

From Grey to Green

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12 oktober 2022



Contents

- Grey to Green Phase 1 (2016)

Pause

- Grey to Green Phase 2 (2020)
- Maintenance (skjøtsel)

Sheffield – The Steel City

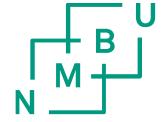


River Sheaf and River Don



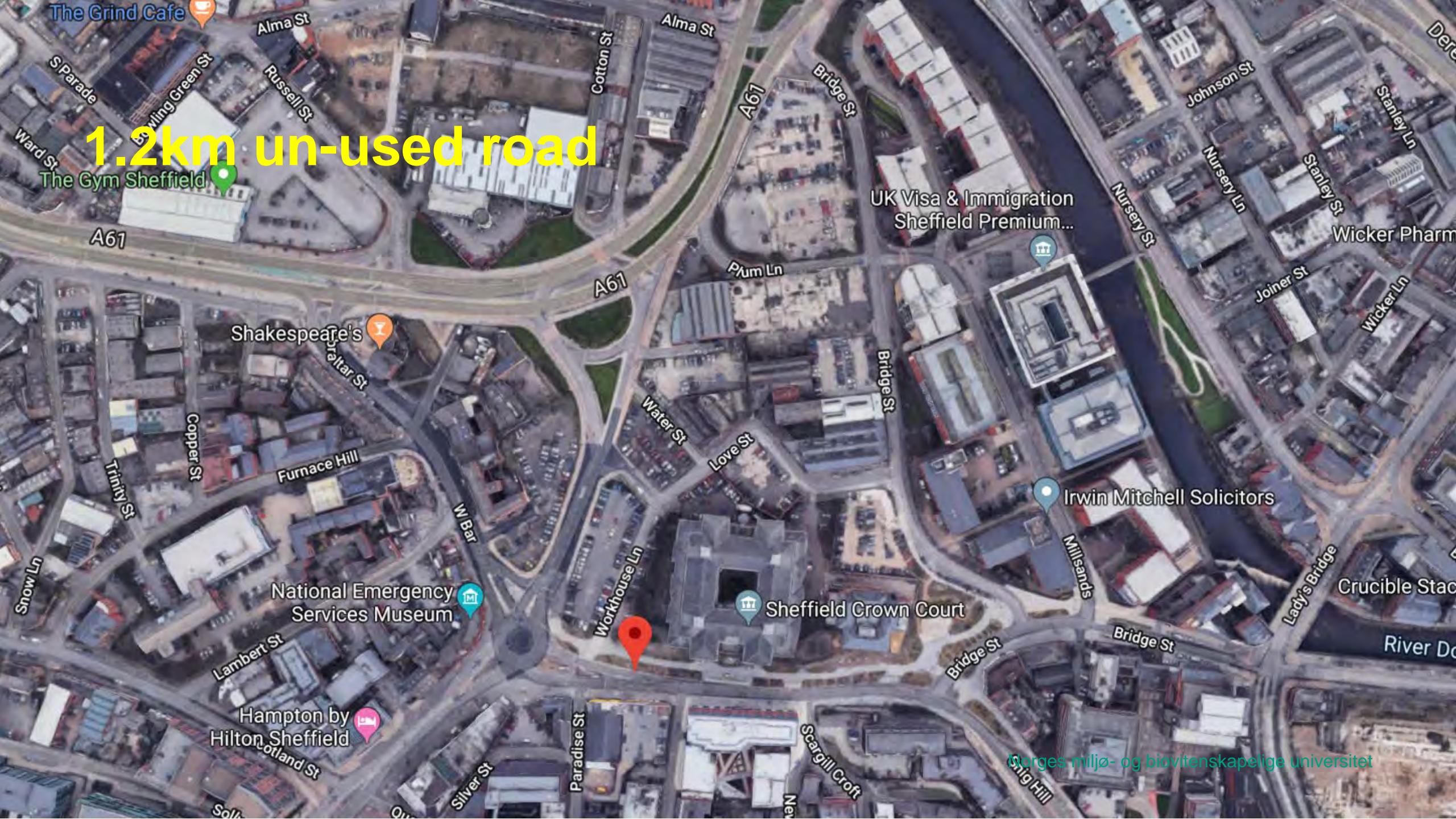
25 juni 2017 Sheffield





Change in road layout: 4 lanes to 2





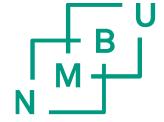
1.2km un-used road

Zac Tudor-
landscape architect
Sheffield City Council (municipality)
(now with Arup)



https://www.instagram.com/zac_tudor/

Norges miljø- og biovitenskapelige universitet



Prof. Nigel Dunnett University of Sheffield



[Pictorial Meadows - Expertly Designed Meadows from Seed and Turf](#)

Norges miljø- og biovitenskapelige universitet



John Lewis Rain Garden, London 2015



Prof. James Hitchmough University of Sheffield

Designing ecological vegetation to be managed in part, with nature conservation type treatments

Application of a spring disturbance to remove winter weed cohorts

1/3 blocks cut down in April and removed, 1/3 cut and herbicided with vinegar (conc. acetic acid), 1/3 burnt as seen in this image



The London Olympic Games 2012-naturalistic planting Showing alternatives to traditional planting



Different ways of using perennials (stauder)

ornamental planting

Mass Planting (single species)
Block Planting
Drift Planting

naturalistic planting

'New naturalism'
Randomly mixed planting
Seed mixes



1. Mass Planting (masseplantinger)



Why use perennials in a mass planting?

Design

- A simple design
- Not distracting
- Creates calm in between more dynamic spaces
- Seasonal interest
- There is a clear arrangement of the plants- formal design

Maintenance

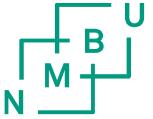
- Easy! Very little skill involved
- Weeds are visible instantly
- Pests and disease are visible instantly
- Maintenance tasks get performed at one time as the whole planting has the same requirements



2. Block Planting (blokkplanting)



**Staudene plantet i større
eller mindre grupper**



Why use perennials in a block planting?

Design

- You can create dynamic combinations
- You can repeat blocks to create rhythm and movement
- Create calm in between more dynamic spaces
- Seasonal interest
- Clear structure as every plant has a given location

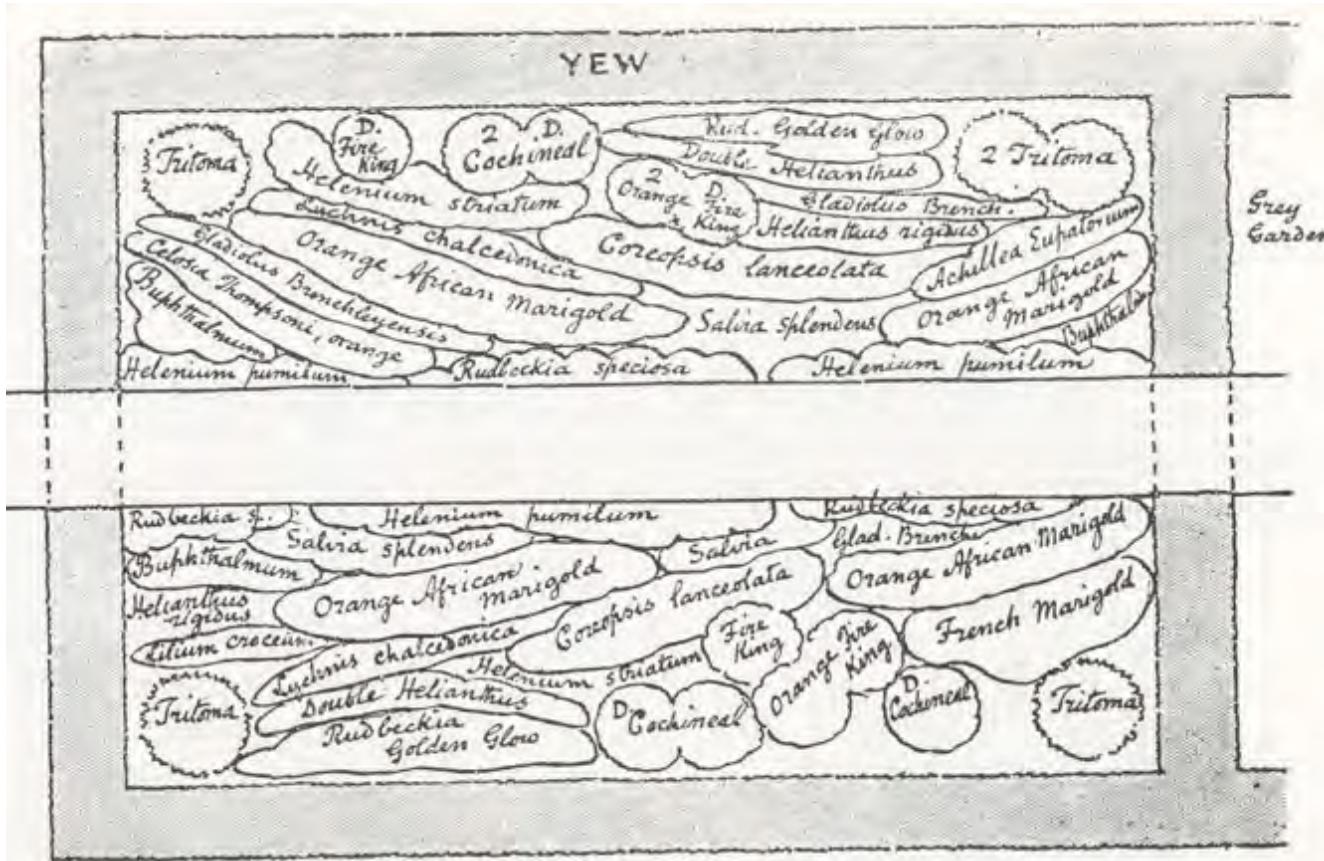
Maintenance

- If plant choices are done well it is easy-issues occur with competition if not
- Weeds are visible instantly
- Pests and disease are visible instantly
- Ideally maintenance tasks get performed at one time as the whole planting has the same requirements

Piet Oudolf- The Perennial Wave (Staudebølgen)

3. Drift Planting

Drift Planting



The English designer Gertrude Jekyll (1843-1932) stretched/**elongated** the block to make a 'drift'.

For the first time this allowed the plants to be viewed from different angles as you passed by.

Piet Oudolf- The Perennial Wave (Staudebølgen)



Why use perennials in a drift planting?

Design

- You can create dynamic combinations
- You can repeat drifts to create rhythm and movement
- Create calm in between more dynamic spaces
- Seasonal interest
- The same plant can be viewed from different angles

Maintenance

- If plant choices are done well it is easy-issues occur with competition if not
- Weeds are visible instantly
- Pests and disease are visible instantly
- Maintenance tasks get performed at one time as the whole planting has the same requirements

Mixed Perennial Plantings used in the Olympic Park London in 2012



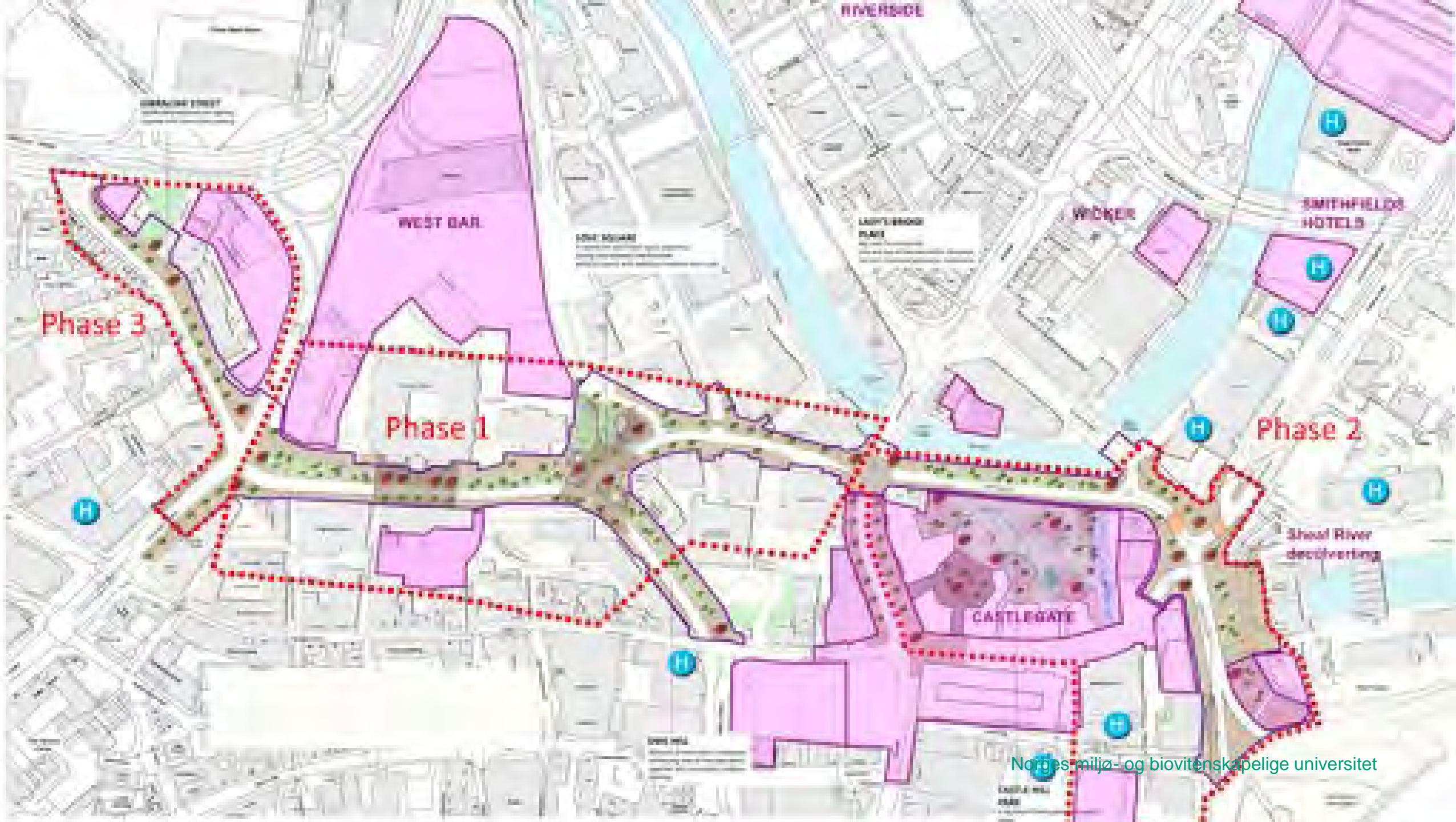
A wide-angle photograph of a hillside garden. The foreground is covered in a dense, colorful mix of wildflowers in shades of yellow, white, pink, and purple. A paved path winds its way up the hill from the bottom right. In the background, there's a green lawn, a bridge, and some buildings under a clear sky.

