

# Promoting Landscape and Biodiversity in Developments

***Wexford County Council***

***29 November 2022***

# Landscape architecture – and the practical use of science

**Tony Williams**

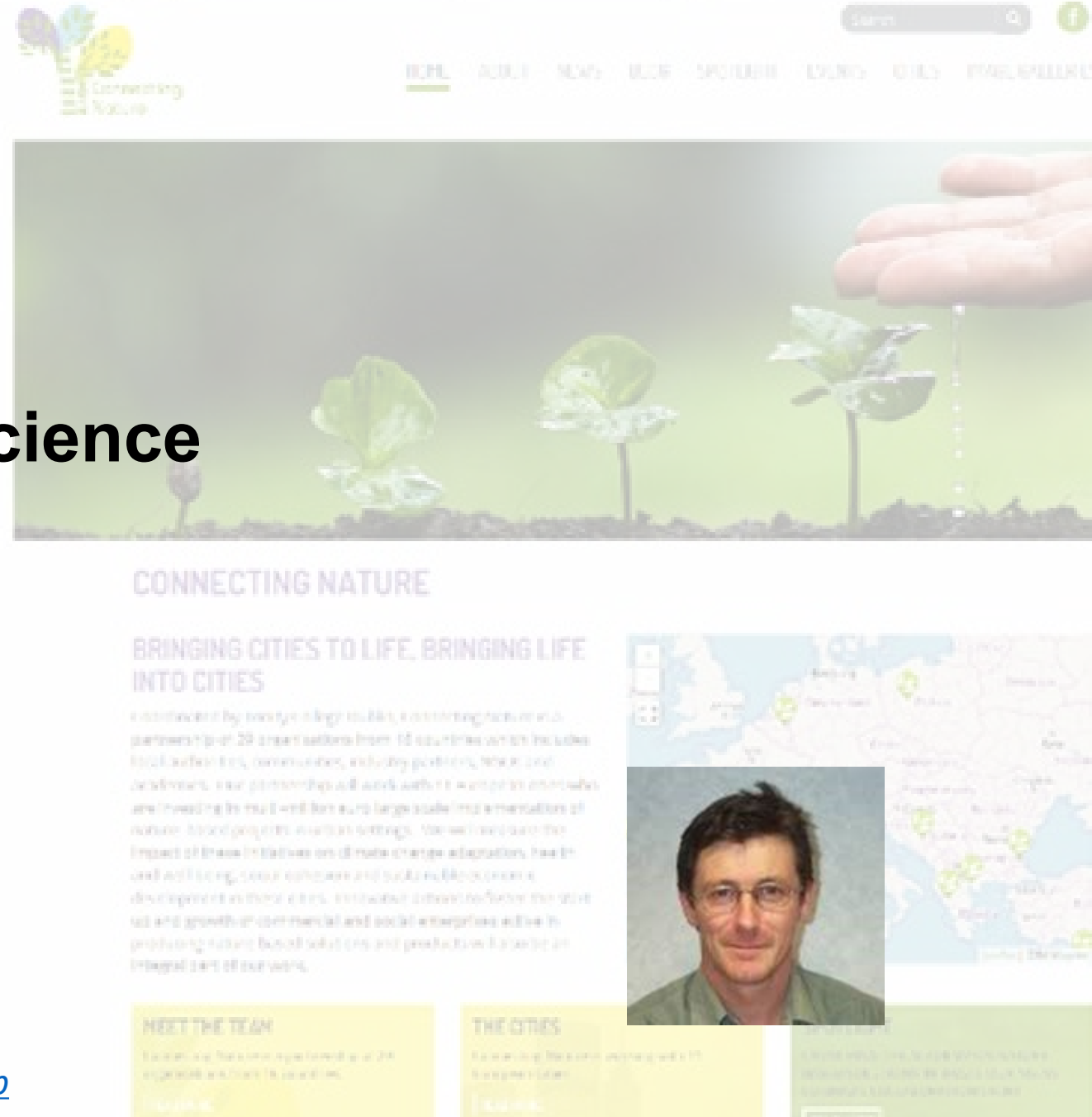
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Transport Infrastructure Ireland*

*PhD Candidate.  
School of Natural Science, Trinity College Dublin.*

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European Voting Member.*

<https://www.iflaworld.com/climate-change-working-group>

Tony Williams



# Promoting Biodiversity (as part of our normal activities)

- Construction Planning:
- Luas Cross City project as an example of integrating the natural world , and making a more Biodiverse ecosystem (more of everything in the urban / peri-urban and rural settings)
- Engineering and planning the interventions is crucial to ensuring successful outcomes
- Work on the details. How will it be done ? and who will do it ? Include this in contracts (but carefully)
- The following is an example from Luas Cross City (Tramway Construction in Dublin)

# Workshop of 14 Nov 2022. Key Themes

- From an analysis of the comments and suggestions, the following were considered the key themes emerging based on the topics discussed. The analysis was focused on how the various topics may be managed through the development and planning processes. This must then be further developed so as to be managed through three differing 'work streams'. It is imperative that some means of ensuring the 'whole picture' is developed and that resources are provided within the final planning and development processes.
- The main themes would seem to be
  - **Standards / Specifications** / guidance (ensuring coherent delivery of design and implementation)
  - **Education** (informing and involvement of all)
  - **Governance (set policy)**
  - **Management Practices (in order to ensure the implementation of policies)**

