

THE SUSTAINABILITY OF THE LANDSCAPE at CITYWEST

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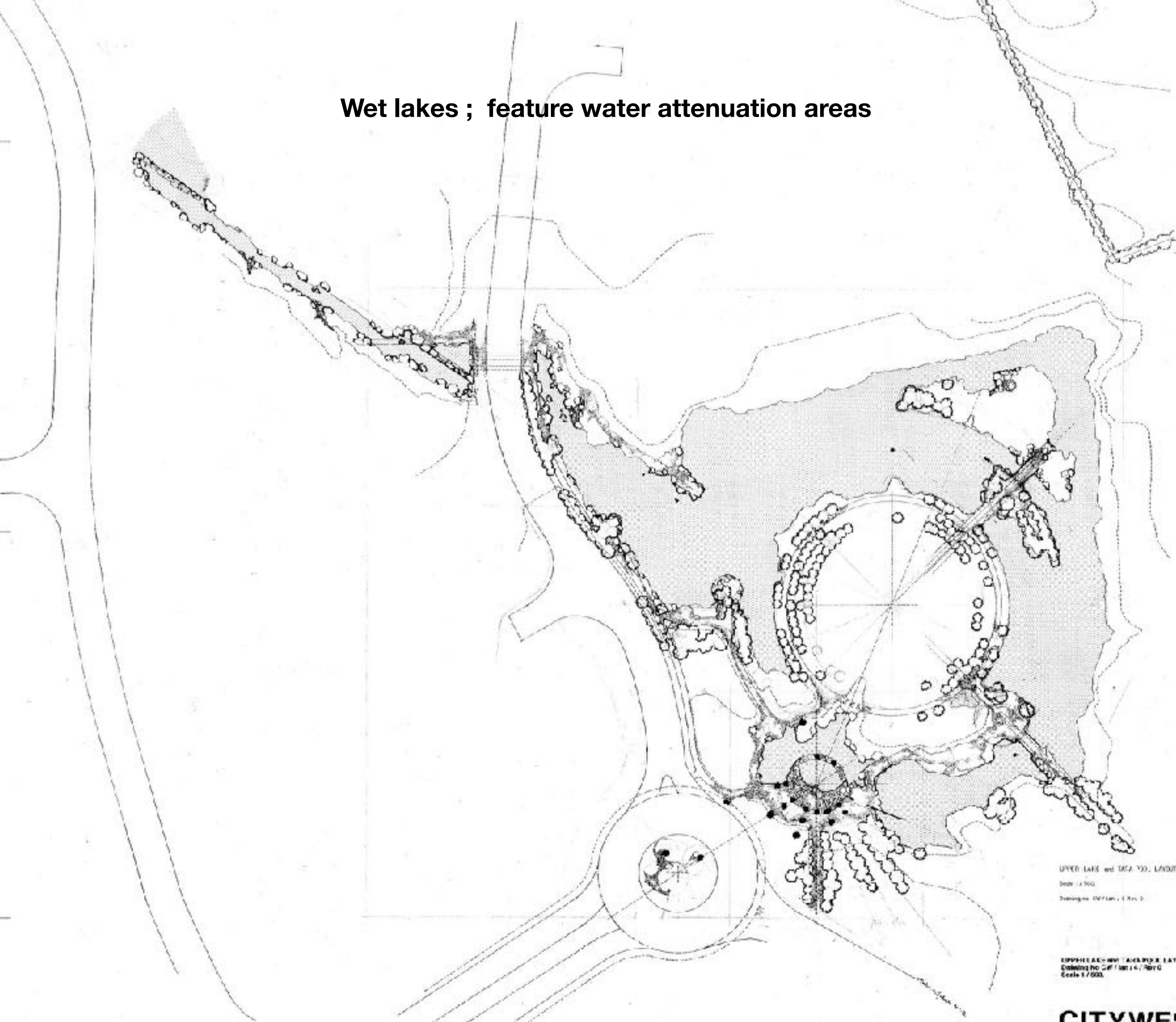
1. The Management of Water in the Citywest Landscape. Natural Attenuation To Capture, Hold and Release

As the run off increases with the area of hard surfaces, then the flow into the natural watercourses is controlled by imitating natural flood plains , wet and dry lakes and swallow holes



Natural Attenuation Area as a Lakeland Setting

Wet lakes ; feature water attenuation areas



UPPER LAKE and TMA 100, LAYOUT
Scale 1:500
Drawing No. 001/100, 1 Rev. 0

UPPER LAKE and TMA 100, LAYOUT
Drawing No. 001/100, 1 Rev. 0
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CITYWEST