High impact- the public loved it!

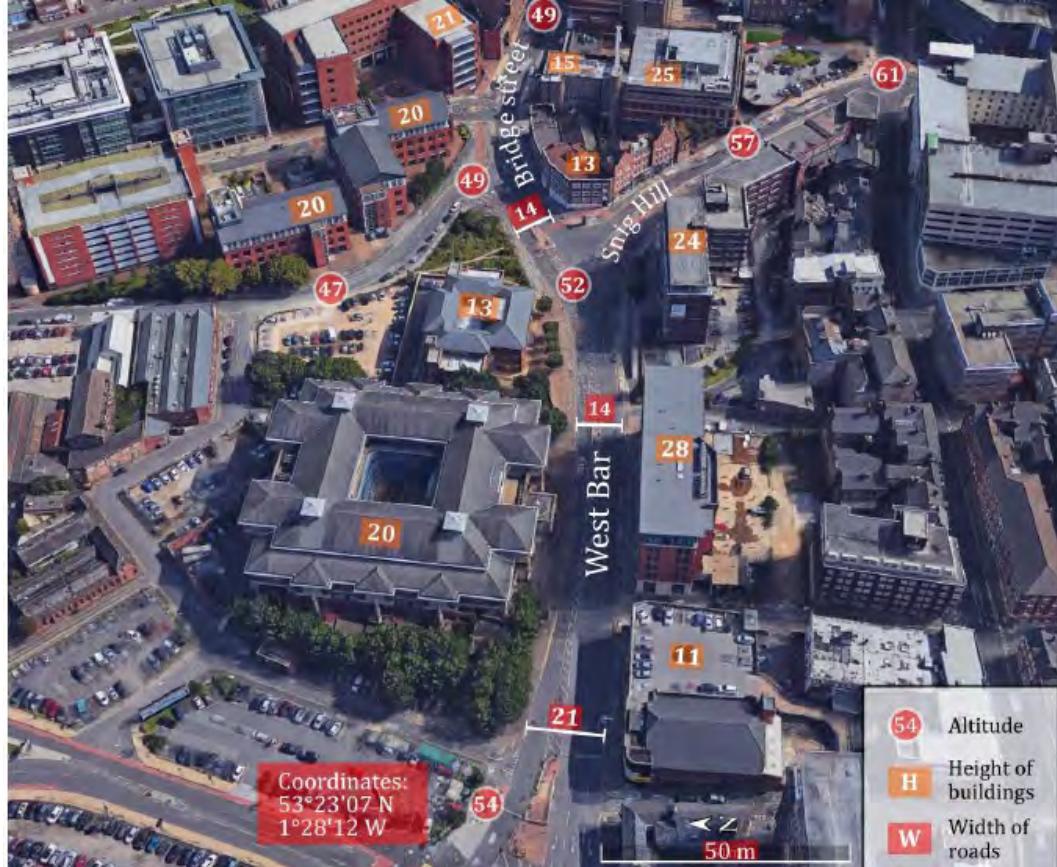


Grey to Green- Phase 1

- Sustainable Drainage System (SuDS)
 - to reduce and treat stormwater runoff
 - in a way that is closer to or mimics natural systems
 - **functional but also beautiful**
 - functional but also has **recreational value**
 - functional but also has **ecological value** (increase biodiversity, create habitats)

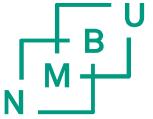


Grey to Green Phase 1



- Design: Nigel Dunnett and Zac Tudor
Sheffield City Council
- Client: Sheffield City Council
- Planted: Spring 2016
- Cost £3.6m
- Funded by: Sheffield City Region, the European Regional Development Fund and Sheffield City Council





SuDS (Sustainable Drainage System) Capacity

- Modelling of the scheme showed the SuDS elements could contain a 60 minute, 1 in 30 year rainfall event with discharge from the whole scheme to the river reduced from 47.3l/sec to 9l/sec.
- A 1 in 100 year rainstorm, 60 minute event would start to overtop the weirs but nevertheless reduces rates from 69.6l/sec to 9.2l/sec.
- The output from the system to the river was estimated to be 12.1l/sec for a 1 in 100 year event plus 30% for climate change. (Data from SusDrain)

Proposal in 2015





Interconnecting swales-The sides are lined to promote the flow of water into the bioswales, but the bases are unlined to promote infiltration of the water back into the underlying soil.





On a steeply sloping part of the site, the check dams form a cascade, with the potential for water to flow over the top of each dam in a severe storm.





Modified green roof style substrate – free draining





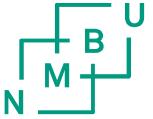
Soil (jord)

- 70% crushed sandstone aggregate from a local quarry (size: 200mm to sand): this promotes drainage and gives bulk and solidity to the substrate.
- 20% composted green waste from Sheffield. The compost component is important because it contains a range of plant nutrients which are released slowly to the plants. Crucially, it retains water for plant growth, improves soil structure for good root growth, and promotes soil microbiota.
- 10% sandy silt loam. The standard soil-forming components of sand, silt and clay are essential to promote nutrient availability to plants, and to providing an optimal soil structure for plant growth.



A 50mm mulch layer of sandstone aggregate



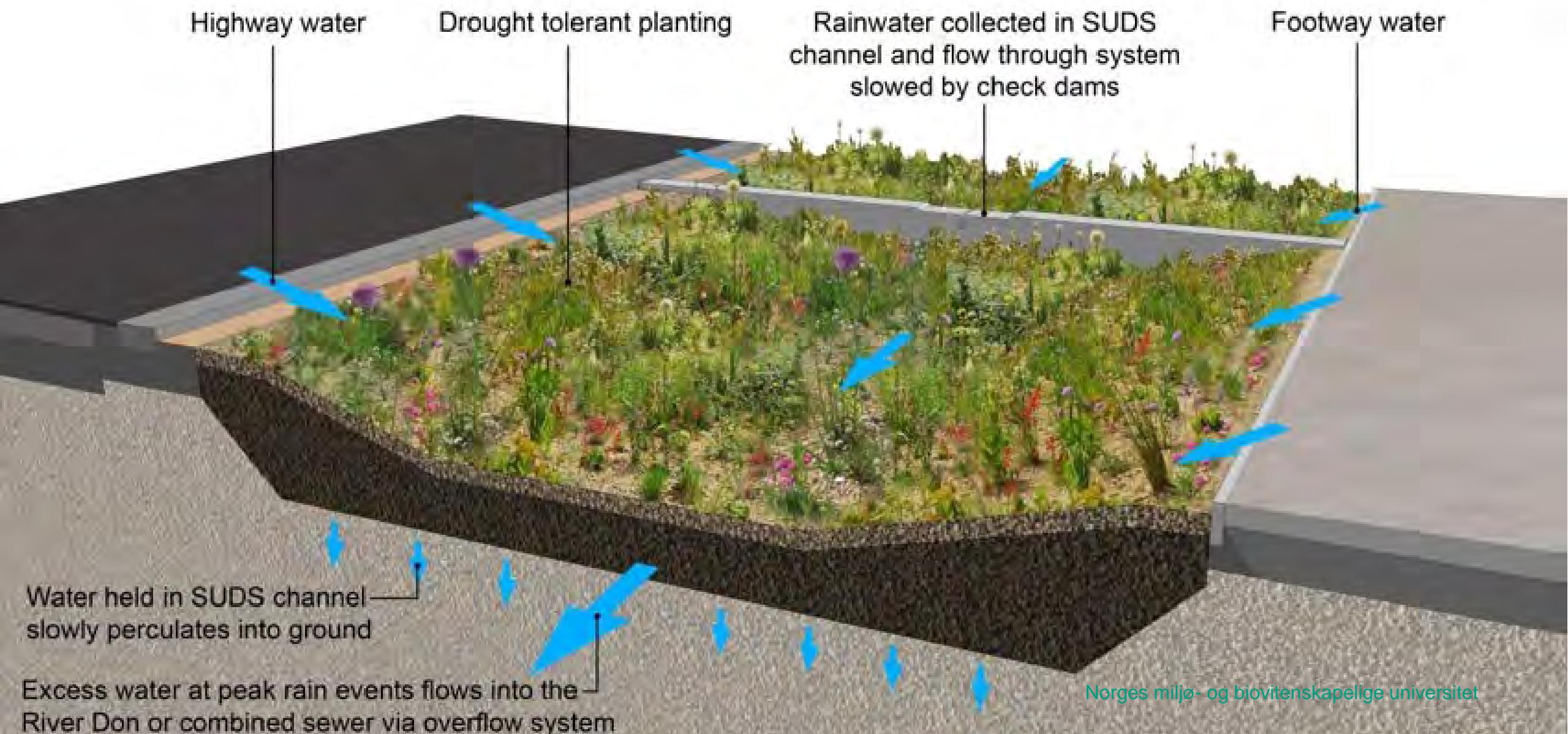


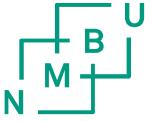
Interconnected swales



- The SuDS scheme of the Grey to Green was planned as a series of interconnected swale cells.
- The palisade fencing along the centre of the beds was a temporary feature to prevent dogs and children crossing the newly establishing plantings.

Sustainable Drainage System (SuDS) - 'Grey to Green Phase 1'



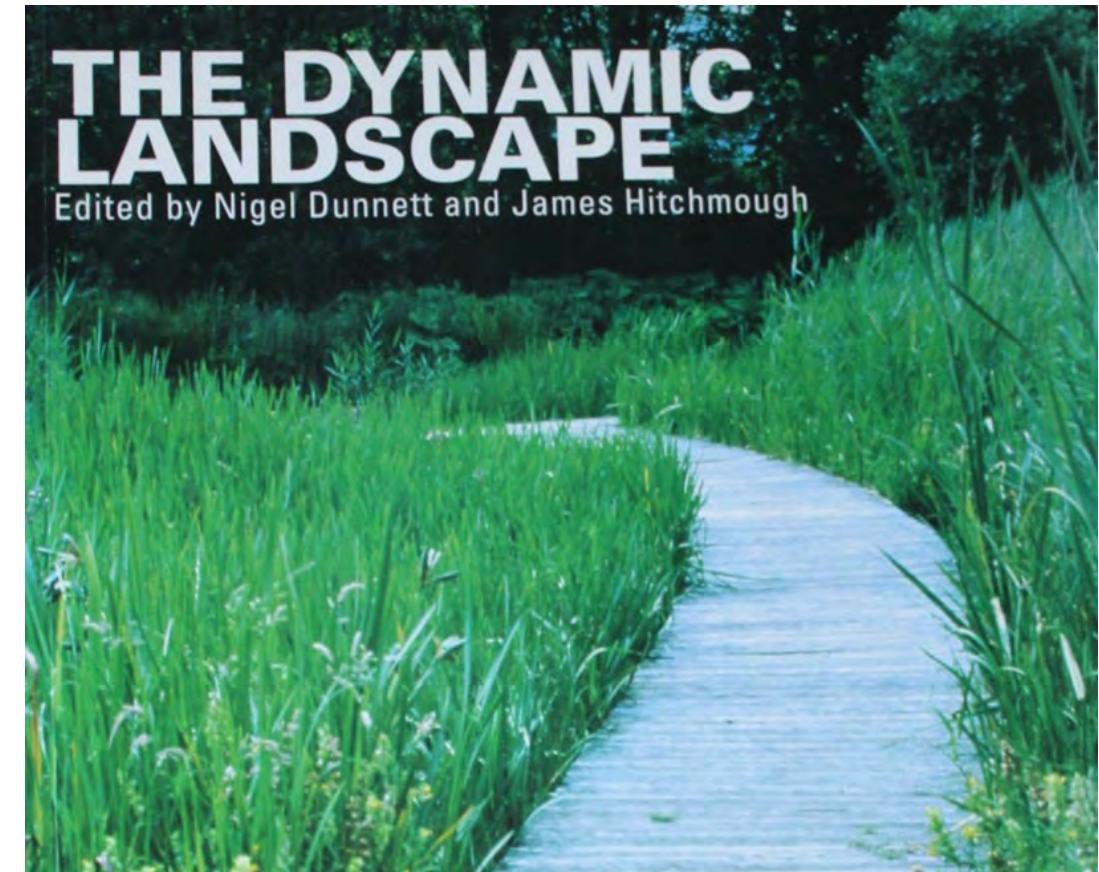


Site conditions for planting

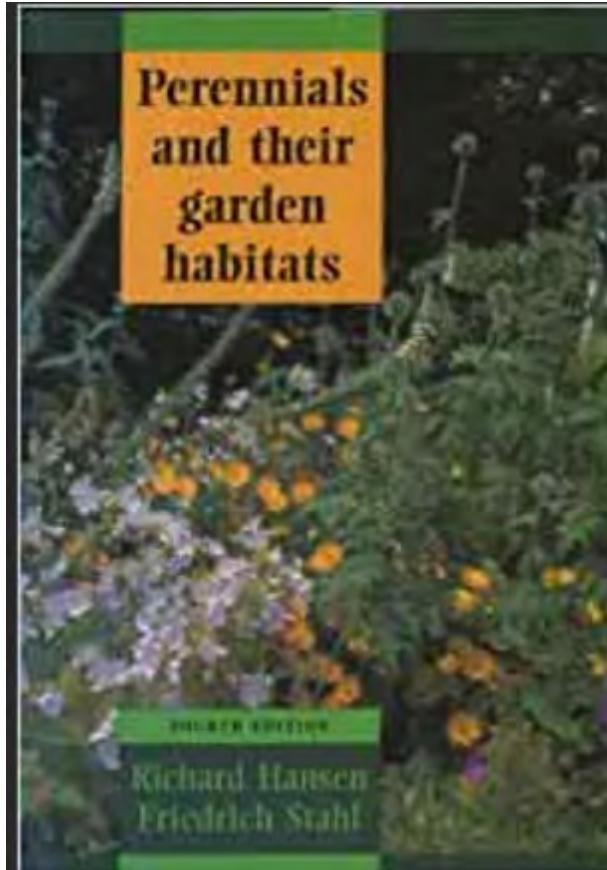
1. Rain gardens and bioswales that directly received the shed rainwater runoff. The average amount of annual precipitation in Sheffield is: 845 mm (33.3 inch) but monthly averages can be as low as 57mm (2.2 inch).
2. Areas that did not receive the runoff: these planting beds are higher than all the others in terms of levels and water does not flow into them.