# Workshop of 14 Nov 2022. Some Key Points

1. Focus on planting native plants
2. Enforcement post-planning
3. Confusion about pollinators
4. Provenance of species, look within 10km to support that system
5. Guidelines on riparian zones
6. Land use – protect lands, water quality
7. Climate Action Plan – Carbon Calculators with planning applications
8. Tree management policy & stock of trees

# Standards and Specifications

for inclusion of Blue Green Infrastructure (BGI), Nature-based Solution (NbS) and biodiversity

- Lessons from our research on the provision of BGI on linear Infrastructure (roads, rail, tram, waterway, powerline, etc)
- Application of engineering and scientific principles within the design and construction phases.
- Clear guidance must be provided.
- Costing and estimation based on the expected resilience of using Nature-based Solutions (NbS) in order to build Blue Green Infrastructure (BGI) Networks.
- Data based on actual projects and examples.
- Lessons may be used in general planning and construction of large and small scale development
- Ensures positive overall landscape interventions.



# Continuing Research in TII

## Blue Green Infrastructure and Nature-based Solutions

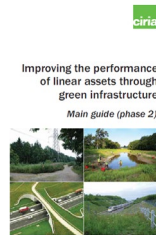


### Delivering green infrastructure along linear assets

#### Scoping study (phase 1)



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Current Research with CIRIA includes

### Green Infrastructure (GI) for Linear Assets

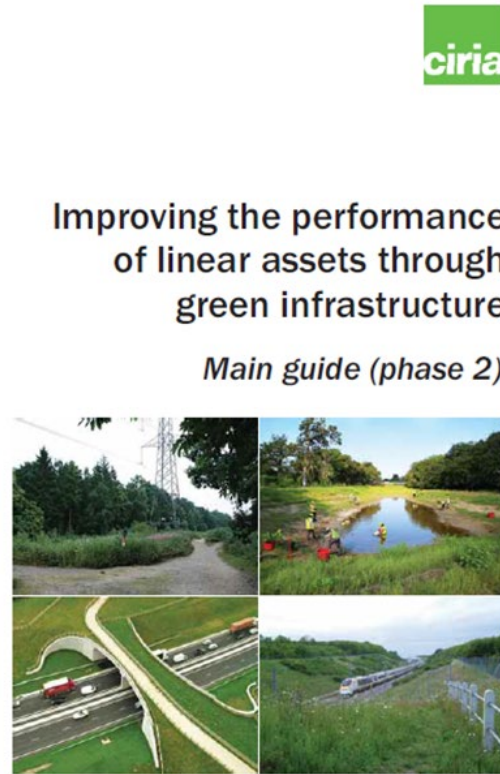
- Phase 1 scoping  
[https://www.ciria.org/Resource/Free\\_publications/Green\\_infrastructure\\_along\\_linear\\_assets\\_scoping\\_study\\_p1.aspx](https://www.ciria.org/Resource/Free_publications/Green_infrastructure_along_linear_assets_scoping_study_p1.aspx)
- Phase 2 Guidance published in 2022

Part 1 Delivering GI Assets along linear Infrastructure – Scoping the research and guidance

Part 2 Improving the performance of linear assets through green infrastructure

# Continuing Research in TII

## Blue Green Infrastructure and Nature-based Solutions



Current Research with CIRIA includes

### Green Infrastructure (GI) for Linear Assets

- Phase 1 scoping
- Phase 2 Guidance on improving the performance of BGI published in 2022

[https://www.ciria.org/CIRIA/CIRIA/Item\\_Detail.aspx?iProductCode=C772F&Category=FREEPUBS](https://www.ciria.org/CIRIA/CIRIA/Item_Detail.aspx?iProductCode=C772F&Category=FREEPUBS)

Part 1 Delivering GI Assets along linear Infrastructure

Part 2 Improving the performance of linear assets through green infrastructure



Definitions

# Blue Green Infrastructure (BGI)

Green Infrastructure (GI)

GI is defined as:

*“...an innovative way of protecting biodiversity while simultaneously contributing to sustainable and smart growth. It is defined as a strategically planned network of natural and semi-natural areas, which deliver a wide range of ecosystem services in terrestrial and marine areas.”*

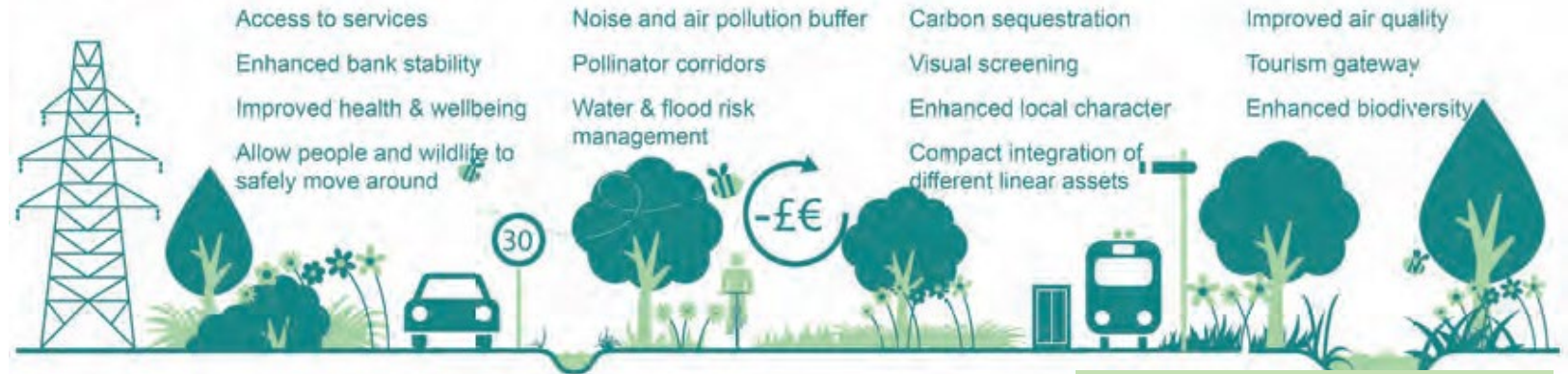
**International Union for Conservation of Nature (IUCN, 2014)**

