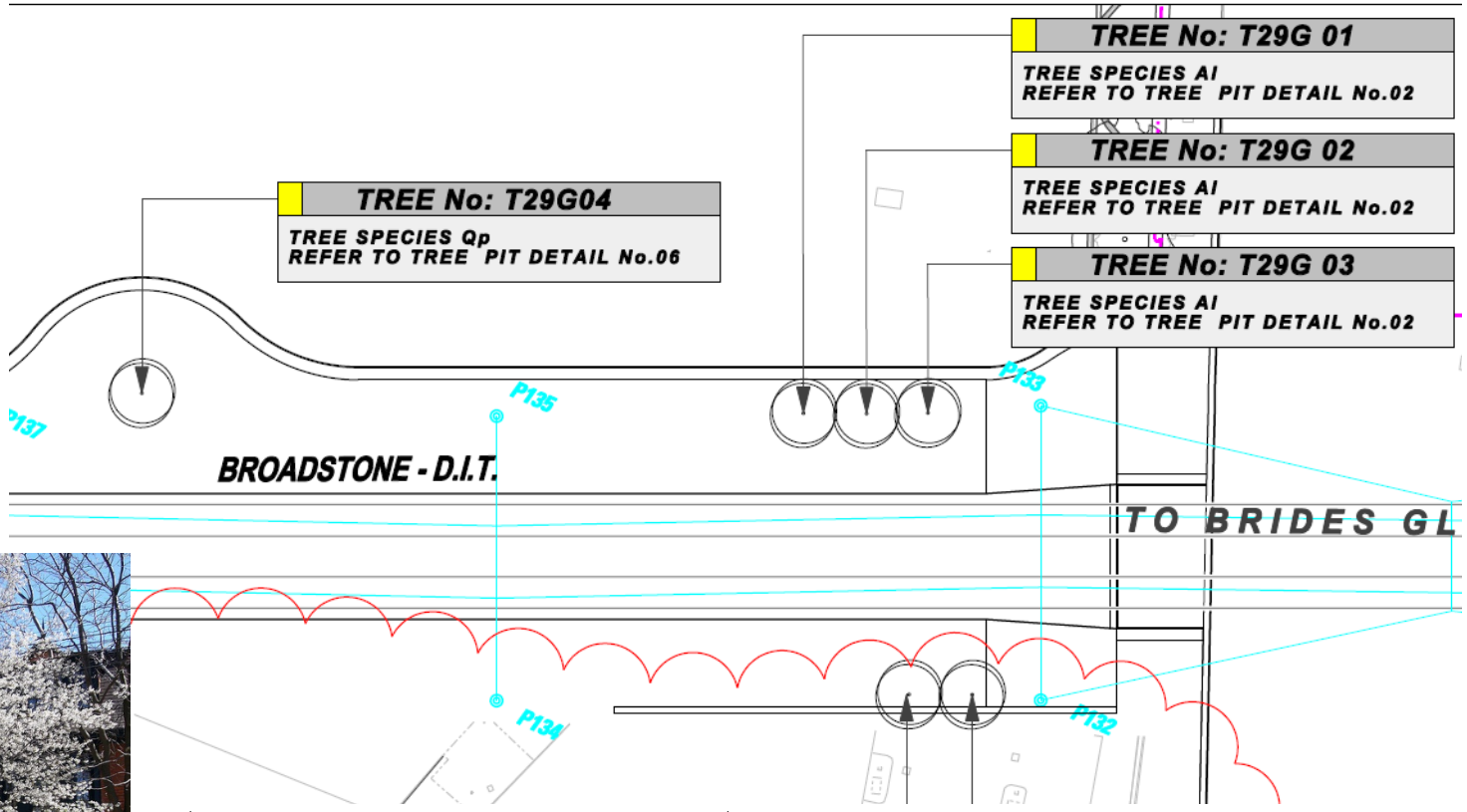
Proposed planting palette

Broadstone Stop

- specimens form horizontally spreading branches.
- fine branching pattern makes the silhouette stand out in winter. The bark and branches have a striking grey colour in the winter.
- Flower - white in somewhat upright clusters, April

**Amelanchier** chosen as specimen






TREE SCHEDULE

| KEY | NAME: | NURSERY SPECIFICATION | GIRTH (cm) | HEIGHT (m) |
|---|---|---|---|---|
| Qp | Quercus palustris | 4x | 25-30 | 4.5 min |
| Al | Amelanchier lamarckii | 3x | 18-20 | 4.5-6.5 |
| *Root system abbreviations: B=Bare Root, RB=Root Bailed, SP=Spring-ring, C=Container-grown. | | | | |