Naturalistic Planting

- Naturalistic herbaceous vegetation differs from conventional herbaceous vegetation in that it mimics the spatial and structural form of semi-natural vegetation
- There will sometimes be distinct canopy layers; shade tolerant near the ground with spring interest
- The decline of early flowering species is masked by the growth of the next 'layer'
- Individual species are generally not planted in clearly defined groups or blocks



Ideas originating in Germany



Published in English in 1993

- Prof. Richard Hansen classified plants according to their habitats and plant sociology –how they co-exist in the wild
- Sichtungsgarten Hermannshof was established in the 1980s to establish new directions in German planting design, especially in naturalistic planting styles
- Experimental Garden -it uses academic research to inform design
- Schau- und Sichtungsgarten Hermannshof (sichtungsgarten-hermannshof.de)



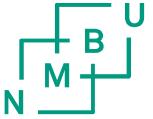
Woodland plant community for moist soils- Hermannshof



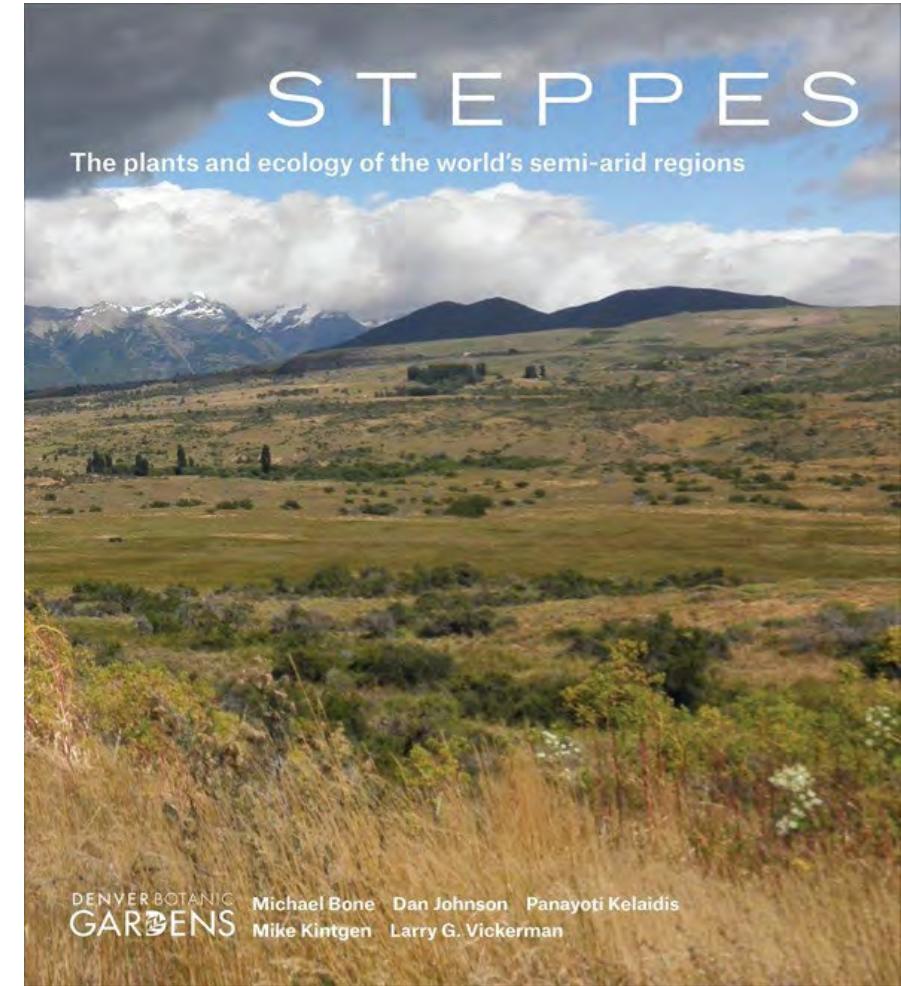
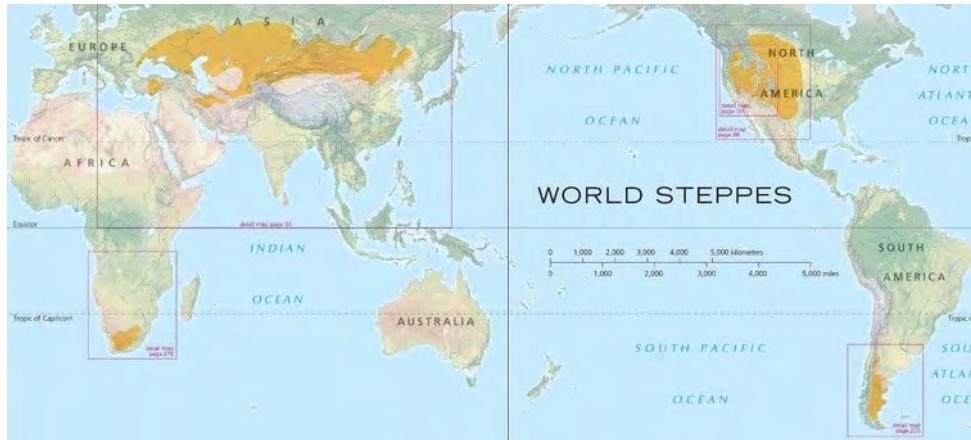
Plants arranged from similar habitats



Steppe planting in the Weihenstephan viewing garden with yucca varieties from the Richard Hansen period.

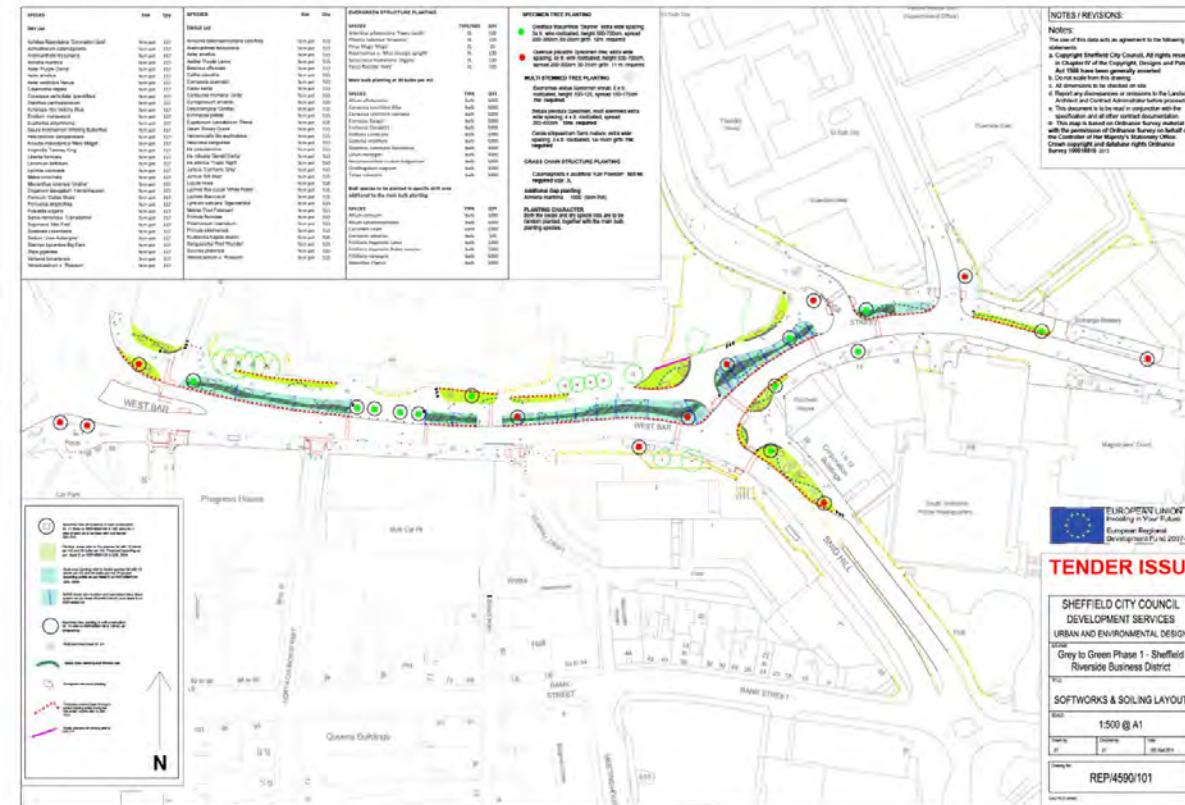


Steppe is a term for semi-arid grassland vegetation
Nigel was familiar with this from his Green Roof research





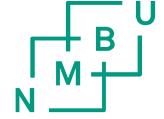
2 Mixed Plantings- Dry (yellow) and Swale-moist (blue)





Mixed perennial plantings

How to make a mixed perennial planting



- Choose plants that are suited to the site
- Ensure that plants are suited to each other:
 - They need to be able to live together
- Design the planting in layers:
 - ground layer
 - main foliage layer
 - taller emergent layer
- **Ensure maximum ground coverage**
- Plantings need to look good
 - don't rely on flowers
 - exploit variety of leaf shapes, texture and colours
 - use new foliage of summer-leaving species to hide untidy spring ephemeral

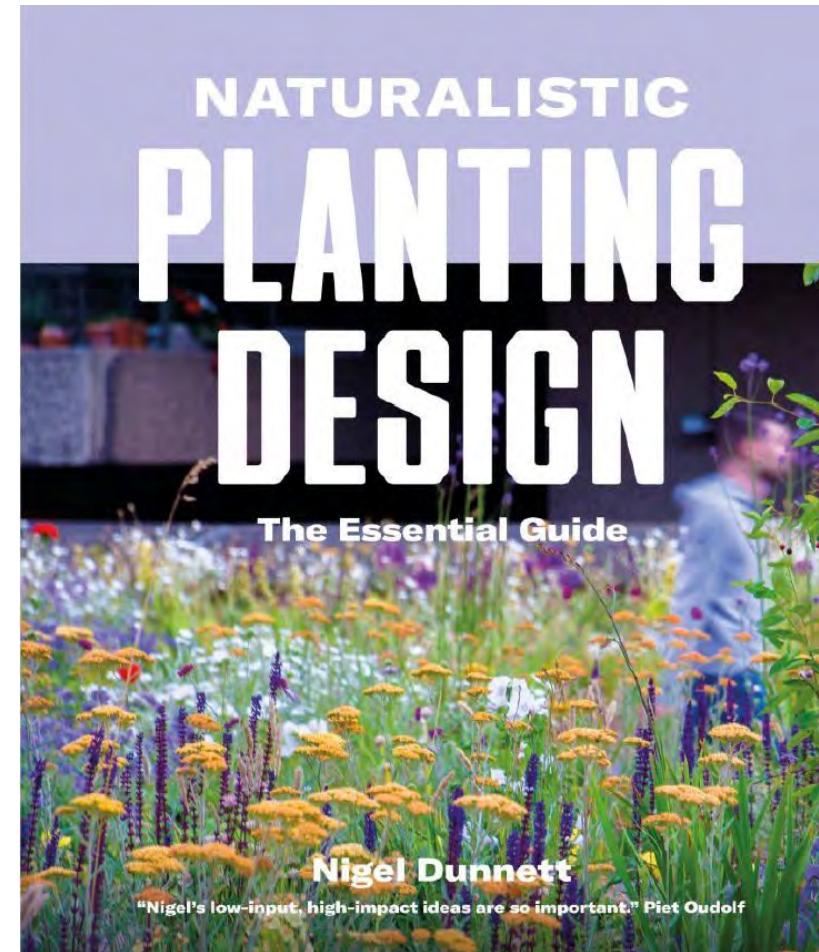
Mixed Perennial Planting



- Leddplanter (over 70 cm) (ca.1-10%)
- Støtteplanter (40-70 cm) (ca.10-40%)
- Bunndekkere (5-40cm)(ca.30-50%)
- Fyllstauder (kortvarige arter) (5-10%)
- Density 9-11/m²

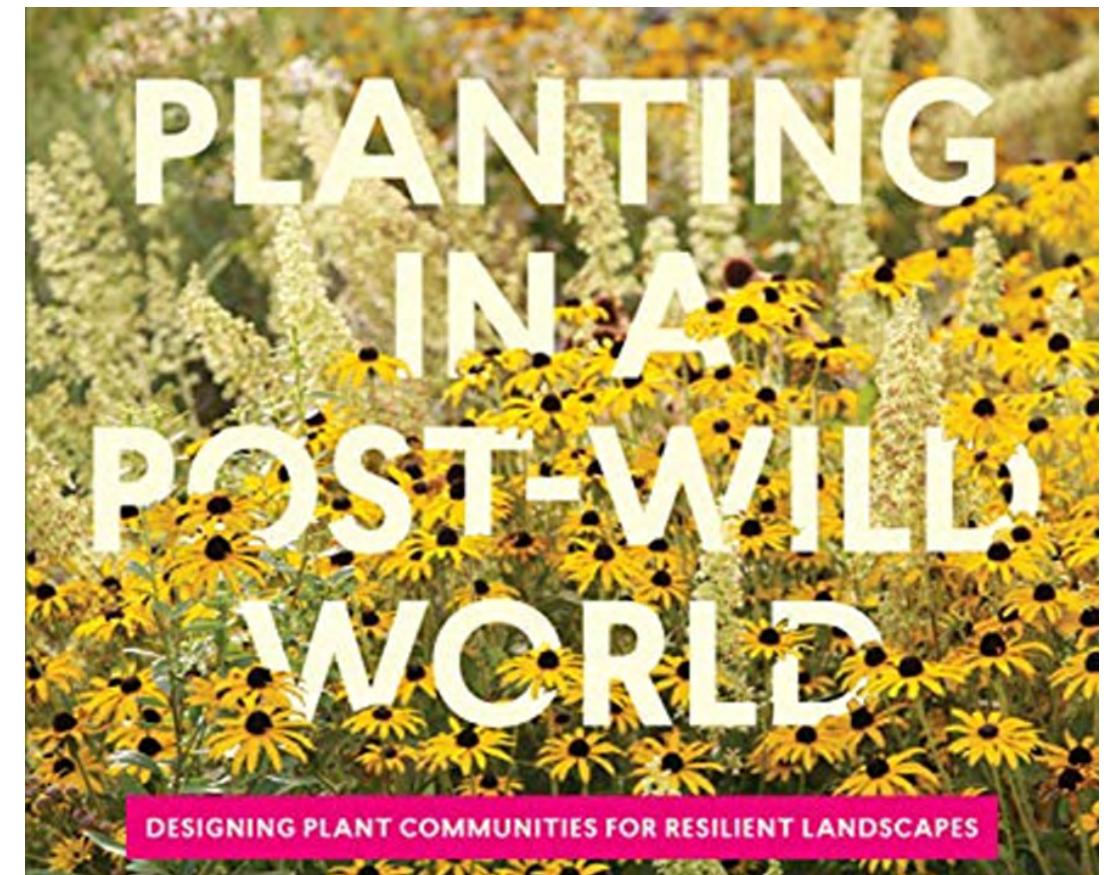
Nigel Dunnett's approach

- Anchor plants + or -10%
 - Satellite + or -40%
 - Ground cover plants
+ or -45%
 - Short-lived +or -5%
-
- The Ground cover plants need to tolerate shade.
 - The Filler plants are short lived and just add colour for the first years.