# Design at the outset

Poorly designed & managed = liability



Well designed & managed = asset



Ref CIRIA Guidance (Phase 2)

# Benefits of BGI as part of asset management

- ✎ reduce the costs of the assets and their operation, and improve their reliability and resilience
- ✎ meet government objectives and requirements for climate change mitigation, resilience and adaptation
- ✎ create multifunctional blue-green networks which will increase the amount of natural habitats and ecological features, thus providing biodiversity gains.
- ✎ create high quality and distinctive local places which are attractive to businesses and investors
- ✎ deliver ecosystem services and natural capital for wider environmental, economic, social and societal benefits (HM Government, 2018)
- ✎ mitigate the impacts of new developments, which include impacts to water, carbon, noise, biodiversity, air quality and society
- ✎ reduce the need for conventional grey infrastructure by supplementing or replacing with a suitable GI alternative
- ✎ improve the health and wellbeing of communities by providing spaces for recreation and attractive routes to promote active means of transport (eg walking and cycling).

# BGI – Ecosystem Services (ES) and benefits





















Provisioning services		Regulating services				Cultural services	
Fish production		Air quality regulation		Noise regulation		Aesthetic experience	
Food production		Carbon storage		Pest control		Education	
Water supply		Cooling and shading		Reduced energy		Interaction with nature	
Wood production		Erosion protection		Recycling/reduced waste		Recreation	
		Flood regulation		Water quality regulation		Sense of place	
						Supporting services	
						Habitats and biodiversity	

Figure 2.1 A range of ecosystem services and benefits

# BGI Wider Benefits

Communities	<ul style="list-style-type: none"> <li>● Greater inward investment.</li> <li>● Reduction in unused land.</li> <li>● Improved modal shift towards sustainable and active transport.</li> <li>● Improved connectivity.</li> <li>● Improved health and wellbeing.</li> <li>● Enhanced user experience.</li> <li>● Reduced visual impact.</li> <li>● Reduced flood risk.</li> <li>● Noise and air pollution buffers.</li> </ul>	<ul style="list-style-type: none"> <li>● Increased economic activity.</li> <li>● Improved cohesion and inclusivity.</li> <li>● Healthcare savings.</li> <li>● Reduced costs associated with crime.</li> <li>● Enhanced access to nature.</li> <li>● Increased opportunities for recreation.</li> <li>● Enhanced and protected local character.</li> <li>● Cleaner air and water.</li> <li>● Increased biodiversity.</li> <li>● Reduced costs of pollutants and contaminants.</li> <li>● Carbon sequestration.</li> <li>● Carbon and energy savings.</li> </ul>
Developers	<ul style="list-style-type: none"> <li>● Saleability.</li> <li>● Increased property prices and land value.</li> <li>● Inward investment opportunities.</li> <li>● Improved planning permission prospects.</li> <li>● Improved environmental reputation.</li> <li>● Contributions towards corporate social responsibility targets and requirements.</li> </ul>	
Landowners	<ul style="list-style-type: none"> <li>● Reduced heating and cooling costs.</li> <li>● Increased property value.</li> <li>● Opportunities for revenue generation.</li> <li>● Reduced flood risk.</li> </ul>	

# BGI Components

<b>3</b>	<b>Components of green infrastructure</b> .....
3.1	Wildflower meadows and grassland .....
3.2	Hedgerows .....
3.3	Scrub .....
3.4	Trees .....
3.5	Woodland .....
3.6	Sustainable drainage systems (SuDS).....
3.7	Wetlands .....
3.8	Green bridges .....
3.9	Green roofs .....
3.10	Green façades .....



# Masterplanning

Big ideas are needed

# National Biodiversity Plan

<https://www.cbd.int/doc/world/ie/ie-nbsap-v3-en.pdf>

<https://www.oireachtas.ie/en/debates/question/2022-02-23/111/>

# National Biodiversity Plan

1

OBJECTIVE

## Mainstream biodiversity into decision-making across all sectors

Target 1.1. Shared responsibility for the conservation of biodiversity and the sustainable use of its components is fully recognised, and acted upon, by all sectors

Target 1.2. Strengthened legislation in support of tackling biodiversity loss in Ireland

2

OBJECTIVE

## Strengthen the knowledge base for conservation, management and sustainable use of biodiversity

Target 2.1. Knowledge of biodiversity and ecosystem services has substantially advanced our ability to ensure conservation, effective management, and sustainable use by 2021

3

OBJECTIVE

## Increase awareness and appreciation of biodiversity and ecosystems services

Target 3.1 Enhanced appreciation of the value of biodiversity and ecosystem services amongst policy makers, businesses, stakeholders, local communities, and the general public

4

OBJECTIVE

## Conserve and restore biodiversity and ecosystem services in the wider countryside

Target 4.1. Optimised opportunities under agriculture and rural development, forestry and other relevant policies to benefit biodiversity