# Luas Cross City

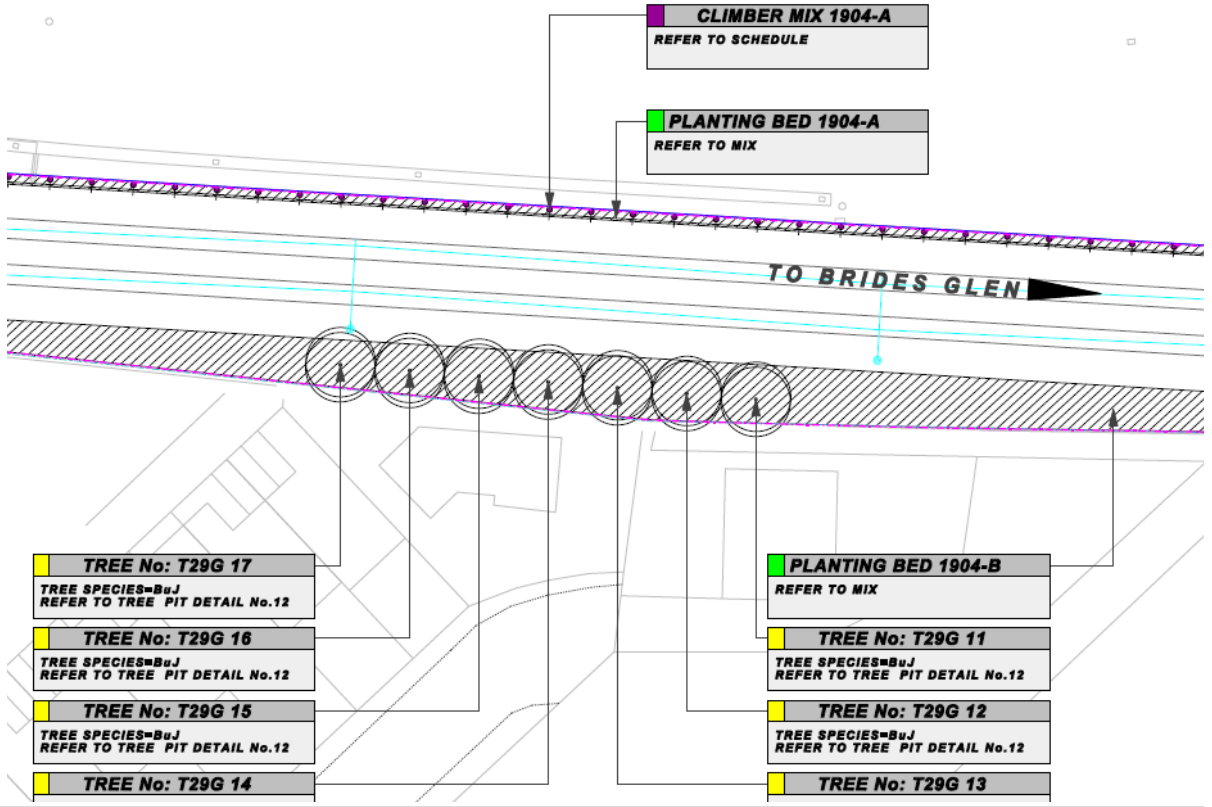
## Urban Design Strategy

Proposed planting palette

Broadstone Bus Depot

- Space dominated by old and new walls
- Birch is a light canopy tree with white bark. In winter this tree is really eye-catching.
- Light bark will complement granite walls
- The autumn colouring is golden yellow.

**Betula jacquemontii** chosen as specimen




**TREE SCHEDULE**

| KEY | NAME: | NURSERY SPECIFICATION | GIRTH (cm) | HEIGHT (m) | MINIMUM BRANCHES |
|---|---|---|---|---|---|
| BuJ | Betula utilis var. jacquemontii | 3x | 18-20 | 4.5-5 | 5 |
| Ad | Acer davidii | 3x | 18-20 | 4.5-5 | 5 |

*Root system abbreviations: B=Bare Root, RB=Root Balled, SP=Spring-ring, C=Container-grown.