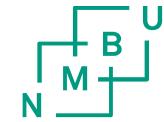


Thomas Rainer and Claudia West approach

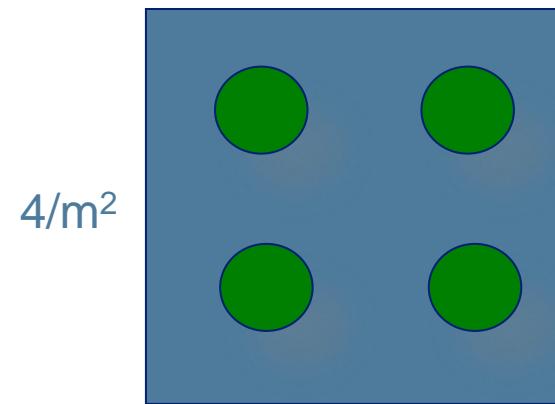
- Structural/framework plants – 10-15%
- Seasonal theme plants – 20-40%
- Ground cover plants- 50%
- Filler plants – 5-10%
- Density 9-11/m²



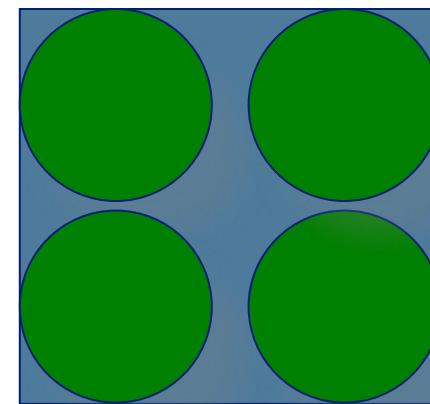
Planting Density- Increasing density reduces weeding



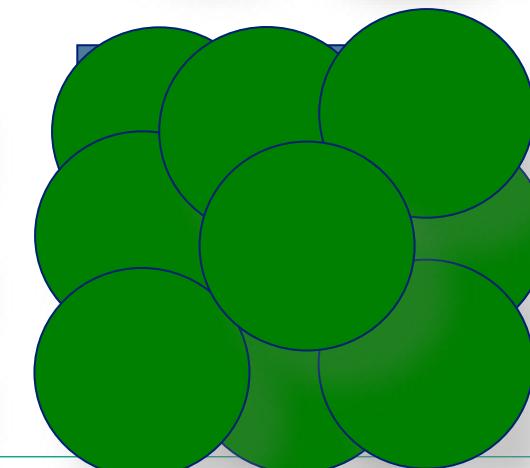
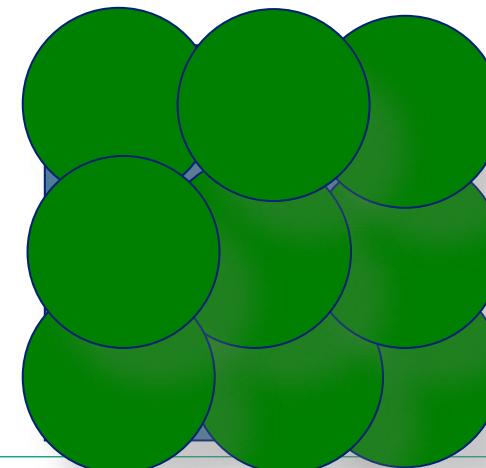
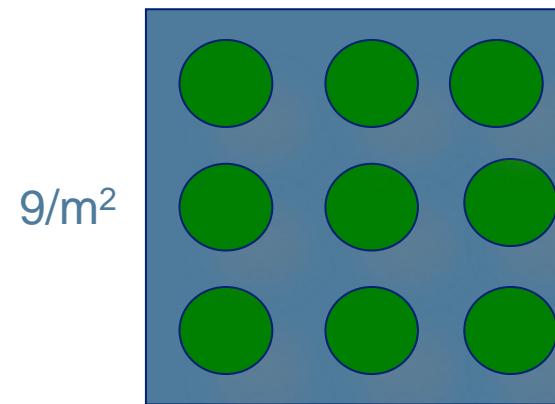
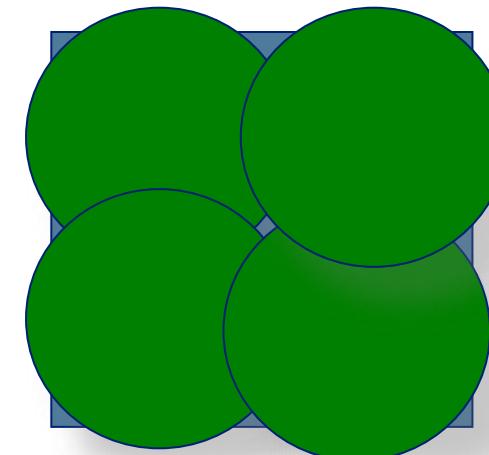
Early spring



Late spring



Early summer



Sarah Price

- She builds up her planting schemes in three vertical layers, starting with the lowest. Short plants (less than 12in/30cm)
- The middle layer (approximately 12in-40in/30cm-100cm, around 40 per cent of the mix) often contains plants with a long flowering season
- Two to three species are selected that will emerge through this tapestry, the taller the better (40in/100cm or more, approximately 10 per cent or less of the mix)



<https://www.telegraph.co.uk/gardening/9672234/Sarah-Prices-guide-to-naturalistic-planting-for-your-garden.html>

Nigel is inspired by plant communities in the wild



Liatris spicata

- Native Range: Central and Eastern United States
- Habitat: Grown in damp meadows, the edges of marshes and savannahs
- Stiff, upright stems
- Photo showing it in North-East Illinois in a mesic sand prairie in the Kankakee Sands Region. Sandy soil but does get wet.



Liatris spicata in the Grey to Green in Sheffield

Example of a mixed perennial planting-Olympic Park

WESTERN EUROPE		Mean number of plants per m ²	Max flowering height (mm)
Tall Emergents			
<i>Cephalaria gigantea</i>		0.1	2000
<i>Telekia speciosa</i>		0.1	1500
<i>Molina caerulea 'Transparent'</i>		0.1	2000
		0.3	
Medium Canopy Species			
<i>Deschampsia cespitosa 'Gold Veil'</i>		1	1000
<i>Campanula lactiflora 'Pritchard's Variety'</i>		0.2	1000
<i>Molinia caerulea 'Moorhexe'</i>		1	600
<i>Lythrum virgatum 'Dropmore Purple'</i>		1.5	1000
<i>Trollius europaeus</i>		0.2	500
<i>Succisa pratensis</i>		0.5	500
<i>Sanguisorba officinalis</i>		1	700
<i>Achnatherum calamagrostis</i>		1	600
<i>Centaurea dealbata 'Steenbergii'</i>		1.5	600
<i>Euphorbia palustris</i>		0.5	900
<i>Geranium sylvaticum 'Mayflower'</i>		0.2	500
<i>Leucanthemum 'x superbum 'T E Killin</i>		3	700
		11.6	
Lower Ground Species and Fillers			
<i>Lychnis chalcedonica</i>		0.2	750
Total plants/m²		11.9	

3 layers

Tall- lowest % because they are the biggest plants

Medium – plants selected for long seasonal interest. Note these plants do not all look good at the one time- but come in succession

Lower- this can have a higher % but in this case the plants in the Medium layer also took this role

**Medium canopy species = *Deschampsia*,
Leucanthemum and *Sanguisorba***

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 c. All dimensions to be checked on site
 d. Report any discrepancies or omissions to the Landscape Architect and Contract Administrator before proceeding
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DRIY List			
Achillea filipendula 'Coronation Gold'	9cm pot	337	
Achimenes calmagrots	9cm pot	337	
Anemone hortensis	9cm pot	337	
Anemone maritima	9cm pot	337	
Aster 'Purple Dome'	9cm pot	337	
Aster amellus	9cm pot	337	
Aster sedulus 'Nirush'	9cm pot	337	
Calanthe repens	9cm pot	337	
Carex virgata 'Grandiflora'	9cm pot	337	
Dianthus barbatus	9cm pot	337	
Echinops ritro 'Veins Blue'	9cm pot	337	
Eudium marmoreum	9cm pot	337	
Euphorbia polychroma	9cm pot	337	
Gaura lindheimeri 'Whirling Butterflies'	9cm pot	337	
Hedera helix 'Semper Vir'	9cm pot	337	
Heuchera sempervirens	9cm pot	337	
Krasia macradenia 'Marie Millet'	9cm pot	337	
Krophofia 'Tawney King'	9cm pot	337	
Liberia formosa	9cm pot	337	
Limonium latifolium	9cm pot	337	
Lysichiton camtschatcensis	9cm pot	337	
Malva moschata	9cm pot	337	
Muscari armeniacum 'Urdine'	9cm pot	337	
Ophioglossum vulgatum 'Hermannii'	9cm pot	337	
Pancratium Dallas Blue'	9cm pot	337	
Petrosia amplexicaulis	9cm pot	337	
Passiflora violacea	9cm pot	337	
Saxifraga nemoralis 'Carradonna'	9cm pot	337	
Saponaria 'Mrs Frit'	9cm pot	337	
Scabiosa columbaria	9cm pot	337	
Scutellaria 'Joe Agerwein'	9cm pot	337	
Stachys byzantina 'Big Ears'	9cm pot	337	
Stipa gigantea	9cm pot	337	
Vestris bonariensis	9cm pot	337	
Veronicastrum v. 'Roseum'	9cm pot	337	

SWALE List			
Amaronia laevigata 'aristata'	9cm pot	335	
Andromache lessoniaria	9cm pot	337	
Aster amellus	9cm pot	335	
Aster 'Purple Lance'	9cm pot	337	
Betonica officinalis	9cm pot	335	
Cathartes palustris	9cm pot	335	
Cassia quinquangularis	9cm pot	335	
Carex secta	9cm pot	335	
Centauria montana 'Jordy'	9cm pot	335	
Dioscorea alata	9cm pot	335	
Dicentra spectabilis	9cm pot	335	
Echinacea pallida	9cm pot	335	
Eupatorium cannabinum 'Pleasant'	9cm pot	335	
Geum 'Emory Queen'	9cm pot	335	
Hemerocallis 'No sulphur'	9cm pot	335	
Heuchera sanguinea	9cm pot	335	
Hyacinthoides non-scripta	9cm pot	335	
Iris robusta 'Gerald Darby'	9cm pot	335	
Iris sibirica 'Tropic Night'	9cm pot	335	
Juncus 'Carmens Grey'	9cm pot	335	
Juncus 'Elk Blue'	9cm pot	335	
Luzula nivea	9cm pot	335	
Lychnis flos-cuculi 'White Robin'	9cm pot	335	
Lychnis flos-cuculi	9cm pot	335	
Lytrum salicaria 'Zigeunerblut'	9cm pot	335	
Malva 'Paul's Scarlet'	9cm pot	335	
Primula florindae	9cm pot	335	
Potentilla 'Ovularium'	9cm pot	335	
Primula elatior	9cm pot	335	
Rudbeckia fulgida 'Gloriosa'	9cm pot	335	
Sanguisorba 'Red Thunder'	9cm pot	335	
Success primrose	9cm pot	335	
Veronicastrum v. 'Roseum'	9cm pot	335	

SPECIES			
Artemisia 'Powis Castle'	3L	100	
Phillyrea 'Laureola' 'Amara'	3L	120	
Pinus 'Mugo' 'Mops'	3L	25	
Rosmarinus o. 'Miss Jessops upright'	3L	120	
Seceococcia foeniculacea 'Digitata'	3L	100	
Yucca fasciculata 'Variegata'	3L	100	

Main bulb planting at 30 bulbs per m²			
SPECIES	TYPE	QTY	
Allium 'Gustav'	bush	5000	
Camassia 'Loddonion Alba'	bush	5000	
Camassia 'Loddonion caerulea'	bush	5000	
Euonymus 'Brigitt'	bush	5000	
Lemnaceus Cleopatra	bush	5000	
Galanthus nivalis	bush	5000	
Gilia tricolor	bush	5000	
Gilia 'Sommer's Bijou Blue'	bush	5000	
Lilium martagon	bush	5000	
Nectaroscordum siculum bulgaricum	bush	5000	
Omphoglossum heterophyllum	bush	5000	
Tulipa sylvestris	bush	5000	

Bulb species to be planted in specific drift areas additional to the main bulb planting			
SPECIES	TYPE	QTY	
Allium 'Gustav'	bush	5000	
Camassia 'Loddonion Alba'	bush	5000	
Camassia 'Loddonion caerulea'	bush	5000	
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Lemnaceus Cleopatra	bush	5000	
Galanthus nivalis	bush	5000	
Gilia tricolor	bush	5000	
Gilia 'Sommer's Bijou Blue'	bush	5000	
Lilium martagon	bush	5000	
Nectaroscordum siculum bulgaricum	bush	5000	
Omphoglossum heterophyllum	bush	5000	
Tulipa sylvestris	bush	5000	

- Glechoma hederacea 'Skyline' extra wide spacing; 5x 1.5m rootholed, height 500-700mm, spread 200-300cm 30-35cm grth 12hr required
- Quercus palustris Specimen tree: extra wide spacing, 4x 1.5m rootholed, height 500-700mm, spread 200-300cm 30-35cm grth 11 hr required

MULTI STEMMED TREE PLANTING

SPECIES			
TYPE	QTY		
Allium 'Gustav'	5000		
Camassia 'Loddonion Alba'	5000		
Camassia 'Loddonion caerulea'	5000		
Euonymus 'Brigitt'	5000		
Lemnaceus Cleopatra	5000		
Galanthus nivalis	5000		
Gilia tricolor	5000		
Gilia 'Sommer's Bijou Blue'	5000		
Lilium martagon	5000		
Nectaroscordum siculum bulgaricum	5000		
Omphoglossum heterophyllum	5000		
Tulipa sylvestris	5000		

GRASS CHAIN STRUCTURE PLANTING

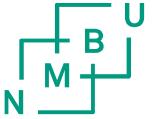
SPECIES			
TYPE	QTY		
Allium 'Gustav'	5000		
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Gilia 'Sommer's Bijou Blue'	5000		
Lilium martagon	5000		
Nectaroscordum siculum bulgaricum	5000		
Omphoglossum heterophyllum	5000		
Tulipa sylvestris	5000		

PLANTING CHARACTER

Both the swale and dry species lists are to be random planted, together with the main bulb planting species.