A semi dry lake ; low maintenance, natural, wildlife rich attenuation area





A dry attenuation hollow at BT as a natural feature



Natural attenuation areas at Inland Fisheries, piped together as with a swallow hole for increased total capacity



2. The Aeration of the Water Bodies.

The aeration of the waterbodies promoted by a series of cascades, waterfall and weirs at Waterside developed in the first phase of the landscape in 1993





3. Woodland Development and Management.

Within 3 months of Planning Permission in 1992 Citywest planted 45,000 trees at a cost of IR£0.25 per plant along the perimeter of Citywest. This created ;

1. An on-site nursery was thereby created with trees growing up to 6 metres tall before being transplanted to development sites over a 10 year period (with comparative trees if procured costing current prices of €300-€2000. The impact of this was to establish a mature landscape setting from the day of Practical Completion at minimum cost (IR£0.25 plus transplanting).
2. As the trees were transplanted from the same soil to the same soil, the same climate to the same climate, the same size hole they left via the use of a nursery tree spade providing stability and no need for staking, and with no time for the root to dry out as they were lifted and planted as part of the same operation, failure rate was 5% or less.
3. Each tree was different as they were shaped and hardened by the wind (on the edge of the plantation), increased growth in the centre of the plantation where sheltered by the edge planting and fighting for the light, whilst others pruned as multi stems by the rabbit or the hare.
4. Conventional nurseries grow, train and prune and transplant every 3 years to create a compact rootball, all costing money and creating uniformity. If one is crooked it is rejected, if they are all crooked you have a natural tree, if there is one crooked tree in a group of straight trees it is the odd one out and the one noticed, if they are all crooked there is no odd one out, it is a group of trees created by nature.
5. To maximise the impact of the individual trees they are placed on site by the Landscape Architect, by eye and not by drawing or specification.
6. The species were predominantly indigenous species such as Oak, Beech, Alder (a nurse crop) Hazel, Ash, Mountain Ash, Birch. This provided maximum benefit to Irish wild life for shelter, nesting, food and protection from the elements.
7. By the selection of indigenous species the concept of the borrowed landscape is engaged by using similar species within the Campus as outside the Campus thereby blurring the boundary and extending the landscape to the Dublin Mountains to the south.



Remnants of the original 1992 woodland development planting.

Existing Remnants of the Original 1992 Woodland Development Planting.



4. Carbon Sequestration.

Ireland is country of grass, grass is a far more effective storage of carbon and its transfer into the soil than woodland. Some species of grass are more effective in capturing the carbon than others based on their root structure. Trials over a 16 year research and development programme in France has refined the cultivars that are most effective in this carbon capture. Citywest has a landscape dominated by grassland over the 350 acres of the Campus and has adopted this 'Carbon Grass' as its standard mix.

An added advantage of mix is a sward that is drought resistant and after initial almost instant 100% establishment requires on average 30% less grass cutting thereby reducing maintenance costs.



5. Landscape Health Research

NATURE BASED SOLUTIONS, AND MAPPING THE 'STATE OF THE LANDSCAPE' at CITYWEST

As part of a research programme by Tony Williams, Trinity College Dublin.

The aim of the research is to provide guidance on the design, construction and maintenance of Nature Based Solutions (NBS) and Blue Green Infrastructure (BGI) as it relates to Strategic infrastructure. Trinity College Dublin, through its existing range of environmental projects and its environmental sensor networks offers a controlled and established base line of monitoring techniques capable of being applied to other sites.

The research covers a wide environmental range, including ;

1. Agricultural and natural based habitats in Counties Wicklow, Louth and Mayo,
2. An inner city established Campus at Trinity College Dublin, and
3. Citywest Business Campus

A significant characteristic of Citywest within the wider study is that it offers a range of sites that have been developed relatively recently over a period of 30 years, allowing for the measurement of natural processes after disturbance and the capacity to create a natural and sustainable habitat post disturbance

Analysis of the main physical properties of the natural sites combine to offer baseline data analyse for such topics as ;

1. The effectiveness of urban interventions as they relate to their provision of ecosystems, such as responses to flood events.
2. The resilience of rural landscapes to interventions and influences of the wider landscape.
3. Measurement of the landscape concept of Citywest, measured against the landscape character of the West of Ireland upon which it is based, but located on the edge of Dublin City.