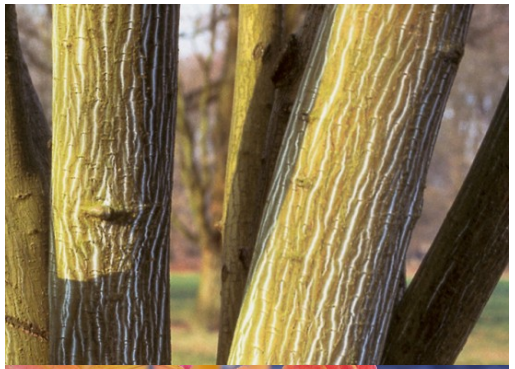
# Luas Cross City

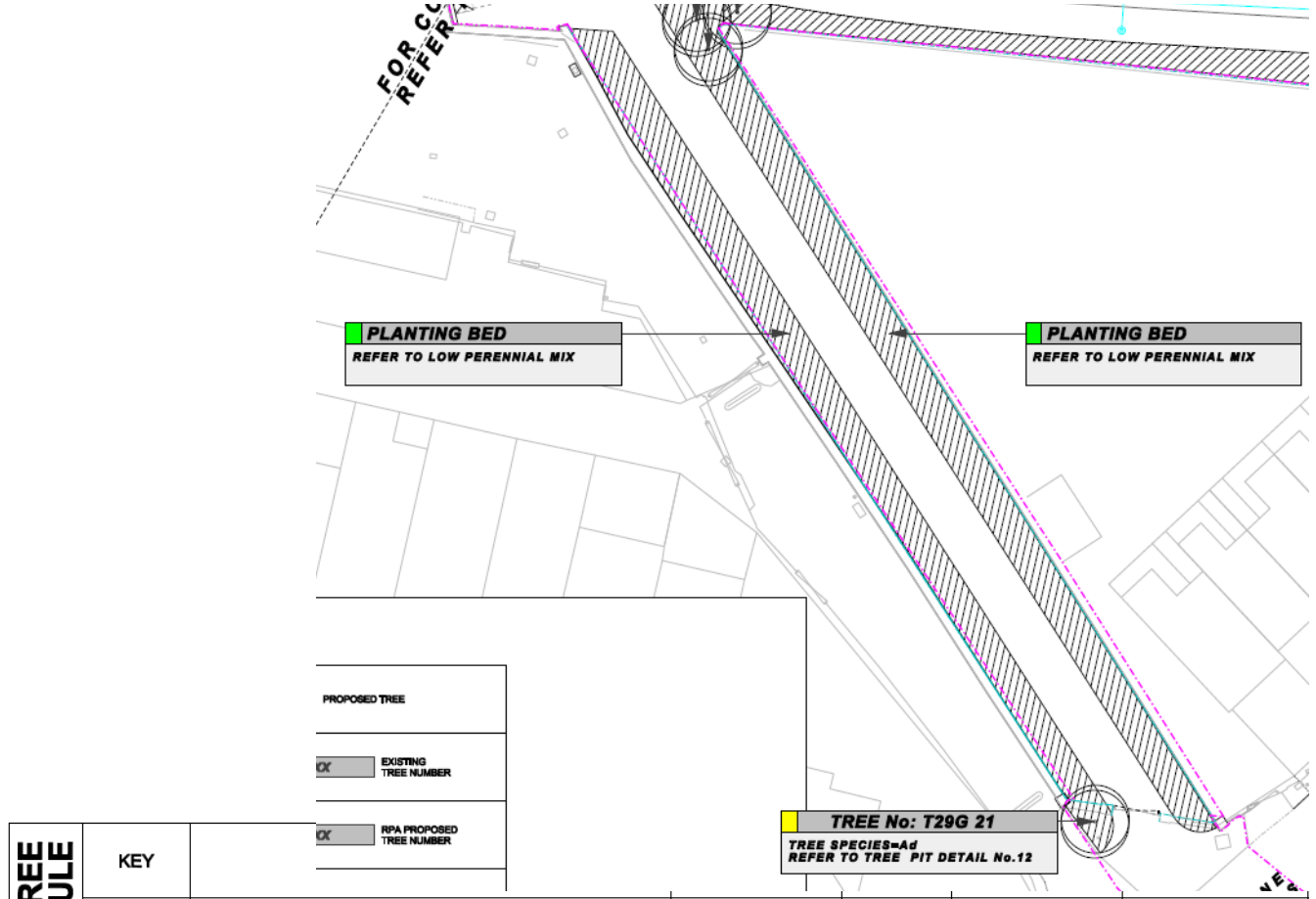
## Urban Design Strategy

Proposed planting palette

Broadstone Pedestrian link

- Feature tree at entrance to walkway
- A. davidii has conspicuously striped bark and will complement historic granite walls
- Good autumn colour for student population
- Tree has a strongly branched and compact root system






TREE SCHEDULE

| KEY | | | | | |
|---|---|---|---|---|---|
| BuJ | Betula utilis var. jacquemontii | 3x | 18-20 | 4.5-5 | 5 |
| Ad | Acer davidii | 3x | 18-20 | 4.5-5 | 5 |

*Root system abbreviations: B=Bare Root, RB=Root Balled, SP=Spring-ring, C=Container-grown.

# Luas Cross City

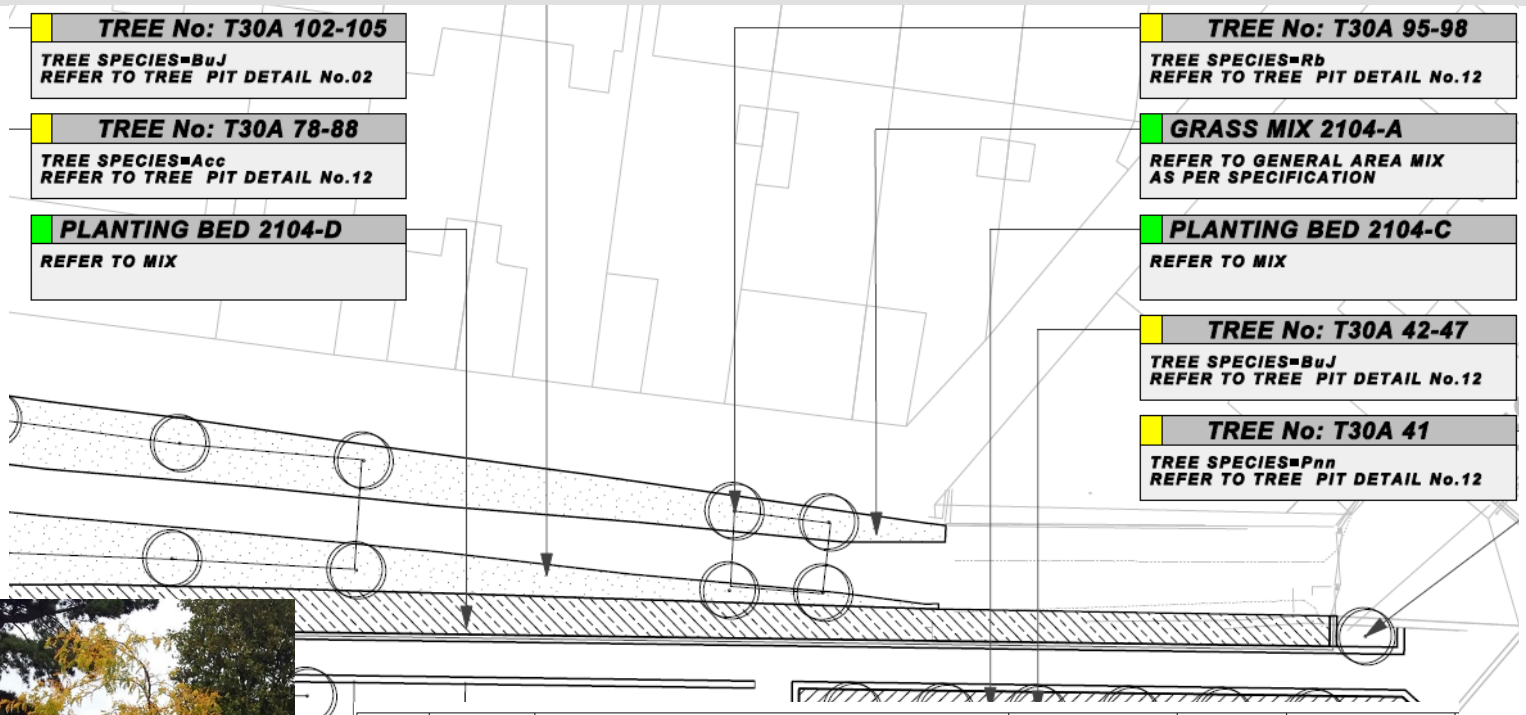
## Urban Design Strategy

Proposed planting palette

Mount Bernard Park

- Pinus Nigra to planter
- 4 no Robinia to entrance to Park
- Establish Birch avenue

**Robinia 'Bessoniana'**




TREE SCHEDULE

| KEY | NAME: | NURSERY SPECIFICATION | GIRTH (cm) | HEIGHT (m) |
|---|---|---|---|---|
| BuJ | Betula utilis var. jacquemontii | 3x | 18-20 | 4.5-5 |
| Bp | Betula pendula | 3x | 18-20 | 4.5-5 |
| Rb | Robinia pseudoacacia 'Bessoniana' | 3x | 18-20 | 4.5-5 |
| Pnn | Pinus nigra nigra | 6xtr | - | 6 |
| Acc | Acer campstre capillipes | 3x | 18-20 | 4.5-5 |

*Root system abbreviations: B=Bare Root, RB=Root Balled, SP=Spring-ring, C=Container-grown.