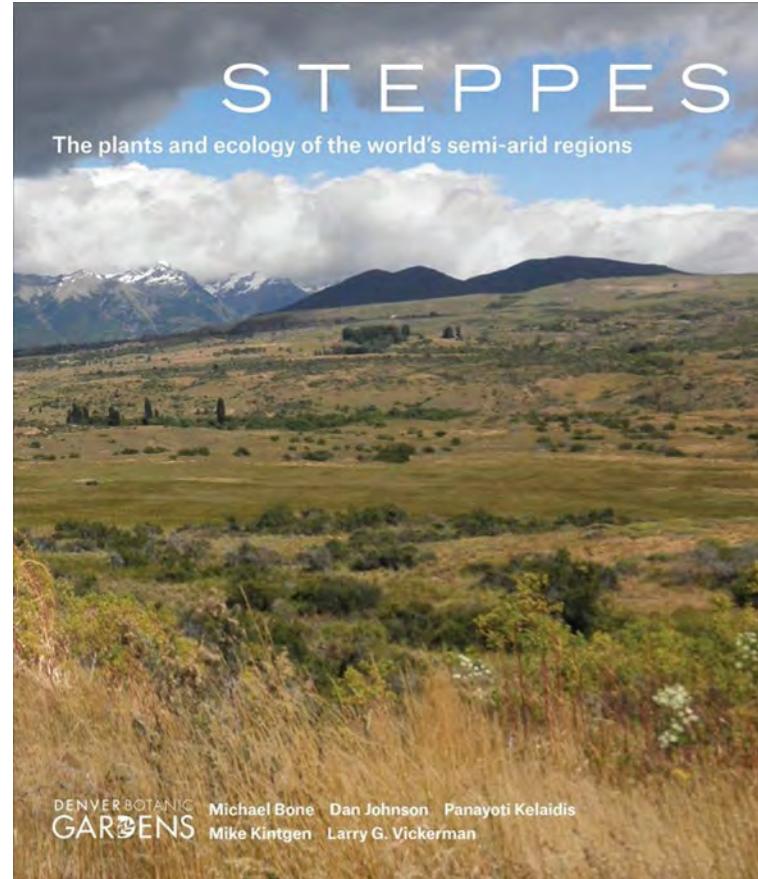


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Stauder – Dry List

SPECIES	Size	Qty
DRY List		
Achillea filipendulina 'Coronation Gold'	9cm pot	317
Achnatherum calamagrostis	9cm pot	317
Anelmannthele lessoniana	9cm pot	317
Armeria maritima	9cm pot	317
Aster 'Purple Dome'	9cm pot	317
Aster amellus	9cm pot	317
Aster sedifolius Nanus	9cm pot	317
Calamintha nepeta	9cm pot	317
Coreopsis verticillata 'grandiflora'	9cm pot	317
Dianthus carthusianorum	9cm pot	317
Echinops ritro Veitchs Blue	9cm pot	317
Erodium manavesii	9cm pot	317
Euphorbia polychroma	9cm pot	317
Gaura lindheimeri Whirling Butterflies	9cm pot	317
Helicotrichon sempervirens	9cm pot	317
Knautia macedonica 'Mars Midget'	9cm pot	317
Kniphofia 'Tawney King'	9cm pot	317
Libertia formosa	9cm pot	317
Limonium latifolium	9cm pot	317
Lychnis coronaria	9cm pot	317
Malva moschata	9cm pot	317
Miscanthus sinensis "Undine"	9cm pot	317
Origanum laevigatum 'Herrenhausen'	9cm pot	317
Panicum 'Dallas Blues'	9cm pot	317
Perovskia atriplicifolia	9cm pot	317
Pulsatilla vulgaris	9cm pot	317
Salvia nemorosa 'Carradonna'	9cm pot	317
Saponaria 'Max Freil'	9cm pot	317
Scabiosa columbaria	9cm pot	317
Sedum 'Jose Aubergine'	9cm pot	317
Stachys byzantina Big Ears	9cm pot	317
Stipa gigantea	9cm pot	317
Verbena bonariensis	9cm pot	317
Veronicastrum v. 'Roseum'	9cm pot	317



Achillea filipendulina 'Coronation Gold'
Verbena bonariensis (Fyllstauder)
Lychnis coronaria



A close-up photograph of a diverse field of wildflowers. In the foreground, bright yellow flowers with dark centers, likely Black-eyed Susans or Rudbeckia, are prominent. Behind them, clusters of purple flowers with yellow centers, possibly Aster species, grow on tall green stems. The background is filled with various green foliage and other wildflowers, creating a lush, natural scene.

Støtteplanter

N
B
M
U



Juli 2019



Swale list



<i>Centaurea montana</i> 'Jordy'	9cm pot	515
<i>Cynoglossum amabile</i>	9cm pot	515
<i>Deschampsia</i> 'Goldtau'	9cm pot	515
<i>Echinacea pallida</i>	9cm pot	515
<i>Eupatorium cannabinum</i> 'Plena'	9cm pot	515
<i>Geum</i> 'Emory Quinn'	9cm pot	515
<i>Hemerocallis lilio asphodelus</i>	9cm pot	515
<i>Heuchera sanguinea</i>	9cm pot	515
<i>Iris pseudacorus</i>	9cm pot	515
<i>Iris robusta</i> 'Gerald Darby'	9cm pot	515
<i>Iris sibirica</i> 'Tropic Night'	9cm pot	515
<i>Juncus</i> 'Carmens Grey'	9cm pot	515
<i>Juncus</i> 'Elk Blue'	9cm pot	515
<i>Luzula nivea</i>	9cm pot	515
<i>Lychnis flos cuculi</i> 'White Robin'	9cm pot	515
<i>Lychnis flos-cuculi</i>	9cm pot	515
<i>Lythrum salicaria</i> 'Zigeunerblut'	9cm pot	515
<i>Molinia</i> 'Poul Petersen'	9cm pot	515
<i>Primula florindae</i>	9cm pot	515

Lythrum salicaria 'Zigeunerblut'



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Mai 2019 *Lychnis flos-cuculi*

Iris sibirica ‘Tropic Night’

Veronicastrum virginicum 'Album'



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Eupatorium cannabinum 'Plenum'



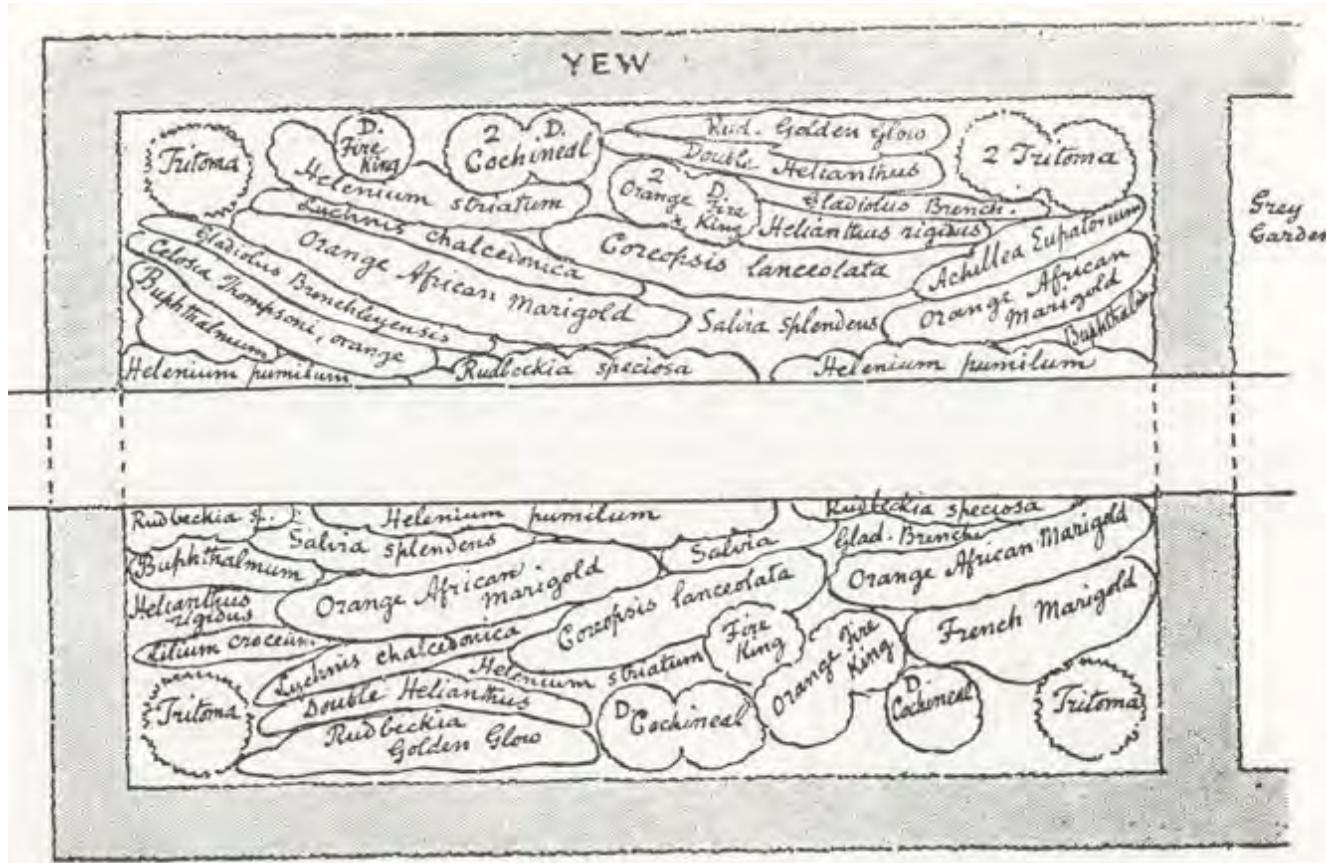
Ornamental grasses- prydgress

'Grass chain structure planting' of 560 *Calamagrostis × acutiflora 'Karl Foerster'* in 3l pots

(Shown in juli 2016)



'Chain planting' = Drift Planting



The English designer Gertrude Jekyll (1843-1932) stretched/**elongated** the **block** to make a 'drift'.

For the first time this allowed the plants to be viewed from different angles as you passed by.

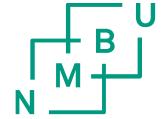
Oktober 2017



A photograph of a modern urban landscape. In the foreground, a large, lush green roof garden is filled with various wildflowers, including tall yellow grasses and clusters of pink flowers. To the right, a paved road curves away. In the background, several multi-story buildings made of reddish-brown brick are visible, featuring large windows and glass-enclosed sections. One building has a sign that reads "IMI Brian Mitchell". The sky is clear and blue.

August 2019

Echinops ritro ‘Veitch’s Blue’



Trees- Trær

- 40 trees
- 30 semi mature trees:
 - 12 *Gleditsia triacanthos* 'Skyline'
 - 11 *Quercus palustris*
 - 7 *Cercis siliquastrum*
- 10 multi-stemmed *Betula pendula*

SPECIMEN TREE PLANTING

- *Gleditsia triacanthos 'Skyline'* extra wide spacing; 5x tr. wire rootballed, height 500-700cm, spread 200-300cm 30-35cm girth 12nr. required
- *Quercus palustris* Specimen tree; extra wide spacing; 4x tr. wire rootballed, height 500-700cm, spread 200-300cm 30-35cm girth 11 nr. required

MULTI STEMMED TREE PLANTING



Euonymus alatus Specimen shrub; 5 x tr. rootballed, height 100-125, spread 150-175cm 7nr. required

Betula pendula Specimen, multi stemmed extra wide spacing; 4 x tr. rootballed, spread 350-400cm 10nr. required

Cercis siliquastrum Semi mature, extra wide spacing; 3 x tr. rootballed, 14-16cm girth 7Nr. required

Cercis siliquastrum- tolerates drought

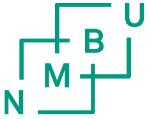




Quercus palustris- tolerates flooding

A paved walkway leads through a landscaped area with various plants and trees, eventually reaching a modern building complex.

Betula pendula



Shrubs- busker

EVERGREEN STRUCTURE PLANTING

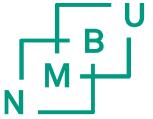
SPECIES	TYPE/SIZE	QTY
<i>Artemisia arborescens 'Powis castle'</i>	3L	100
<i>Phlomis tuberosa 'Amazone'</i>	3L	120
<i>Pinus Mugo 'Mops'</i>	3L	25
<i>Rosemarinus o. 'Miss Jessops upright'</i>	3L	120
<i>Sacocca hookeriana 'Digyna'</i>	3L	120
<i>Yucca flaccida 'Ivory'</i>	3L	100

A wide-angle photograph of an urban street scene during sunset. In the foreground, a lush green garden bed is filled with various flowers, including yellow Phlomis fruticosa. A paved walkway leads into the background. On the right, a white and blue double-decker bus is driving away from the camera, with its digital display showing "Grevatt Lane" and "Pay". The background features a mix of architectural styles, including a modern glass building, several brick apartment complexes, and a large, multi-story industrial-style building on the right. The sky is a warm, golden color.