Target 4.2. Principal pollutant pressures on terrestrial and freshwater biodiversity substantially reduced by 2020

Target 4.3. Optimised benefits for biodiversity in Flood Risk Management Planning and drainage schemes

Target 4.4. Harmful invasive alien species are controlled and there is reduced risk of introduction and/or spread of new species

Target 4.5. Improved enforcement of wildlife law

# National Biodiversity Plan

## 5

OBJECTIVE

**Conserve and restore biodiversity and ecosystem services in the marine environment**

Target 5.1. Progress made towards good ecological and environmental status of marine waters over the lifetime of this Plan

Target 5.2. Fish stock levels maintained or restored to levels that can produce maximum sustainable yield, where possible, no later than 2020

## 6

OBJECTIVE

**Expand and improve management of protected areas and species**

Target 6.1. Natura 2000 network designated and under effective conservation management by 2020

Target 6.2. Sufficiency, coherence, connectivity, and resilience of the protected areas network substantially enhanced by 2020

Target 6.3. No protected species in worsening status by 2020; majority of species in, or moving towards, favourable status by 2021

## 7

OBJECTIVE

**Strengthen international governance for biodiversity and ecosystem services**

Target 7.1. Strengthened support for biodiversity and ecosystem services in external assistance

Target 7.2. Enhanced contribution to international governance for biodiversity and ecosystem services

Target 7.3. Enhanced cooperation with Northern Ireland on common issues

Target 7.4. Reduction in the impact of Irish trade on global biodiversity and ecosystem services

# The Global View

Expressed locally

# Projects ...in the global landscape Expressed locally



IFLA (Global) are involved in developing policies at global (and local) level .....



An approach to ecosystem management as part of ensuring a multidisciplinary approach (starting with Landscape Architects and Traditional Architects)



The aim is the delivery of the principles of BGI into the implementation of all projects.....and its translation into specifications and standards is needed.



## **Indigenous Ecosystem Corridors and Nodes** A joint project of the UIA and the IFLA

### **IEC+N**

Linking people and the landscape

<https://www.iflaworld.com/indigenous-ecosystem-corridors-and-nodes>

Website in development

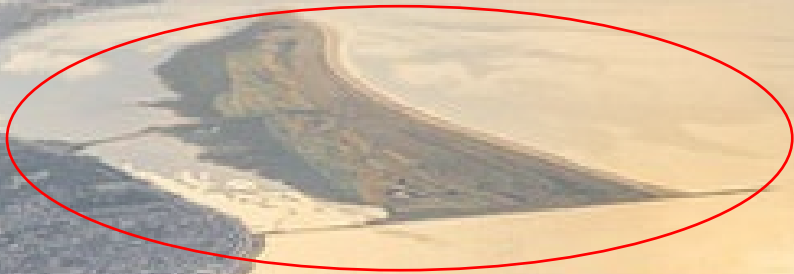


Projects ...in the global landscape  
Expressed locally

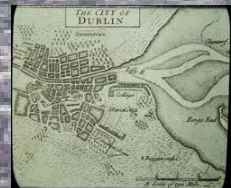
Dublin Bay



<https://www.dublinbaybiosphere.ie/>



Bull Island, Dublin Bay.  
An Island that grew due to the port development (since 1821) and a place for nature and walking.  
UNESCO biosphere as the site for my research



Tom Williams



# Projects ...in the global landscape Expressed locally

**IEC+N** Current Project under IFLA / UIA umbrella and addressing 17 UN SDGs (Start up and Concept)

Phase 1. Setting the structures in place utilising existing GO, NGO and community resources. Planned as community Led under Aarhus structures and assisted by the professional institutes.

## • Linking 'living Melbourne' with 'Dublin Bay UNESCO Biosphere'

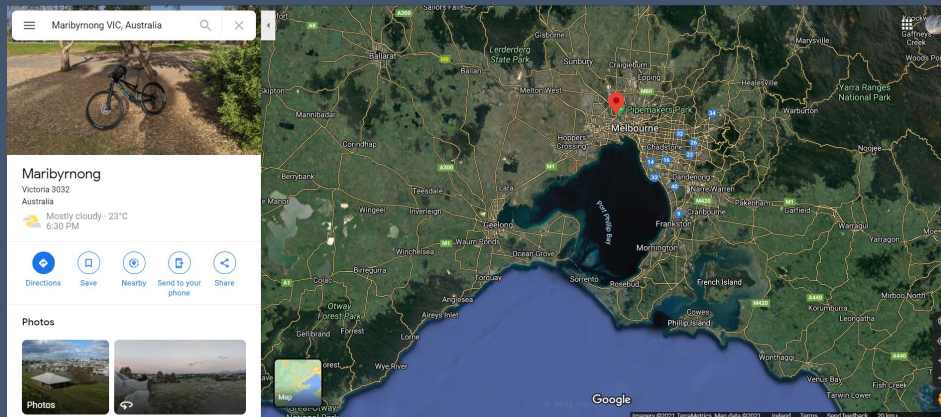
### Living Melbourne - The Urban Forest

One million, 1,000,000 plus trees planted and ecosystem restoration as the 'norm'



Living Melbourne: our metropolitan urban forest

Launched 5 June 2019 – World Environment Day





# Site Analysis

Designing to enhance to biodiversity of the area

Retention of the existing (within reason)  
is preferable to replacement

# Collect, Analyse and use the data

in order to know the natural world for your locality

<https://biodiversityireland.ie/>

## The National Biodiversity Data Centre



The National Biodiversity Data Centre works to make biodiversity data and information more freely available in order to better understand and assist the protection of Ireland's biodiversity.