# Luas Cross City

## Urban Design Strategy

Proposed planting palette

**Tree Mix**

A mix is proposed in the Broadstone Cutting

- Use native species
- Consider overlooking and value for screening
- Consider views from the tram for future passengers
- Apply 5-10% principles
- Year round interest
- Long term landscape structure
- Use more ornamental species at stops and for example mount Bernard park as appropriate to its context

The following mix was chosen

Betula pendula
Alnus glutinosa
Sorbus aucuparia
Crataegus monogyna
Corylus avelane
Sambucus nigra
Prunus spinose and P.padus

And other natives

# Luas Cross City

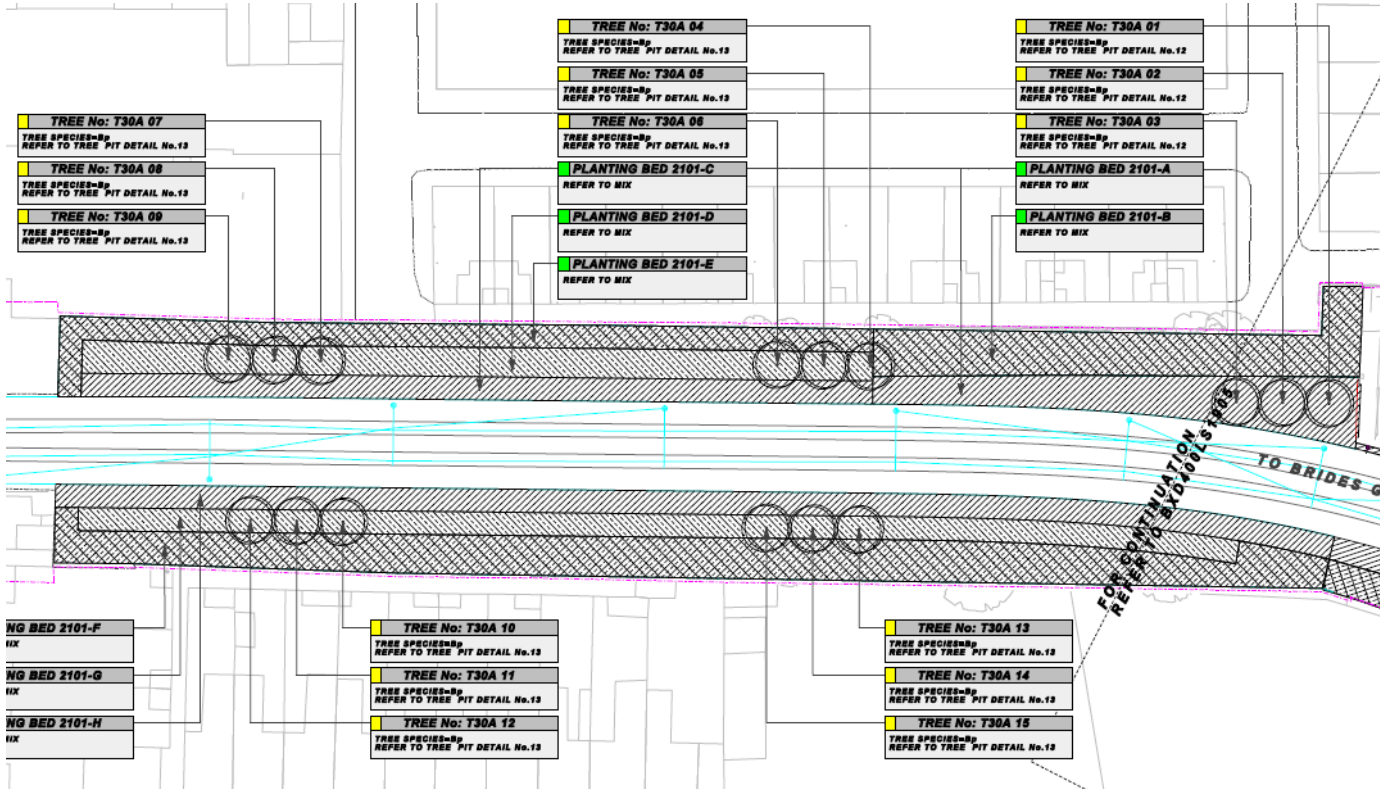
## Urban Design Strategy

Proposed planting palette

Entry to Broadstone Cutting

- Hardy native species
- Birch is a light canopy tree with white bark best in well drained soils
- Shallow rooting
- Colouring in autumn from yellow to yellow brown.
- Planted in groups aiming for an ornamental feel with a native focus