Phlomis fruticosa



Rosmarinus officinalis
'Miss Jessopp's Upright'



Bulbs- Løker og knoller

Main bulb planting at 30 bulbs per m²

SPECIES	TYPE	QTY
Allium aflatunense	bulb	5000
Camassia Leichtlinii Alba	bulb	5000
Camassia Leichtlinii caerulea	bulb	5000
Eremurus Bungei	bulb	5000
Eremurus Cleopatra	bulb	5000
Galtonia candicans	bulb	5000
Galtonia viridiflora	bulb	5000
Gladiolus communis byzantinus	bulb	5000
Lilium martagon	bulb	5000
Nectaroscordum siculum bulgaricum	bulb	5000
Omithogalum magnum	bulb	5000
Tulipa sylvestris	bulb	5000

Bulb species to be planted in specific drift area
additonal to the main bulb planting

SPECIES	TYPE	QTY
Allium cernuum	bulb	1000
Allium sphaerocephalon	bulb	5000
Cyclamen coum	corm	1000
Eremurus robustus	bulb	500
Fritillaria imperialis Lutea	bulb	1000
Fritillaria imperialis Rubra maxima	bulb	1000
Fritillaria meleagris	bulb	5000
Galanthus Elwesii	bulb	5000

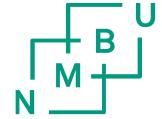


Maintenance-cutting and removing

- Cutting or mowing the above ground shoots of grasses and herbaceous plants yes or no?
- Generates large amounts of biomass
- Increases light in the community, more likelihood of seedling establishment within
- Gradually reduces productivity of the system (this is very beneficial)



The public prefer it cut back



The longer you can wait to cut back the better as this reduces weed establishment

North American prairie, Sheffield botanical gardens



The public do not want to look at bare soil for months





Bulbs- Løker og knoller



[Spring Bulb Display | Lurie Garden](#)



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Interesting foliage helps



Extensive bulb planting

- 45,000 bulbs including: *Allium*, *Camassia*, *Cyclamen*, *Eremurus*, *Fritillaria*, *Galanthus*, *Galtonia*, *Gladiolus*, *Lilium*, *Nectaroscordum*, *Nerine*, *Ornithogalum* and *Tulipa*



Eremurus robusta

Allium cvs

Art work

- Throughout the scheme are a number of 4.2m totem-like structures filled with sculptures and carvings.
- The sculptures are made from stone and metal and incorporate stories of the area together with eye-catching mirror and lighting effects





Matching art and seating



The public barely notice the art now





Grey to Green – Phase 1 success

- The project has improved the city's resilience to climate change, enhanced the public realm, and increased connectivity in the city centre
- The project is now attracting investment in new and existing jobs
- The project is a template for other cities wanting to install naturalistic style planting in water management
- It is being used for research-

Grey to Green Phase 2

- Design: Nigel Dunnett and Zac Tudor
Sheffield City Council
- Client: Sheffield City Council
- Planted: Summer 2020
- Cost £6.3m
- Funded by: Sheffield City Region, the European Regional Development Fund and Sheffield City Council

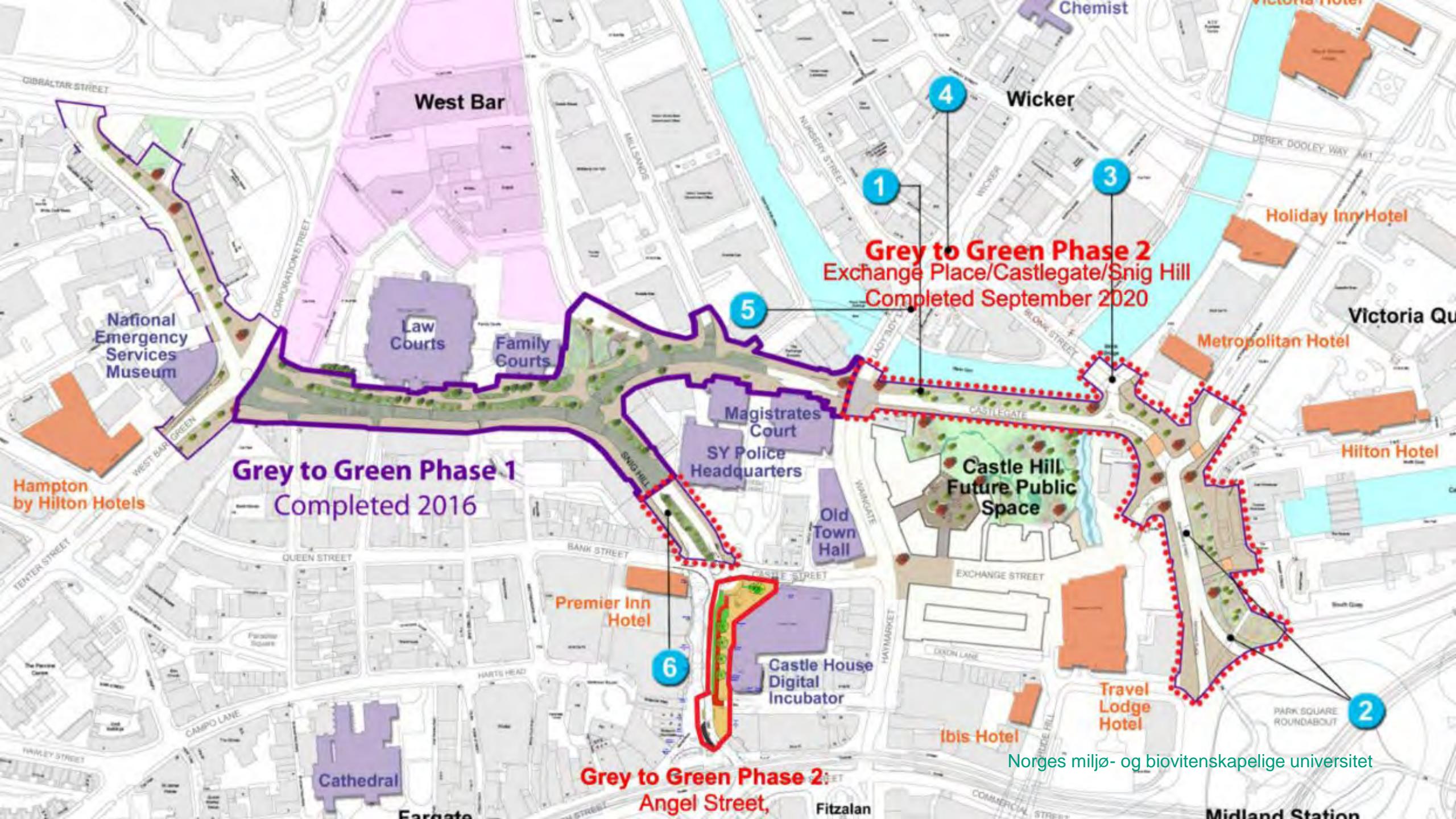


Grey to Green Phase 1

Completed 2016

Grey to Green Phase 2
Exchange Place/Castlegate/Snig Hill
Completed September 2020

Grey to Green Phase 2:
Angel Street, Fitt



Pedestrians and Cyclists





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Interconnecting swales





Soil

Imported Manufactured Top Soil

- Planting areas allow for an average depth of soil to be 600mm
- Type: semi extensive growing medium

Mix: **70% sandstone aggregate** (20mm to sand)

- 20% composted green waste
- 10% Silt Loam topsoil

A man in an orange high-visibility work suit is operating a small orange mini-excavator. He is seated in the cab, looking down at the work area. The excavator's arm is extended, and its bucket is digging into a large pile of dark brown soil. The machine has "KX016-4" and "INSTANT HIRE" branding. The background shows a city street with buildings, a road, and some people walking.

October 2020

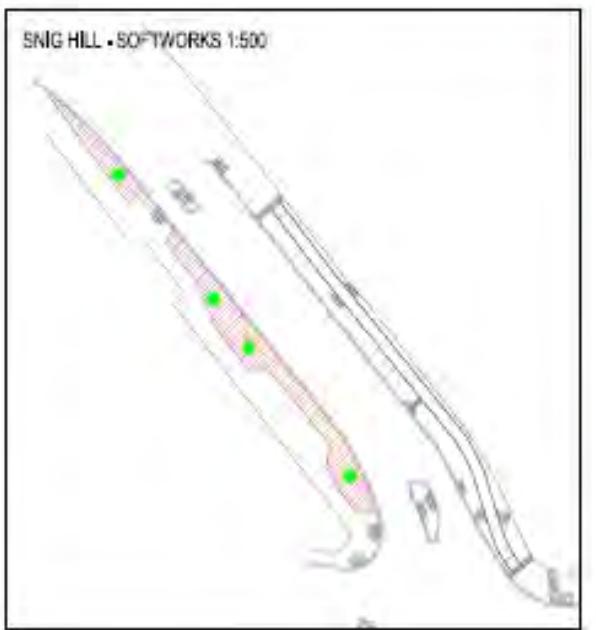
Impacted by the pandemic



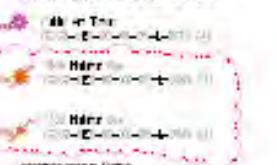


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SOFTWORKS PLANTING SCHEDULE



• PUBLIC AND PRIVATE LIBRARIES LOCATED



新编初中现代文阅读

- Update existing regular, annual, periodic and special publications and reports.
 - Develop plans, policies and procedures for the collection, processing, analysis and reporting of information.
 - Implement and evaluate the system.

第四節 計算機應用範例

- Both pathogenic and non-pathogenic bacteria can cause disease

www.sagepub.com/journals

the end of my afternoon with
you, I will never forget the pleasure
of your company.

Unacademy

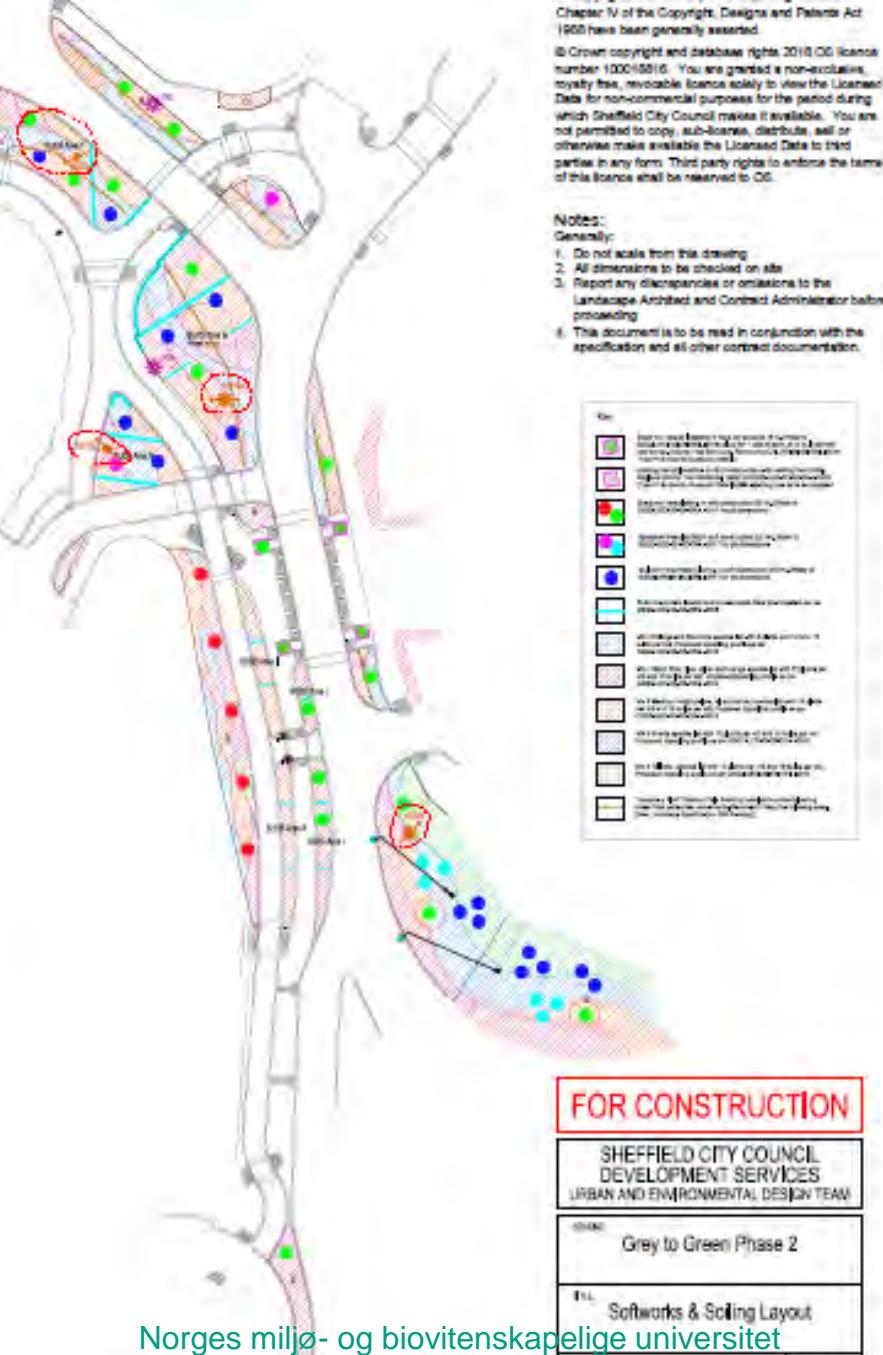
Type: semi-extensive grafting medium
Mo: 17% calcium aggregate (20mm x 10mm); 20%
expanded green media; 17% 300g LEACH SOILS
Refer to Specification 129, 130a & 132 for alternative
mediums.