5941539  
RECORDS



17326  
SPECIES



172  
DATASETS

<https://biodiversityireland.ie/>

STEM (Faculty of Science,  
Technology, Engineering and  
Mathematics)  
School of Botany

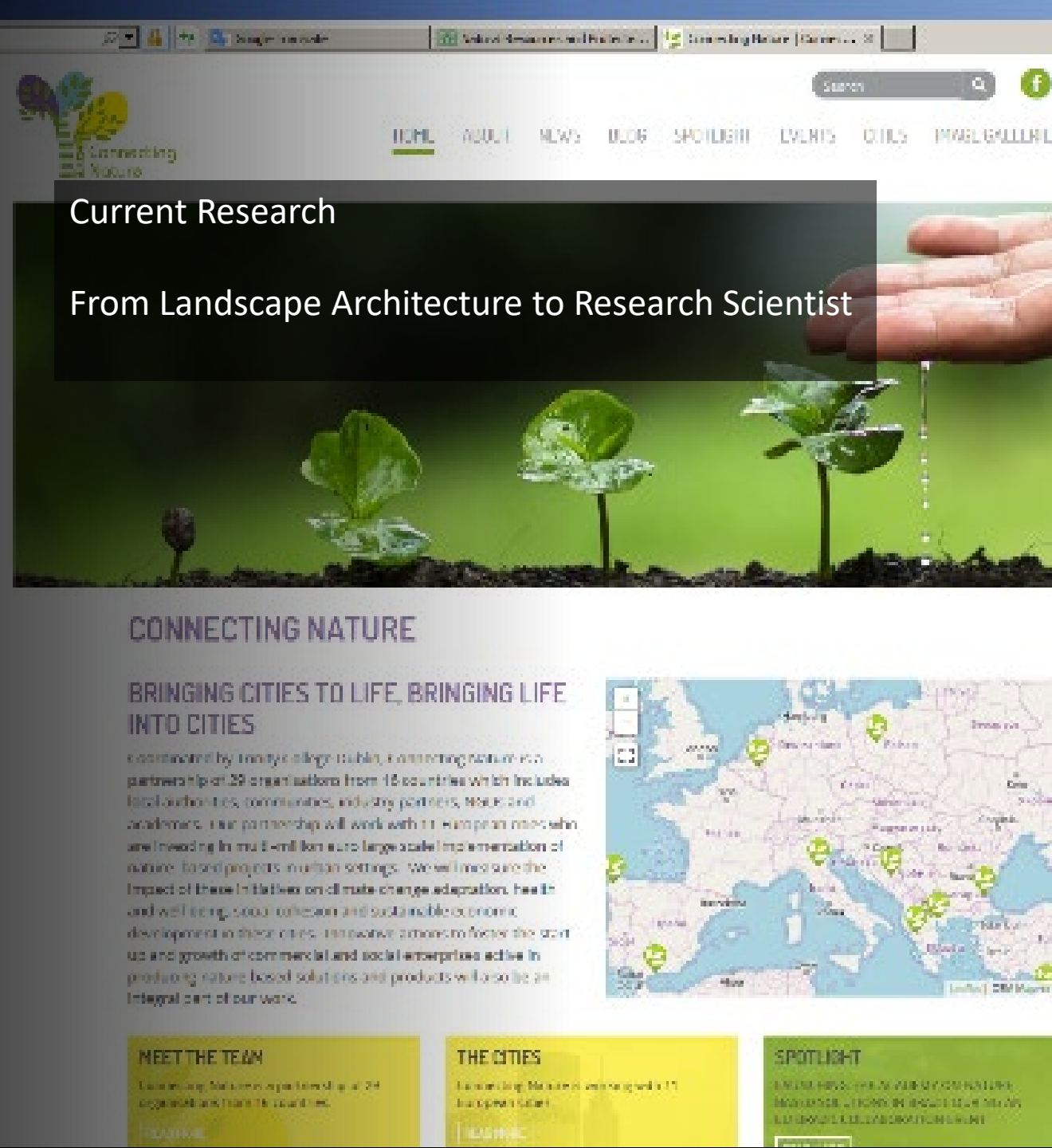
Trinity College Dublin

# EU – Connecting Nature

Tony Williams

Supervisor : Prof. Marcus Collier

<https://connectingnature.eu/>

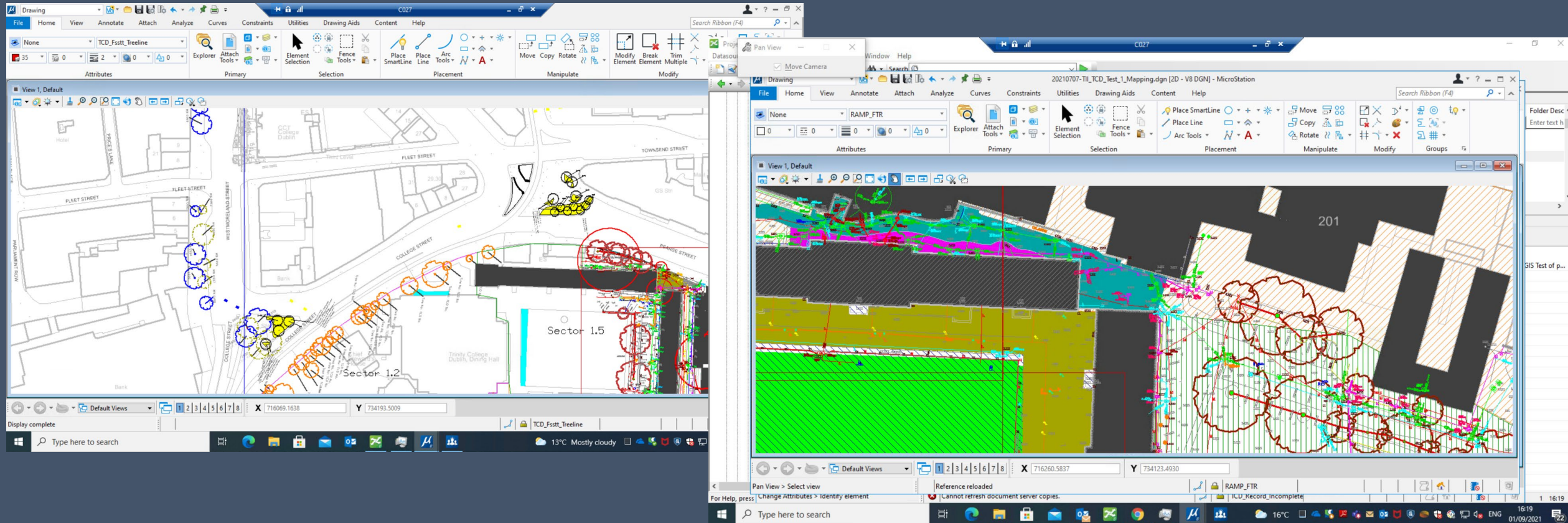




# Field Sites

Ecological Fossitt Designations

- The assessment of the ecological ‘community’ (including humans)





# Field Sites

Ecological (Fossitt) Designations (Fine tuning the data collection)

Update

College Sectors 1.1 to 1.16

### Fossitt Designations

- 18 Fossitt designations identified in first pass (including properties at Santry and Dartry)
- BL3 to be further split as surfaces (BL3A) and buildings (BL3B) (differing colour and polygon)
- Possible designation of porous versus non porous surfaces, asphalt versus concrete (flexible versus non flexible material) as part of developing possible subcategories within the fossitt designation (and a greater level of detail being available on the topographic survey)

### Designations and refinement?

- BL3 being drawn as separate polygons within the same BL3