**Betula pendula** chosen as specimen




**TREE SCHEDULE**

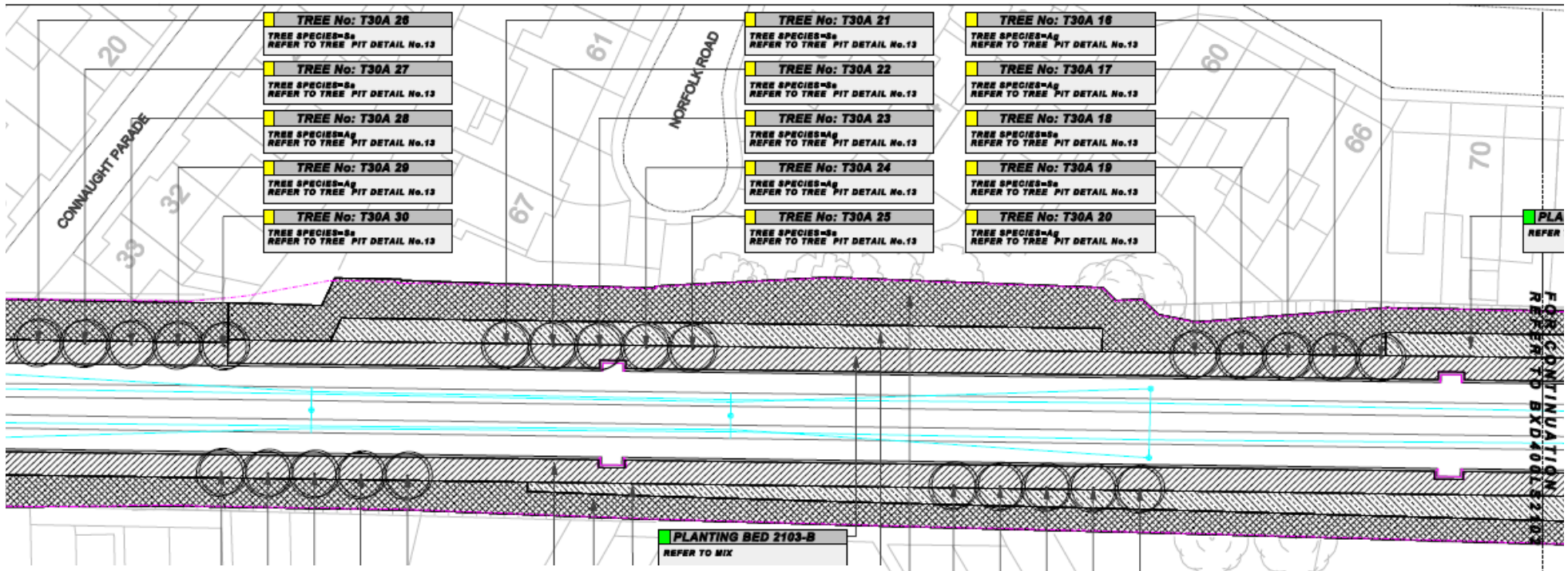
| KEY | NAME: | NURSERY SPECIFICATION | GIRTH (cm) | HEIGHT (m) |
|---|---|---|---|---|
| Bp | Betula pendula | 3x | 12-14 | 3-4.25 |
| | | | | |

*Root system abbreviations: B=Bare Root, RB=Root Balled, SP=Spring-ring, C=Container-grown.

# Luas Cross City

## Urban Design Strategy

Proposed Broadstone Cutting planting palette




TREE SCHEDULE

| KEY | NAME: | NURSERY SPECIFICATION | GIRTH (cm) | HEIGHT (m) |
|---|---|---|---|---|
| Ag | Alnus glutinosa | 3x | 12-14 | 3-4.25 |
| Sa | Sorbus aucuparia | 3x | 12-14 | 3-4.25 |

*Root system abbreviations: B=Bare Root, RB=Root Balled, SP=Spring-ring, C=Container-grown.

# Luas Cross City

## Urban Design Strategy

Proposed planting palette

**Tree Mix**

Sorbus aucuparia

# Luas Cross City

## Urban Design Strategy

Proposed planting palette

**Tree Mix**

Alnus glutinosa

# Luas Cross City

## Urban Design Strategy

Proposed planting palette

**Tree Mix**

Betula pendula

# Luas Cross City

## Urban Design Strategy

Tree Pit Construction

Utilities incorporated at Design Stage

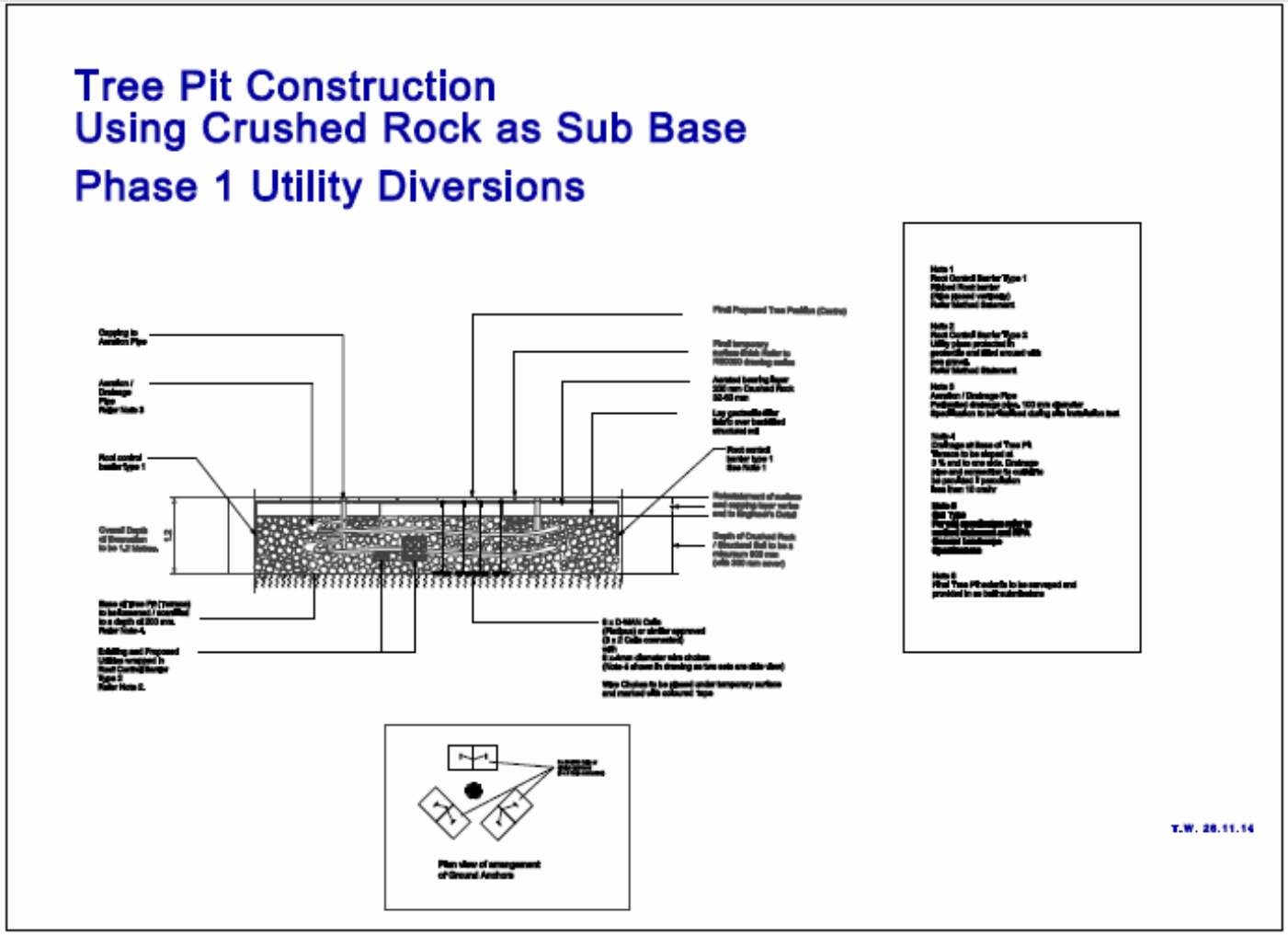
Examples of O Connell Street Tree Pit Construction.