TREE SOILS

Tree soils in forest and salt areas. Refer to Specification

* [>>>](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?db=pubmed&term=(cannabis+OR+cannabinoids)+AND+(cancer+OR+carcinogenesis))

Method	RMSE	RMSE	Model Validity
Linear	0.5	Non-linear	Mid
Logistic	0.8	Non-linear	Mid
Gamma	0.5	Non-linear	High
Normal	0.4	Non-linear	Mid
Exponential	0.6	Non-linear	Mid



rges miljø- og biovitensk

FOR CONSTRUCTION

SHEFFIELD CITY COUNCIL
DEVELOPMENT SERVICES
URBAN AND ENVIRONMENTAL DESIGN TEAM

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Software & Scilin Layout

1:500			MAPS
Topo.	Sheet No.	Description	Page

Trees



SPECIMEN TREE PLANTING

- *Liquidambar styraciflua 'Worplesdon'* Extra wide spacing; 5x tr. wire rootballled, height 500–700cm, spread 200–300cm 30–35cm girth 25nr. required
- *Quercus palustris* Specimen tree; extra wide spacing; 4x tr. wire rootballled, height 500–700cm, spread 200–300cm 30–35cm girth 5nr. required
- *Nyssa sylvatica* Specimen tree; extra wide spacing; 4x tr. wire rootballled, height 500–700cm, spread 200–300cm 30–35cm girth 3nr. required
- *Sorbus aucuparia* Extra Hеду Standard tree; extra wide spacing; 3x tr. wire rootballled, 15–18cm girth 9nr. required

MULTI STEMMED TREE PLANTING

- *Betula pendula* Specimen, multi stemmed extra wide spacing; 4 x tr. rootballled, spread 350–400cm 15nr. required

Additional Gap planting
Armenia maritima 750nr (9cm Pot)

PLANTING CHARACTER
Unless stated as group all planting and bulb mixes are to be randomly planted throughout there given areas

- North American species proving successful in Sheffield
 - Able to cope with flooding and drying out
 - Provide good autumn colour

Bigger trees





Trees defining boundaries-more hazards



Shrubs- busker

Phase 1

6 evergreen shrubs in 3l pots

Phase 2

10 shrubs including 7 deciduous in 5l
pots

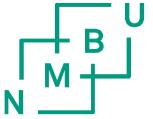
Group	Density	Shrubs to be positioned on site by Landscape Architect during planting time.	Structure	QTY	Size
	low	Shrubs (Specimen Locations)			
	low	Amelanchier lamarkii	structure	50	5L
	low	Aronia arbutifolia 'Brilliant'	structure	50	5L
		Euonymus alatus ' Compactus'	structure	50	3L
		Viburnum opulus	structure	15	5L
	med	Hydrangea paniculata 'Limelight'	structure	30	5L
	high	Hydrangea petiolaris	structure	20	5L
	low	Phlomis russeliana	structure	75	3L
	med	Pinus mugo 'gnom'	structure	30	5L
		Viburnum bodnantense Dawn	structure	50	5L
		Acer tataricum ginnala	structure	20	35-45L *
Group	Density	* multistem, height 1500-200, 3x transplant, container grown, min 3nr branches			
	5-7G	high			

Aronia × prunifolia 'Brilliant' and *Amelanchier lamarckii*



Larger plants- quicker impact





Mixed Perennial Plantings

Phase 1- Mixed Planting

2 Mixes

- Dry
- Swale
- Density- 15/m²

Phase 2 Mixed Planting

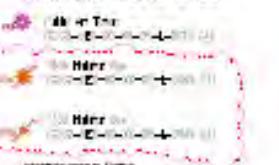
5 Mixes

- Short (pink, blue, silver, orange)
- Medium (yellow, blue and red)
- Foliage
- Tall
- Shade
- **Density is 12 plants/m² but Mix 3 foliage is 6/m².**

SOFTWORKS PLANTING SCHEDULE



• PUEBLO ARROYOS & RÍO SALTILLO LOCAL ENS



www.wiley.com/go/

- Update existing legislation, expand
existing sustainable development
and environmental protection
measures.
 - Encourage private sector
participation in environmental
protection.
 - Promote environmental
education and awareness.

第二章 财务管理

- Both paths provide much better security at point-to-point level

REFERENCES

SEARCHED **INDEXED**

TOPICAL GROWING MEDIUM

Impacted sandstone reworking medium to all
plating areas allows for an average depth of 50 cm to be
achieved.

Type: sandstone reworking medium
Mix: 75% additional aggregate (20mm to sand), 25%
compacted green sand, 1750-1800 kg/m³
Water to Impactmix® (C20-30) 6-10% for penetrative
action required.

TREE SOILS

For more on how and why genes affect us, refer to *How Your Genes Define You*, 2009.

Species	QPF	Max
Arctoionyx	30	51
Chionodrepanis	50	52
Crithagrinae	42	44
Drepanis	18	19
Eremomela	50	56
Geothlypis	30	32
Himatione	77	78
Loxops	43	44
Myiochanes	30	31
Myiochanes	43	49-49*

Method	EP	EIS	Normal Velocity
Imperial	50	None yet	None
Conway	48	None yet	None
Conway	55	None yet	None
Conway	50	None yet	None
Conway	50	None yet	None

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Notes:
Generally:

1. Do not scale from this drawing
2. All dimensions to be checked on site
3. Report any discrepancies or omissions to the Landscape Architect and Contract Administrator before proceeding
4. This document is to be read in conjunction with the specification and all other contract documentation.

Legend:

- Pink: Landscaped area - proposed planting
- Purple: Landscaped area - existing planting
- Red: Existing trees and shrubs
- Blue: Existing trees and shrubs
- Green: Existing trees and shrubs
- Blue square: Existing trees and shrubs for protection
- Light blue: Existing trees and shrubs for protection
- Light grey: Existing trees and shrubs for protection
- Medium grey: Existing trees and shrubs for protection
- Dark grey: Existing trees and shrubs for protection
- White: Existing trees and shrubs for protection
- Light green: Existing trees and shrubs for protection
- Medium green: Existing trees and shrubs for protection
- Dark green: Existing trees and shrubs for protection

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SHEFFIELD CITY COUNCIL
DEVELOPMENT SERVICES
URBAN AND ENVIRONMENTAL DESIGN TEAM

Phase 2
Grey to Green Phase 2

Softworks & Scalling Layout

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Softworks & Scaling Layout

1:500

Mix 1 – Short pink, blue, silver and orange

Mix 1 - Short - Pink, Blue, Silver and Orange

SPECIES

Perennials

	Structure	QTY	Size	Group	Density
Achillea Paprika	canopy	450	9cm pot	3-5G	Mid
Achillea terracotta	canopy	450	9cm pot	3-5G	Mid
Aster amellus 'King George'	canopy	450	9cm pot		Mid
Agastache rugosa Albiloba	canopy	450	9cm pot		Mid
Artemisia stelleriana 'Boughton silver'	canopy	220	9cm pot		low
Berkleya officinalis	canopy	445	9cm pot		Mid
Dianthus cruentus	semi emergent	683	9cm pot	3-5G	high
Dictamnus alba purpureus	canopy	445	9cm pot		Mid
Echinacea pallida	canopy	445	9cm pot		Mid
Echinops ritro 'Veitch's Blue'	semi emergent	240	2L Pot		low
Erigeron darkest of all	canopy	660	9cm pot		High
Eryngium yuccafolium	semi emergent	445	9cm pot		Mid
Euphorbia Fire glow	canopy	445	9cm pot		Mid
Gaura lindheimeri 'snowstorm'	canopy	445	9cm pot		Mid
Gypsophila paniculata 'Rosenschleier'	canopy	445	9cm pot		Mid
Hyssopus officinalis subsp. aristatus	canopy	225	9cm pot		low
Iris x robusta Gerald Derby	semi emergent	420	9cm pot	3-5G	Mid
Juncus 'Carmens Grey'	Canopy	210	9cm pot		Low
Kniphofia 'Jenny Bloom'	emergent	420	2L Pot	3G	Mid
Kniphofia Tawny King	emergent	420	2L Pot	3G	Mid
Liatris spicata	canopy	665	9cm pot	3-5G	high
Origanum roseum	canopy	440	9cm pot		Mid
Perovskia 'Lacy blue'	semi emergent	425	2L Pot		Mid
Phlomis tuberosa Amazonae	semi emergent	425	9cm pot		Mid
Primula veris	canopy	665	9cm pot		high
Salvia caradonna	canopy	425	9cm pot		Mid
Sanguisorba blackthorn	emergent	425	9cm pot		Mid
Saponaria 'Max Frei'	canopy	425	9cm pot		Mid
Sedum Matrona	canopy	425	9cm pot		Mid
Sisyrinchium striatum	canopy	225	9cm pot	3-5G	low
Veronicastrum virginicum Roseum	semi emergent	225	9cm pot		Mid

Grasses

	Structure	QTY	Size	Group	Density
Sesleria nitida	canopy	430	9cm pot	3-5G	Mid
Sesleria autumnalis	canopy	650	9cm pot	3-5G	high
Stipa gigantea	emergent	225	9cm pot		low
Cortaderia selloana Pumila	emergent	40	2L Pot		V low
Miscanthus 'Undine'	emergent	225	9cm pot		low

Bulbs/corms

	Structure	QTY	Size	Group	Density
Allium Pink Jewel	canopy	2200	Bulb/corm	10-15G	high
Crocosmia x crocosmiiflora 'Venus'	canopy	2850	Bulb/corm	10-15G	mid
Eremurus Cleopatra	emergent	1600	Bulb/corm	3-5G	low
Gladiola byzantinus	canopy	1900	Bulb/corm	10-15G	mid
Lilium Orange Marmalade	semi emergent	1150	Bulb/corm	10-15G	v low
Schizostylis coccinea 'Fenland Daybreak'	canopy	1900	Bulb/corm	10-15G	mid
Tulbaghia violacea	canopy	1850	Bulb/corm	10-15G	mid

The plan outlines the role of each plant

There are perennials, grasses and bulbs within the one mix



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Mix 2- Medium Yellow, blue, and red

Mix 2 - Medium Height - Yellow, Blue and Red

Species

Perennials

Achillea filipendulina 'Coronation Gold'	semi emergent	200	9cm pot
Agastache 'Blue Fortune'	canopy	454	9cm pot
Aster amellus 'Violet Queen'	canopy	454	9cm pot
Aster novae-belgii 'Purple Dome'	canopy	454	9cm pot
Aster turbinellus	canopy	454	9cm pot
Astilbe 'Purple Lance'	canopy	454	9cm pot
Calamintha 'Blue cloud'	canopy	700	9cm pot
Coreopsis verticillata Zagreb	canopy	700	9cm pot
Echinacea paradoxa	semi emergent	454	9cm pot
Echinops ritro 'Veitch's Blue'	semi emergent	200	2L pot
Euphorbia palustris	canopy	454	9cm pot
Ferula communis	emergent	50	2L pot
Helenium 'Wyndley'	semi emergent	454	9cm pot
Hemerocallis lilioasphodelus	canopy	454	9cm pot
Iris sibirica Tropic Night	semi emergent	454	9cm pot
Juncus patens 'Carmens Grey'	canopy	200	9cm pot
Kalimeris incisa 'Charlotte'	canopy	454	9cm pot
Kniphofia Percy's Pride	emergent	454	2L pot
Kniphofia uvaria	semi emergent	50	Supplied by others
Lychnis chalcedonica	semi emergent	454	9cm pot
Lychnis coronaria	canopy	454	9cm pot
Lythrum 'zigeunerblut'	canopy	454	9cm pot
Perovskia 'Blue Spire'	semi emergent	454	2L pot
Primula elatior	Canopy	454	9cm pot
Primula veris	canopy	700	9cm pot
Rudbeckia fulgida deammi	canopy	700	9cm pot
Rudbeckia subtomentosa	semi emergent	454	9cm pot
Solidago rugosa 'Fireworks'	semi emergent	200	9cm pot
Verbena bonariensis	emergent	700	9cm pot
Veronicastrum virginatum 'Fascination'	Emergent	454	9cm pot

Grasses

Sesleria autumnalis	canopy	706	9cm pot
Calamagrostis acutiflora 'Karl Foerster'	emergent	200	9cm pot
Miscanthus sinensis Silberfelder	emergent	200	9cm pot
Panicum virgatum 'Heavy metal'	canopy	454	9cm pot

Bulbs/Corms

Allium 'Molly'	Canopy	2750	Bulb/corm
Camassia leichtlinii Caerulea	Semi emergent	3500	Bulb/corm
Crocosmia george davison	Canopy	750	Bulb/corm
Eremurus stenophyllus	emergent	1500	Bulb/corm
Lilium martagon Orange Marmalade	semi emergent	1000	Bulb/corm

The plan outlines the role of each plant

There are perennials, grasses and bulbs within the one mix



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Mix 3- Foliage and Structure Planting

- In Phase 1 *Calamagrostis x acutiflora* 'Karl Foerster' was planted based on 500mm centers
- Now grasses are in nearly ever mix and more dominant in some

Mix 3 - Foliage and Structure (only 6 plants per m²)

Species

Grasses

	Structure	QTY	Size
Carex secta	canopy	490	9cm pot
Calamagrostis 'Karl Foerster'	emergent	490	9cm pot
Calamagrostis brachytricha	semi emergent	2000	9cm pot

Perennials

	Structure	QTY	Size
Anemone japonica 'White'	semi emergent	690	9cm pot
Echinacea 'White Swan'	semi emergent	690	9cm pot
Libertia formosa	canopy	690	9cm pot
Verbena bonariensis	Emergent	690	9cm pot

Bulbs /Corms

	Structure	QTY	Size
Allium Mount Everest	semi emergent	2000	Bulb/corn
Allium sphaerocephalus	semi emergent	4300	Bulb/corn
Eremurus White Beauty	Emergent	600	Bulb/corn
Leucojum Aestivum	Canopy	2000	Bulb/corn

A wide-angle photograph of a modern urban street. On the left, there's a mix of old brick buildings and a large, modern concrete structure with glass walls. A paved walkway leads towards the center. In the foreground, there's a green, grassy area with several red wooden benches. The right side features a paved sidewalk lined with young trees and a green fence. The sky is overcast.

Mix 3- mai 2021



September 2021

Desember 2021





Mix 4- Tall Mix

Mix 4. Tall Mix		Structure	QTY	Size
Perennials & Grasses				
Aster turbinellus		understorey	300	9cm pot
Aster tataricus 'Jindai'		canopy	200	9cm pot
Astilbe 'Purple Lance'		understorey	200	9cm pot
Campanula 'loddon anna'		canopy	200	9cm pot
Coreopsis tripteris		canopy	200	9cm pot
Echinops bannaticus 'Taplow Blue'		canopy	200	9cm pot
Eupatorium 'Ivory Towers'		canopy	200	9cm pot
Eupatorium 'Purple Bush'		canopy	200	9cm pot
Euphorbia palustris		understorey	190	9cm pot
Vernonia fasciculata		understorey	190	9cm pot
Helianthus lemon queen		Canopy	200	9cm pot
Juncus patens 'Carmens Grey'		understorey	200	9cm pot
Miscanthus giganteus		emergent	190	9cm pot
Miscanthus 'Silberfeder'		emergent	190	9cm pot
Persicaria amplexicaulis 'Firetail'		understorey	200	9cm pot
Thalictrum elin		Canopy	200	9cm pot
Echinacea purpurea Magnus		understorey	200	9cm pot
Geranium psilostemon		understorey	200	9cm pot
Bulbs/corms			QTY	Size
Narcissus poeticus recurvus			3060	Bulb/corm

- The plan outlines the role of each plant
 - There are perennials only and one species of bulb within the one mix

Mix 4





November 2021



Mix 5- Shade

Mix 5 - Shade

Anemone japonica 'Honoree Jobert'
Aster divaricatus
Astrantia claret
Brunnera macrophylla
Deschampsia cespitosa
Dryopteris filix femina
Euphorbia polychroma
Francoa sonchifolia 'Pink Giant'
Geranium Phaeum alba
Geranium sylvaticum Mayflower
Heuchera maxima
Libertia Formosa
Luzula nivea
Pulmonaria saccharata 'Cotton Cool'