- Allowing later analysis of differing surfaces

Further Analysis and designations within Fossitt	
■	BL3 Buildings and Artificial Surfaces
■	BL3B Artificial at-grade Surfaces
■	BL3C Artificial Surfaces - Conc
■	BL3D Artificial Surfaces- Asphalt - Tar

21/09/2009

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# Construction Planning

- Luas Cross City, Dublin
- As an example of pre planned introduction of trees and vegetation
- Part of increasing the canopy cover after construction, a net increase
- **Concept : Both Urban and incorporating / replacing semi natural (along the canal and old railway cutting**
- **Design and Stage : Awareness of the existing ecology allowed some sensitivity (Smooth newts caught and moved nearby to the canal area)**
- **Post Construction Considerations : Residual lands considered for other uses with local authority and community (on going)**



# An example of multidisciplinary elements Tree Pit design and Construction Luas Cross City

## Existing and Proposed Trees – Strategy developed

Landscape Architects:

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

Utility Engineer:

Michelle Merne (TII)

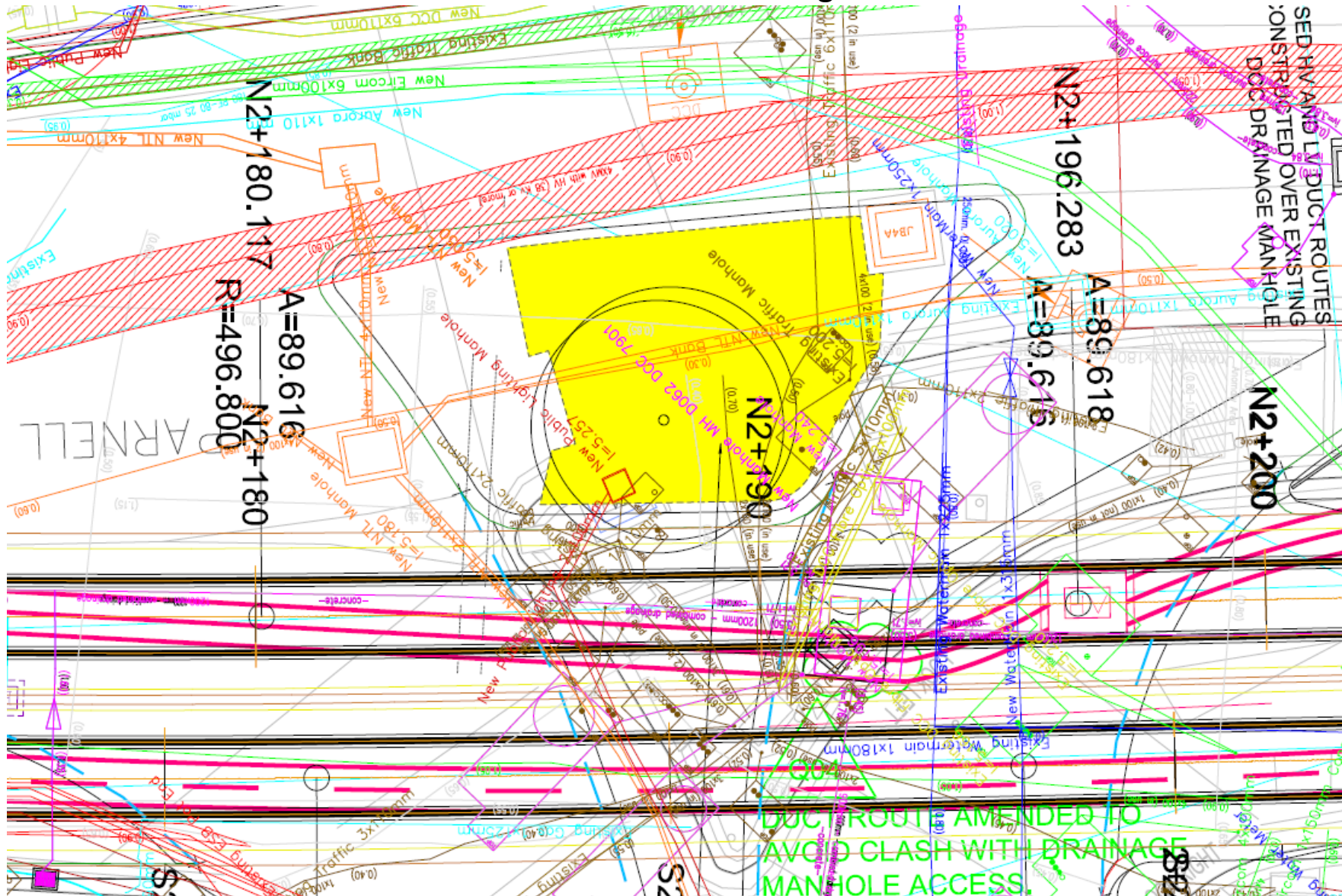
Arborists:

