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# **ROSEBURN PARK BIODIVERSITY AND NATURAL CAPITAL**



**Prepared for Friends of Roseburn Park  
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# INTRODUCTION

Roseburn Park plays an important role in the lives of many different communities including

- Sports enthusiasts, members of the Murrayfield Dafs Cricket Club and the Murrayfield Wanderers Rugby Club, and university students who play pick-up football on the weekends
- Formal and informal exercise groups, boot camps, and the individuals like the man who does his own boxing routine every morning and the young woman who brings her yoga mat to run through her poses.
- Dog-walkers, summer picnickers and the many residents of the three Roseburn seniors homes who take a turn through the park every day.
- The pupils of Roseburn Primary School who have sports days in the park, help to plant daffodils and leave their messages of hope on the old cherry trees and their parents who stop for a chat after dropping their children off.

Since 2016, the park has been part of the City of Edinburgh's flood management network and the park's paved path is key to the new cycle plan. During pandemic lockdowns, the park became important as a place to meet people outside and as a space to connect to nature.

The park is part of other networks and systems as well, ones that society is only just beginning to recognise and understand. The aims of this report are to assess the contributions Roseburn Park makes to biodiversity and natural capital and to propose potential changes to the park landscape that would increase these contributions while enhancing its value as an amenity to all the people who use it.





# THE PARK IN SYSTEMS

The area that is now the park has always been part of the water systems of the region. The natural soil is alluvial deposit from being flooded over and over again by the Water of Leith. The soil was enriched during the 18th and 19th century as an 'irrigated meadow' upon which sewage was spread.

From 2016-2018 major works were carried out in the park so that it can be quickly converted into an emergency reservoir when the Water of Leith floods again, bringing it into the City's water management network.

It is part of a wildlife corridor that runs along the river. This allows species, including foxes, otters, swans, herons, ducks, moor hens and more, to travel across the city for food, habitat and mates, enabling individuals and gene pools to stay healthy and resilient in the face of changes and challenges.

But the park is also part of wider systems. The trees, soil and plant life play their part in the cycling of many elements, including carbon and nitrogen. The park contributes to removing air pollution from nearby roads while also operating as a carbon sink. Maintaining and improving the contribution that local greenspaces make to biodiversity and green networks is core to the Edinburgh Biodiversity Action Plan 2019-2021.

This report outlines the extent to which Roseburn Park currently contributes to biodiversity, and to ecological services including water and carbon management and makes some suggestions as to how these aspects of the park can be enhanced into the future.





# GREEN INFRASTRUCTURE

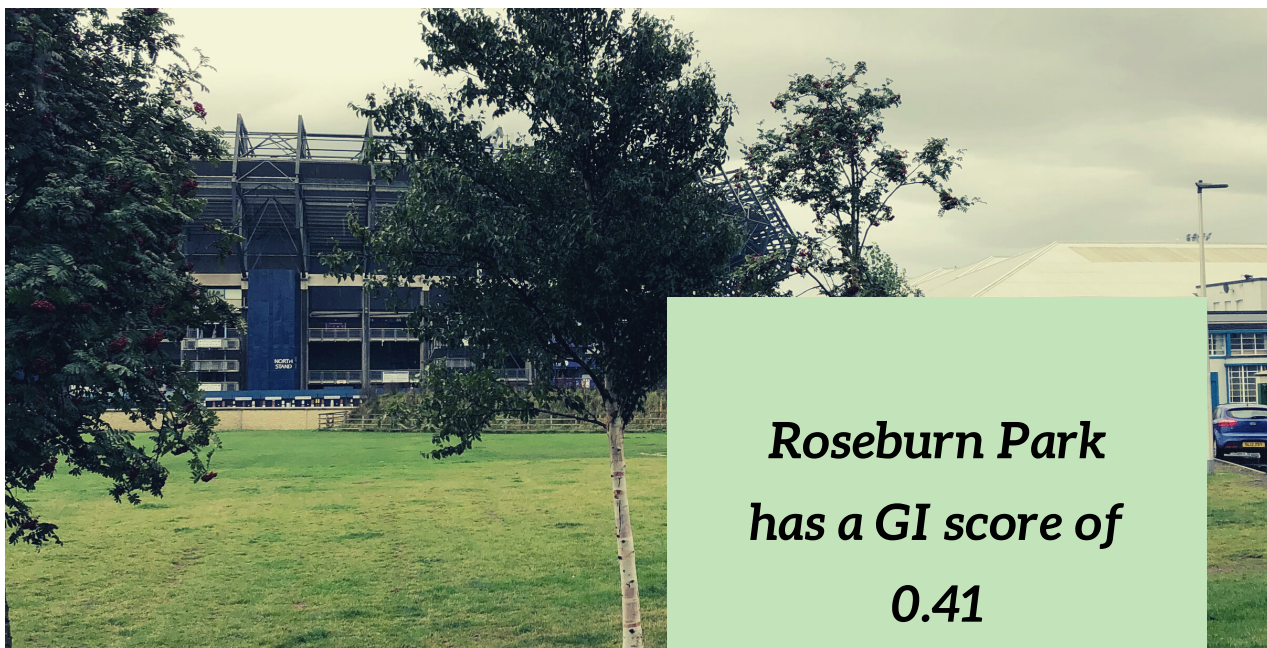
While the park has been formally incorporated into the City of Edinburgh's strategy to adapt to the impacts of climate change, in the form of providing flood control, it has not been recognised for the part it plays in mitigating climate change through carbon sequestration and storage. It has also received little attention for the role it could play in biodiversity regeneration.