Pre Planting

# Luas Cross City

## Urban Design Strategy

Tree Pit Construction




**Contractor: GMC Utilities**

**Arborist : Felim Sheridan**

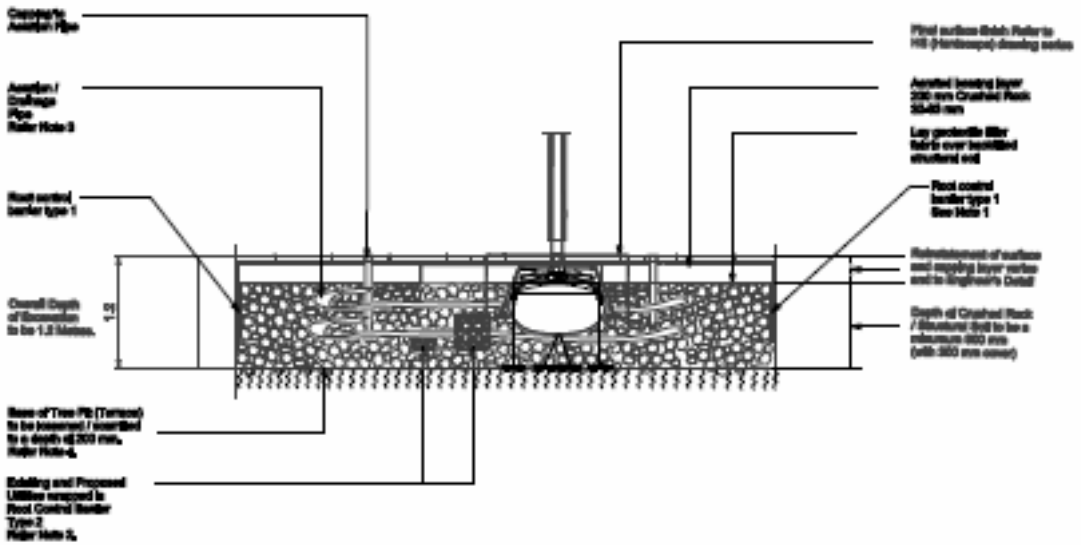
**Based on Stockholm Tree Pit Design – Orjan Stahl et al.**

# Luas Cross City

## Urban Design Strategy

Tree Pit Construction

## Phase 2 Main Infrastructure Works



**Contractor: Sisk Steconfer J.V.**

**Arborist : Felim Sheridan**

**Arborist : John Morgan**

**Ecologist : Colin Wilson**

**Landscape Architect : Fergal Parlon**

**Based on Stockholm Tree Pit Design – Orjan Stahl et al.**

# Luas Cross City

## Urban Design Strategy

Tree Pit Construction

Utilities incorporated at Design Stage

Examples of O Connell Street Tree Pit Construction.

Pre Planting

# Luas Cross City

## Urban Design Strategy

Tree Pit Construction

Utilities incorporated at Design Stage

Examples of O Connell Street Tree Pit Construction.

Pre Planting

# Luas Cross City

## Urban Design Strategy

Tree Pit Construction

Utilities incorporated at Design Stage

Examples of O Connell Street Tree Pit Construction.