Planning Stage-Ciarán Keating (for TII)  
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 (mostly engineers)**

Tony Williams

# Utilities and Tree Pits – Design in Unison









Dawson Street – Existing London Planes to be retained



## 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 arboricultural advice obtained to allow individual street tree details be developed.
- Trees removed only when necessary
- Requirement for aftercare and monitoring
- Hand over to city and operator

LCC (BXD)

# Trees - existing





LCC (BXD)  
DAWSON STREET

# Tree Planting - proposed

## New Trees

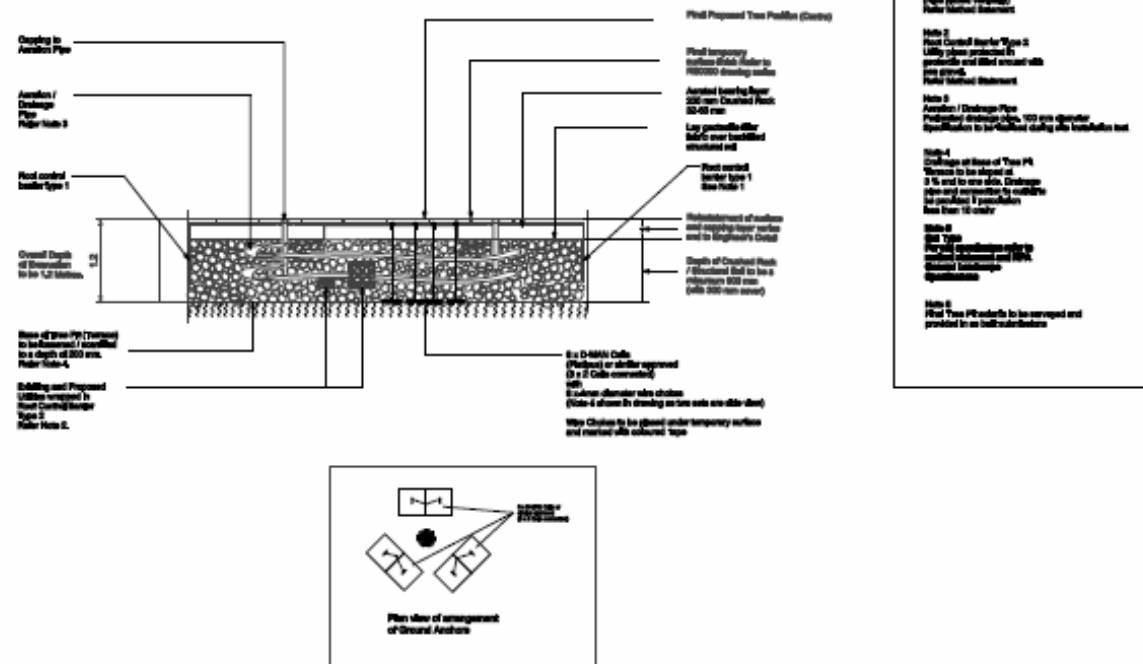
- Challenge to adjust utility layouts in order to fit new street trees
- Tree grille proposed with infill to match surrounding paving
- Structural soils used as part of build up
- London Plane tree type used to match existing
- But not always.
- We are aiming to increase the range of species used