Bulb/corm

Polygonatum multiflorum
Muscari Blue magic

structure	QTY	Size	Group	Density
canopy	55	9cm pot		Mid
canopy	55	9cm pot		Mid
canopy	55	9cm pot	5-7G	Mid
canopy	55	9cm pot		Mid
canopy	55	9cm pot		Mid
canopy	55	9cm pot	5-7G	Mid
canopy	55	9cm pot		Mid
canopy	55	9cm pot		Mid
canopy	55	9cm pot		Mid
canopy	55	9cm pot	5-7G	Mid
canopy	55	9cm pot		Mid
canopy	55	9cm pot		Mid
canopy	55	9cm pot		Mid
canopy	55	9cm pot		Mid
canopy	55	9cm pot		Mid
canopy	55	9cm pot		Mid
canopy	55	9cm pot		Mid

Structure	QTY	Size	Group	Density
canopy	75	Bulb/corm	5-7G	Mid
understorey	435	Bulb/corm	20-30G	Mid

- In Phase 1 none of the planting was in 'deep shade'
- In Phase 2 there is a huge wall bordering part of the site

Mix 5- shade planting



Volunteers november 2020 bulb planting



Art- same 4.2m totem-like structures



In phase two the artworks are made from wood and are designed to create habitats for the wildlife that is returning to the area



Art now has an ecological focus



Signage introduced to Phase 1 and 2



Market



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Multi-functional space



Ecological versus horticultural maintenance



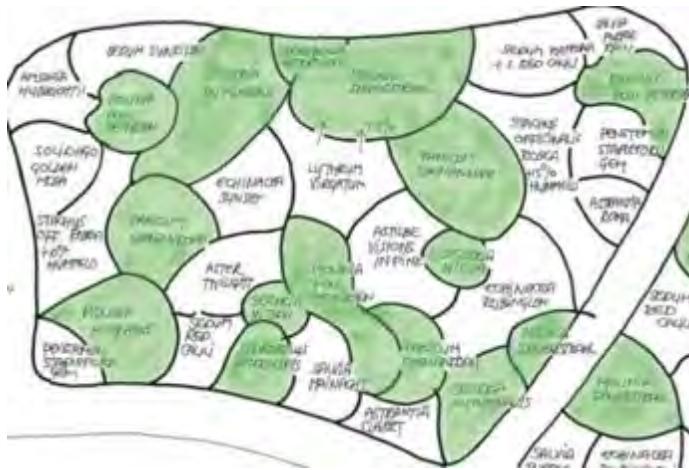
Mixed plantings- Ecological maintenance



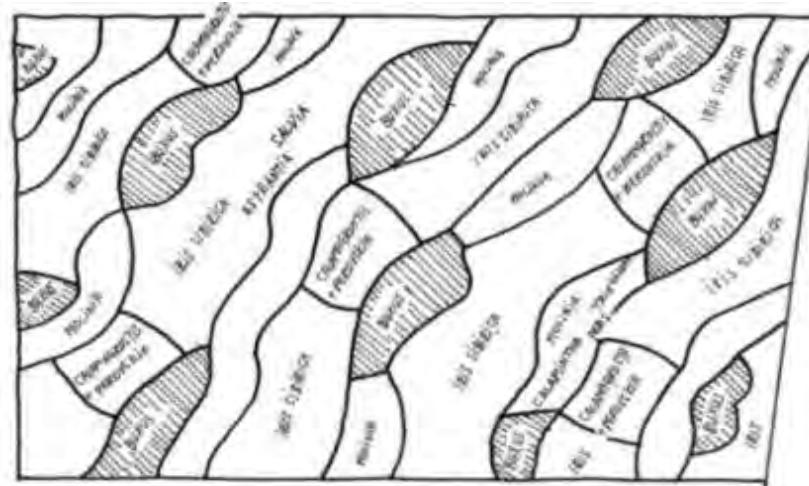
- The Ecological approach is more concerned with the bigger picture, and connections; what are the consequences for A when making changes to B?
- The landscape is dynamic therefore there are no clear rules
- The landscape is not a product therefore maintenance is a process



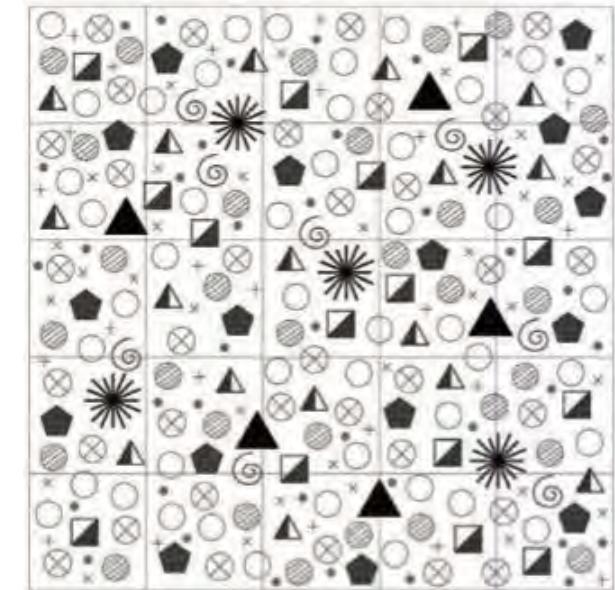
Different ways of arranging perennials



Block Planting



Drift Planting



Mixed planting

Grey to Green Phase 1

- It is now 6 years old
- The fyllstauder are gone i.e. *Verbena bonariensis*
- What has taken that 10% gap?
- There have been winners and losers-
Eupatorium cannabinum has taken over
and has been removed in places
- It does not matter that there are less
species as the plants fill the gaps
- This is not standard maintenance



The valuable role of Green Estate

- Green Estate is a not for profit social enterprise based in Sheffield working for people, place and a fairer way of doing business-
<https://greenestate.org.uk/>
- The plantings require specialist maintenance in the establishment phase which they have.
- Contracted for 3 years for Grey to Green Phase 1 but then continued as Amey could not manage it





Key maintenance tasks associated with perennial plantings

- Cutting/removal of plants by various means
- Addition of nutrients/water
- Restricting the capacity for weed seedling establishment
- Elimination of unwanted plants
- Control of pests and diseases
- Removal of debris

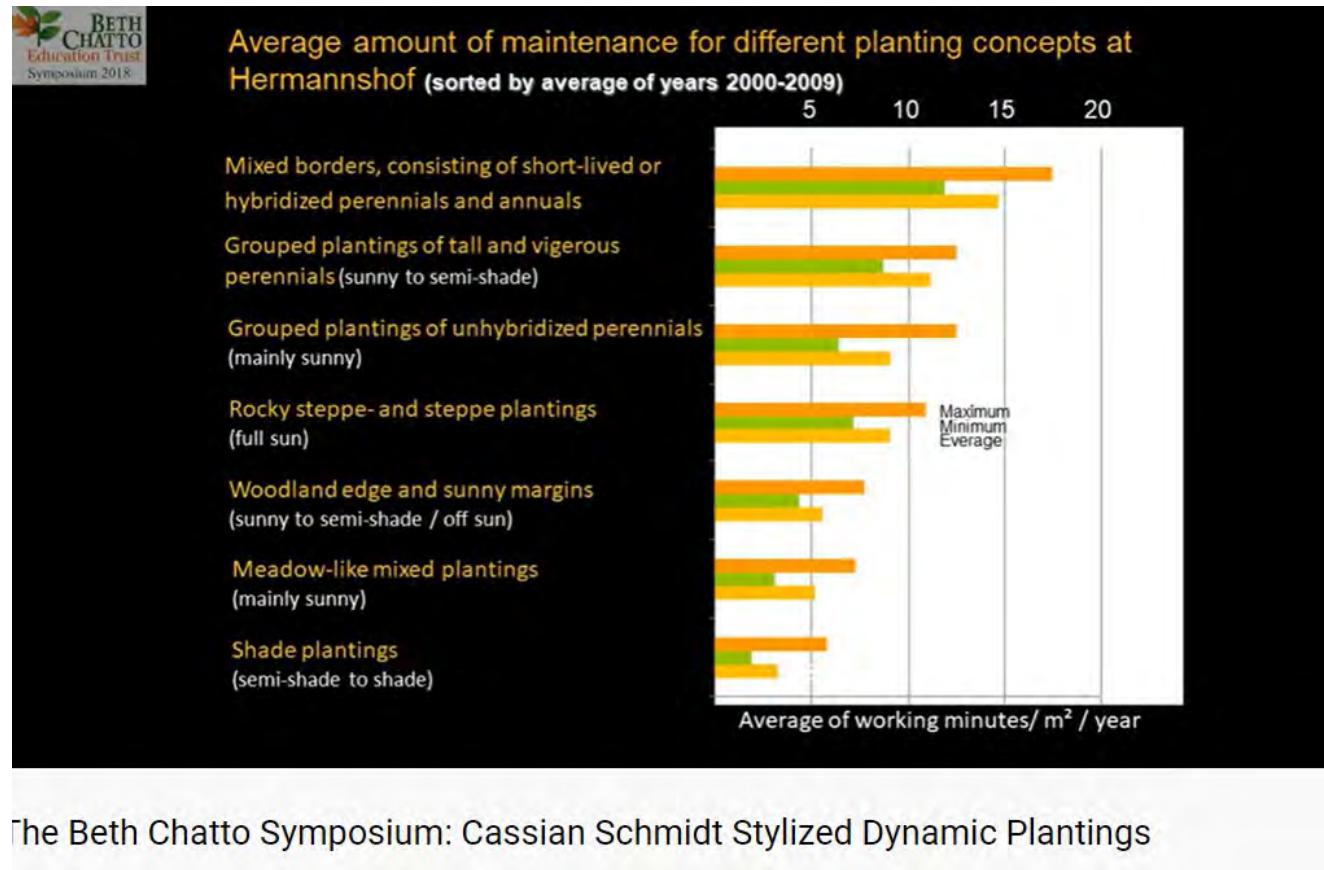
Staking- perennials that need support should not be used in public landscapes. This is an un-necessary expense



The cost of maintenance

Information on overall costs i.e. labour and maintenance of perennial plantings is not readily available.

The High Line in New York contacted Cassian Schmidt for this information



Watch this lecture

<https://www.youtube.com/watch?v=4HyeXING4AY>



Establishment/Maintenance- Addition of Water/Nutrients

- Increase in growth rate and standing biomass, plants may be judged to look “better”
- More biomass to remove in future?
- Decrease root: shoot ratio; plants deal less well with severe moisture stress
- Resource consumption is increased
- Increase in competition between species leading to dominance of the most vigorous species at the expense of the least dominant
- Weed invasion normally increases

Grey to Green was watered during establishment but not since then

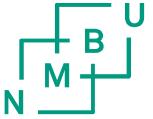
Keeping the mulch weed free



Establishment/Maintenance- Control of Pest and Disease

- Plant selection - avoid plants that need pest and disease control
- Plant habitat- recreate the conditions they thrive in typically in the wild
- Accept what happens and do nothing
- Remove plants
- Apply pesticides on sighting symptoms- this is not an option anymore
- There have been no issues with pest and disease in the Grey to Green





Why use perennials in mixed plantings?

Design

- It has impact!
- It looks more naturalistic
- You can create dynamic combinations
- Seasonal interest
- All the plants should be suited to the site conditions so should look healthy

Maintenance

- It requires long term vision as it is inspired by ‘the wild’ and is ever-changing
- Weeds are not as obvious as the ground layer is covered
- If a plant dies due to pest or disease it does not need to be replaced
- Watering should be more cost-effective as plants will have similar requirements

Sommerrogata og Sommerroparken, Oslo



T%	t%	ARTSNAVN LATIN	ARTSNAVN NORSK	VEKSTJORD CM	STØRRELSE (INNKØP) AREA M2	ANTALL PR. M2	ANTALL TOTAL	KOMMENTARER ØKOLOG
KS. TRÆR								
-EKS		Acer platanoides	Spisslønn	-	-	-	8	Norsk art
-EKS		Aesculus hippocastanum	Hestekastanje	-	-	-	1	Fremmed art - potensielt høy risiko.
-EKS		Tilia cordata	Småbladlind	-	-	-	1	Norsk art
RÆR								
1		Acer platanoides	Spisslønn	100-120	SO 18-20 cm **	-	34	Norsk art
2		Tilia cordata	Småbladlind	100-120	SO 18-20 cm **	-	4	Norsk art
					* Opstammet træ, uten gjennemgående stamme. Kronen må ha min. 5 kraftige greiner			
					* Rotklumpens diameter må være min. 4 x stammens omkrets			
USKER								
1		Pinus sylvestris 'Watereri'	Dverg skogfuru	70-80	30-40 cm ***	-	7	Norsk art
2		Hippophae rhamnoides	Tindved	70-80	30-40 cm ***	-	5	Norsk art
3		Salix lanata L.	Ullpil / ullvier	70-80	25-30 cm ***	-	13	Norsk art
4		Prunus spinosa	Slåpetorn	70-80	30-40 cm ***	-	8	Norsk art
					* Bredtvoksende bærplante; dyrket og leveret som klumplante. Omplantet min. hvert tredje år.			
					* Uten gjennemgående stamme. Greinene må være jevnt fordelt i ulike retninger, og være friske/uten svikskade.			
					* Rotsystemet må være kraftig/godt forgreinet, og utviklet i forhold til antall omplantninger.			
RESS					30			
1		Calamagrostis × acutiflora 'Karl Foerster'	Fagerrørkevin 'Karl Foerster'	40	9 cm potte	18	4	72
2		Molinia caerulea 'Moorhexe'	Blåtopp 'Moorhexe'	40	9 cm potte	12	6	72
					Fremmed art - ukjent kultivar			
					Norsk art			
TAUDER					40			
1		Agastache 'Black Adder'	Hageanisisop 'Black Adder'	40	9 cm potte	10	9	90
2		Eupatorium maculatum 'Purple Bush'	Storhjortetrest 'Purple Blush'	40	9 cm potte	10	9	90
3		Nepeta faassenii 'Walkers Low'	Prydkattemynte 'Walkers Low'	40	9 cm potte	10	9	90
4		Persicaria amplexicaule 'Firedance'	Blodslirekne 'Firedance'	40	9 cm potte	10	9	90
					Ukjent/ikke vurdert			
					Fremmed art - ingen kjent risiko.			
					Fremmed art - ikke risikovurdert.			
					Ukjent/ikke vurdert			
TAUDEMIX 1					92			
M1_01	17	Brunnera macrophylla	Forglemmegeisøster	40	9 cm potte	15,3	9	137
M1_02	17	Knautia mecedonica	Makedonia rødknapp	40	9 cm potte	15,3	9	137
M1_03	17	Panicum virgatum 'Rehbraun'	Staudehirse 'Rehbraun'	40	9 cm potte	15,3	9	137
					Norges miljø- og biovitenskapelige universitet			

Planted in July- watered once since



Takk!