Pre Planting

# Luas Cross City

## Urban Design Strategy

Tree Pit Construction

Final surface ready for paving

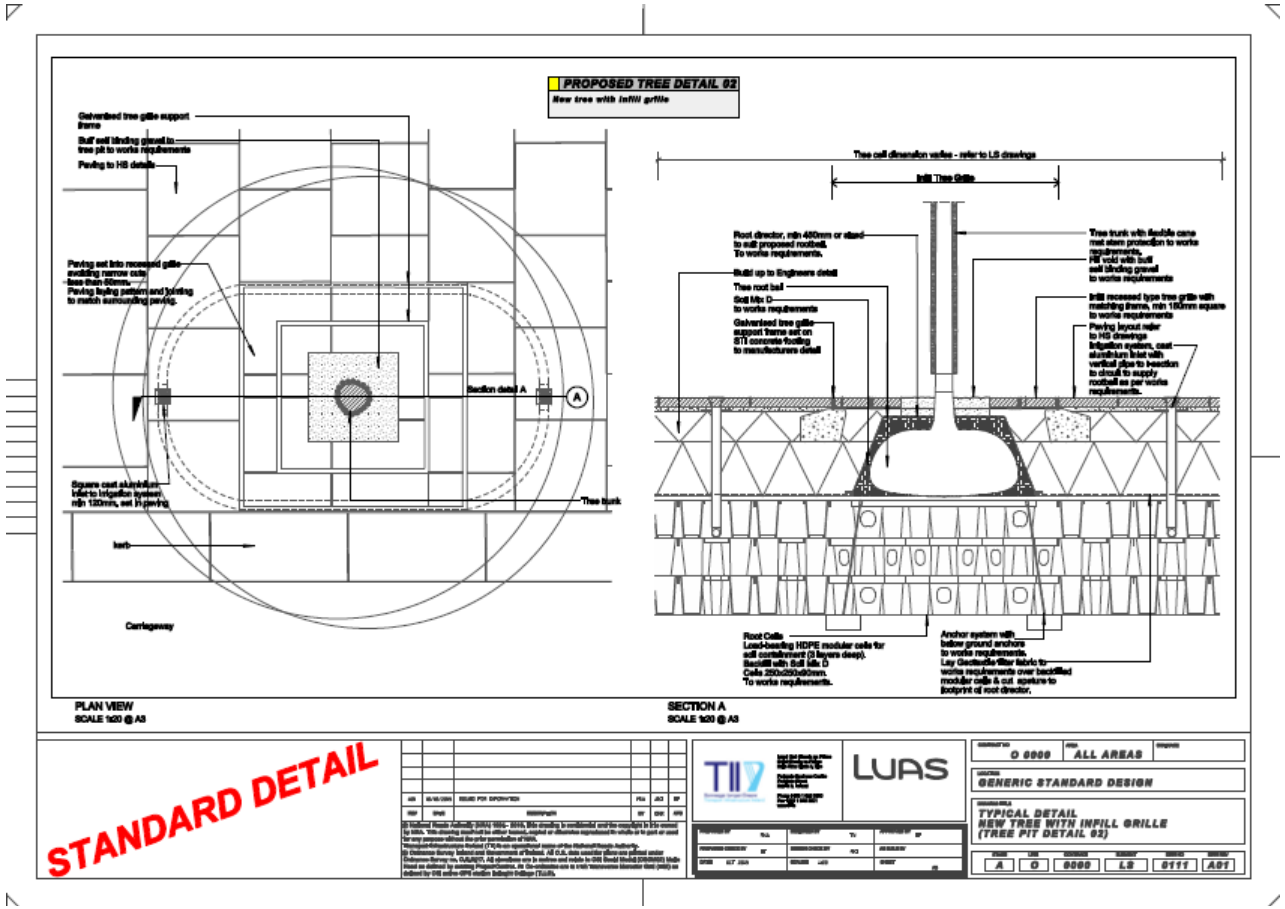
Examples of O Connell Street Tree Pit Construction.

Pre Planting

# Luas Cross City

## Urban Design Strategy

Tree Pit Construction




Tree Pit using Soil Cells
90 % available for soil

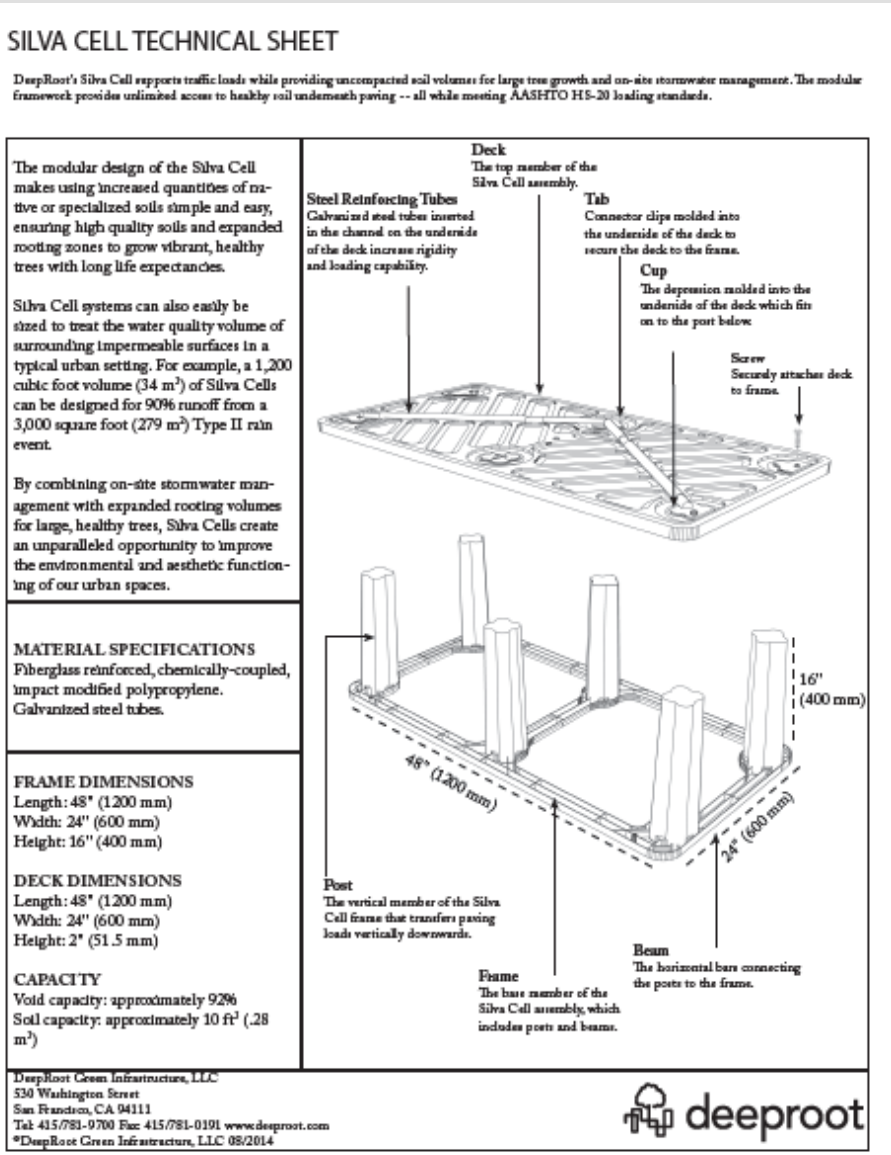
But construction difficulties with utilities.