# Luas Cross City

## Urban Design Strategy

### Tree Pit Construction

### Tree Pit Construction Using Crushed Rock as Sub Base Phase 1 Utility Diversions



Contractor: GMC Utilities

Arborist : Felim Sheridan

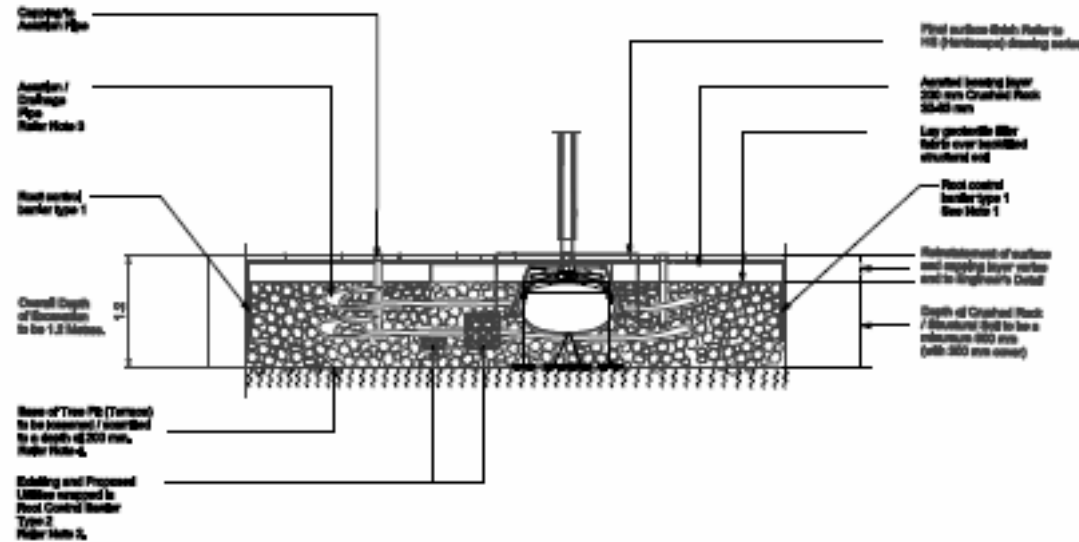
Based on Stockholm Tree Pit Design – Orjan Stahl et al.

# 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

Construction Challenges

Ireland



**During and post Construction**

Tony Williams



# Luas Cross City

## Urban Design Strategy

Tree Pit Construction



January 2017

Final surfacing complete

O Connell GPO Tramstop

Pre Planting



# Luas Cross City

## Urban Design Strategy

Tree Pit Construction





Management Practices (in order to ensure the implementation of policies)

Standards / Specifications

# Plant Materials

Using native species (mostly)  
Ornamental and non-native with care  
Wild flower seeds to be locally sourced

Pollinator friendly species are favoured. All-Ireland Pollinator Strategy

# Trees

- Pollinator trees (flowers (not fruit))



Trees	To suit each individual bay	Using Pollinator species and Using the existing trees as a reservoir of resistant or potentially resistant
	Tony Williams	

# Low and General Planting - Infrastructure

(Shrubs / Ground Covers etc)

## Plant materials matched to a management strategy

Planting MS 1	High maintenance / ornamental. At safety points and as part of DRA mitigation.	<ul style="list-style-type: none"><li>• 600 mm high and to 1.2 metre depending on positions</li></ul>
Planting MS 2	General Maintenance	<ul style="list-style-type: none"><li>• Ornamental and variety for hammerheads.</li><li>• Further detailed in 1:50 or appropriate scale planting plans</li></ul>
Planting MS 3	Low maintenance naturalised	<ul style="list-style-type: none"><li>• Grasses and wild flowers. Self seeding and cut and removal of arisings twice per season</li></ul>

# Low and General Planting (Shrubs / Ground Covers etc)



Planting MS 4

Swale and wetland area

- Drainage from the adjacent hard standing.
- Allowance for standing water and species diversity.
- Viewing areas and science stations for visitors.

# Hedges



Hedges

Along medians in combination with fencing

- Cotoneaster, Ceanothus, and other species for biodiversity (Flowering Shrubs)
- Assist in wayfinding

# All Ireland Pollinator Plan

<https://pollinators.ie/>

Peter Cuthbert BSc Agr ( Hort)  
[cuthbertpeter@ymail.com](mailto:cuthbertpeter@ymail.com)



# Through the eye of the Pollinator





# Make it better for pollinators

Native wild flowers

(and locally sourced seed)

Allow natural colonisation to occur





WILSON  
SECURITY  
24 HR RECORDING  
LIVE CCTV  
MONITORING  
www.wilsonsecurity.ie  
Tel: 011 255 6965



Provide nesting opportunities

Close to food sources (Pollen and nectar)





- Ivy on trees as an ecosystem
- Hedgerows



Peter Cuthbert BSc Agr ( Hort)

<https://pollinators.ie/>





Peter Cuthbert BSc Agr ( Hort)

<https://pollinators.ie/>





Peter Cuthbert BSc Agr ( Hort)

<https://pollinators.ie/>

# Next Steps

- Biodiversity audit of the site and linking to the locality and the region (the Biodiversity Audit Centre are there to assist) <https://biodiversityireland.ie/>
- Follow the guidance on the [All Ireland pollinator plan](#), [National Biodiversity Plan](#), and promote their use
- Become familiar with the analysis of, and construction on development sites with a view to retention of that which is part of the biodiversity network ....i.e retain as much as possible
- Ensure sufficient space (patch size) and connectivity and linkages to the rural areas (opportunities to link natural sites.
- These activities have been shown to be a benefit to agriculture, nature and economic and social activity)
- Reviewing the possibilities for the inclusion of BGI and NbS **in your site**
- **....with a long term view**



A Connemara Landscape  
Paul Henry

Go Raibh  
Maith Agat

Thank You