Citywest has been developed on a phased programme thereby permitting measurement of a built landscape of varying age / maturity, species, soil and environmental conditions including undeveloped original farmland and natural regeneration. Such measurements shall include but not restricted to ;

1. Recent tree planting and monitoring of growth and development.
2. Installation of sensors and record data on new, retained and original planting.
3. Measurement of Air Quality, NO2 and noise levels.
4. Root zones and the ;
 - 4.1 Assessment of the quality of the soil / substrate.
 - 4.2 Mapping of the root system (geo physical)
 - 4.3 Stability assessment effectiveness (water and nutrient uptakes).
5. Above ground and canopy for growth rates ; intermodal extension, leaf size and other indicators of overall health. Including ;
 - 5.1 Transpiration rates
 - 5.2 Tilt sensors
 - 5.3 Canopy light
 - 5.4 Particulate matter and associated microclimate and atmospheric measurements.
6. Atmospheric Gas and Climate;
 - 6.1 O2 ppm and %, CO2, NO2, SO2, C6H6.
 - 6.2 Moisture and rainfall.
 - 6.3 Air quality particle matter ppm.
 - 6.4 Climatic ; pressure mBar, air temperature.
 - 6.5 Soil temperature, O2. CO2, significant gases ppm.
7. Audio recording including insect, mammal and birdsong. Species richness filtered and analysed.

Data collection by using remote and investigation.

6. Landform and Climate Amelioration.

Traditionally in Ireland buildings were placed in the leeward of a hill and or woodland planting to shelter from the prevailing wind and rain. Today it is less so with increased insulation and double glazing. Citywest prior to development as flat agricultural land was exposed to the cold south westerlies from the Dublin Mountains.

The first action of a development is to strip and store the topsoil, and then excavate the subsoil for the foundations. It can be exported from the site at a cost or reused as part of the landscape. This creates 3 opportunities ;

1. To provide the shelter traditionally provided by the hillside.
2. To drop the building into the landscape as opposed to sitting on it, the building emerges from a natural cradle of landform.
3. It receives the subsoil as a carbon sink on the site.

The landform should be created with a dip and a scarp slope, with all slope types in the same direction as if created by a natural force such as wind on the dunes or glaciers on the valley. The slope can be articulated with ridges or 'goat tracks' that add form and aid access for maintenance. This is best done by site instruction, the track machine being the chisel of the sculptor.

The landform can then be reinforced by woodland planting to complete the Landscape Cradle that shelters and visually integrates the structure within the overall landscape.



7. Wildflower Meadows

Optional *Eriophorum Angustifolium* (Cotton Grass)

Citywest Village Neighbourhood Park ; Seeding with Irish wildflower mixes

Meadow Buttercup



Ox Eye Daisy



Ragged Robin



Yellow Flag Iris



Purple Loosestrife



Self Heal



8. Dead and Decaying Wood.

An Age Structure from 5 to 200 years.



A Sapling Seeded by a Bird within the Fertile and Sheltered Ground of a Tree Stump



A Slowly Decaying Carcass of a Stump

Dead trees and down wood play an important role in ecosystems by providing wildlife habitat, recycling nutrients, aiding plant regeneration, decreasing erosion, and influencing drainage and soil moisture and carbon storage.

An imported and transplanted Phalanx of Beech Tree Stumps

With a power and gravitas many times greater than a hundred healthy semi mature specimens.



An illusion ;

If the stumps are 200 years old then so must be the land form upon which they sit, in reality less than one year old

9. Reed Beds at the Tara Lake and Waterside



Reed Beds at Waterside

Reeds and rushes (*Juncus* spp.) are two marginal aquatic grass-like plants that help purify the water where they grow. Bulrushes remove a wide array of contaminants in the water including oil, bacteria, nutrients and organics and any metals contaminating the water.



Reed Beds at the Tara Lake

Winter cutting of reed will maintain its dominance. Summer cutting of reed reduces its competitive ability, allows a more diverse mix of vegetation and ultimately eliminates it. No management at all will allow natural succession to continue, the speed of which is largely dependant on the water regime.

Reed Beds at the Tara Lake

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Reedbeds are dynamic ecosystems ; temporal and spatial variation in the habitat is key to maintaining a high diversity of flora and fauna. Management that maintains a range of successional stages will maximise their conservation value and biodiversity.

Overall, invertebrate interests are best served if all stages of reed bed succession, from young reed in open water to old reed with scrub invasion on almost dry ground over dense litter, are provided. The juxtaposition of the stages can be important as many invertebrates have different requirements at various times in their life cycle. Small scale variation within a broader mosaic is desirable. Variation in associated habitats is also important : bare marginal substrates can be very important and shallow pools with abundant emergent and submerged aquatic vegetation generally support a more diverse invertebrate fauna..



Reed Beds at Waterside