Alternative forms also available that allow easier integration of the utilities .

# Luas Cross City

## Urban Design Strategy

Tree Pit Construction



SILVA CELL TECHNICAL SHEET

DeepRoot's Silva Cell supports traffic loads while providing uncompacted soil volumes for large tree growth and on-site stormwater management. The modular framework provides unlimited access to healthy soil underneath paving -- all while meeting AASHTO HS-20 loading standards.

The modular design of the Silva Cell makes using increased quantities of native or specialized soils simple and easy, ensuring high quality soils and expanded rooting zones to grow vibrant, healthy trees with long life expectancies.

Silva Cell systems can also easily be sized to treat the water quality volume of surrounding impermeable surfaces in a typical urban setting. For example, a 1,200 cubic foot volume (34 $m^3$) of Silva Cells can be designed for 90% runoff from a 3,000 square foot (279 $m^2$) Type II rain event.

By combining on-site stormwater management with expanded rooting volumes for large, healthy trees, Silva Cells create an unparalleled opportunity to improve the environmental and aesthetic functioning of our urban spaces.

MATERIAL SPECIFICATIONS
Fiberglass reinforced, chemically-coupled, impact modified polypropylene.
Galvanized steel tubes.

FRAME DIMENSIONS
Length: 48" (1200 mm)
Width: 24" (600 mm)
Height: 16" (400 mm)

DECK DIMENSIONS
Length: 48" (1200 mm)
Width: 24" (600 mm)
Height: 2" (51.5 mm)

CAPACITY
Void capacity: approximately 92%
Soil capacity: approximately 10 $ft^3$ (.28 $m^3$)

Deck
The top member of the Silva Cell assembly.

Steel Reinforcing Tubes
Galvanized steel tubes inserted in the channel on the underside of the deck increase rigidity and loading capability.

Tab
Connector clips molded into the underside of the deck to secure the deck to the frame.

Cup
The depression molded into the underside of the deck which fits on to the post below.

Screw
Securely attaches deck to frame.

16" (400 mm)

48" (1200 mm)

24" (600 mm)

Post
The vertical member of the Silva Cell frame that transfers paving loads vertically downwards.

Frame
The base member of the Silva Cell assembly, which includes posts and beams.

Beam
The horizontal bars connecting the posts to the frame.

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deeproot

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# Luas Cross City

## Urban Design Strategy

Tree Pit Construction


Tree Pit using Soil Cells
90 % available for soil

Alternative forms also available that allow easier integration of the utilities .

# Luas Cross City

## Urban Design Strategy

Summary and Conclusions

### Lessons Learned

Utility Design must be done at the outset

Changes to utility design must factor in the position of the tree and tree pit infrastructure

Maintenance and aftercare regime to be fully developed and agreed with operator (TII/Transdev) and Local Authority

Must review current requirements and regulations to account for revised tree pit design. E.g. 6 m clearance for water mains (arterial at 450/600 mm but also prevented tree pit installation to date – Dawson Street)

Development by TII of tree planting strategy for urban/peri-urban and rural

Ongoing development and ensure best practices e.g. adoption of BS 8545 and revised BS 8537.

# IFLA Europe Trees and Vegetation Technical Working Group
# Van den Berk Projects

http://www.vdberk.co.uk/references

Athletes Village (now East Village) Photography by David Rowley

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Athletes Village (now East Village) Photography by David Rowley

The ape and the trees…….

Photography by David Rowley

IFLA EUROPE
THE EUROPEAN REGION OF THE
INTERNATIONAL FEDERATION OF LANDSCAPE ARCHITECTS

# IFLA Europe Trees and Vegetation Technical Working Group Group in Formation

Van den Berk Nurseries
Boomkwekerijen Baumschulen Pépinières

## Other Associations

- Arboricultural association
- ECTP-CEU European Council of Spatial Planners
- ELCA - European Landscape Contractors Association
- Institutes of Horticulture
- Other

- National and European Universities

Institutions in particular

- Council of Europe
- European Commission. DG Environment, DG Market
- Other such as World Urban Parks,(Europe to start with )

You, me, us……

**And become in time…….**
**IFLA Global Trees and Vegetation Technical Working Group**

IFLA EUROPE
THE EUROPEAN REGION OF THE
INTERNATIONAL FEDERATION OF LANDSCAPE ARCHITECTS

IRISH LANDSCAPE INSTITUTE
INSTITIÚID AILTIRÍ TÍRDHREACHA NA hÉIREANN

Tony Williams BA.Nat.Sci.M.L.Arch. MILI

Van den Berk Nurseries
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Photography by David Rowley

IFLA Europe
The European Region of the
International Federation of Landscape Architects

# IFLA Europe Trees and Vegetation Technical Working Group National e.g. Ireland Possible members (group in formation)

## Possibilities being realised

Van den Berk Nurseries
Boomkwekerijen Baumschulen Pépinières

IRISH LANDSCAPE INSTITUTE
INSTITIÚID AILTIRÍ TÍRDHREACHA NA hÉIREANN

## Other Associations

- Landscape Institute of Northern Ireland – LINI
- Irish Association of Landscape Industries (affiliated body)
- Arboricultural Association – Irish Branch
- Association of Landscape Contractors
- Garden and Landscape Design Association
- Irish Hardy Nursery Stock Association

Universities –

- University College Dublin (UCD)
- UCD School of Landscape,
- UCD Department of Plant Science

- Trinity College Dublin (TCD)
- TCD School of Botany
- TCD Department of Engineering

- Other Commercial Sponsors with national focus

- State Agencies
- e.g. Teagasc, An Bord Bia, TII, Office of Public Works

- The public

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Go Raibh Maith Agaibh

Thank you