The Scottish Wildlife Trust has drafted a scale that enables planners to quantify the biodiversity of what it calls the 'green infrastructure' of an area and its accompanying contribution to natural services. This tool has been piloted in a few Edinburgh parks (e.g. Meadows, Harrison Gardens). This report pilots the tool in Roseburn Park.

'Natural capital is a term for the habitats and ecosystems that provide social, environmental and economic benefits to humans. Scotland has a wide range of these habitats and ecosystems - each of which makes a unique contribution to the wellbeing of those who live and work in Scotland.'

(NatureScot website)





***Roseburn Park  
has a GI score of  
0.41***

The Natural Capital Standard rates different types of landscape according to the following groups of functions, with many elements providing a range of services (from Table 2 of Appendix of the Natural Capital Document):

- Food for People
- Biodiversity
- Local Climate Regulation
- Flood Regulation
- Water Quality
- Erosion and Sediment Control
- Pollination
- Air Quality Regulation
- Noise Regulations
- Carbon Storage

Each type of landscape is given a weighting on the range of services it provides and the amount of that service provided. A score for the landscape being assessed is derived from multiplying the area under each type of landscape management by the weighting given, adding up all the sections and then dividing by the total area.

A survey was conducted on the park to establish the different types of landscape use present. These areas were measured using QGIS software and an Openstreetmaps basemap. The table on the following page outlines how much of Roseburn Park is under each type of landscape management.

The greenspace infrastructure natural capital index score for Roseburn Park is 0.41 reflecting the predominance of amenity grasslands (0.4). The extra 0.01 shows that in addition to amenity grasslands, there are enough landscape features with higher natural capital to offset the paved areas (including the buildings) and the permeable paved areas.

The biggest current contributors to natural capital in Roseburn Park are the 'retained' native and non-native trees (weighted at 0.8). For this reason, additional research was done into the contribution of these trees.



# LANDUSE TYPES



**7% RETAINED TREES 0.8**  
4140m<sup>2</sup>



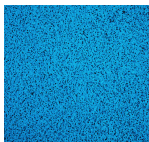
**2% NATURALISED GRASSLAND 0.6**  
1400m<sup>2</sup>



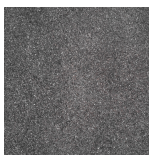
**83% AMENITY GRASSLAND 0.4**  
48,140m<sup>2</sup>



**1% PLANTED NATIVE TREES 0.4**  
685m<sup>2</sup>



**1% PERMEABLE PAVING 0.2**  
670m<sup>2</sup>



**5% SEALED AREAS (BLDGS) 0.0**  
2646m<sup>2</sup>



# TREES

Roseburn Park has 65 mature trees. During the floodworks construction, 30 additional mature trees were taken down. While the category of 'retained trees' is included in the GI tool calculation, some additional research was done into the specific contributions of these trees using Treezilla.org. Treezilla is a crowd-sourced platform that maps and monitors urban trees across the UK. It was developed by The Open University and Forest Research.

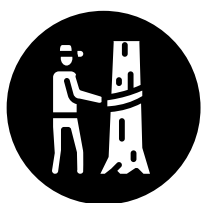


Age and size of tree have the biggest impacts on a tree's ability to carry out these services. Retaining mature trees is therefore the most important strategy in tree management.



## **Ecological Services of remaining mature trees**

- 15,000 litres Avoided Runoff
- 31.5 tons Carbon Dioxide Stored
- 1.2 tons Carbon Dioxide Removed Annually
- 173,000 litres Water Intercepted
- 3.7 kg Air Pollutants Removed Annually



## **Ecological Services lost from tree felling for floodworks**

- 9000 litres Avoided Runoff
- 0.43 tons Carbon Dioxide Removed Annually
- 73,000 litres Water Intercepted
- 1.6 kg Air Pollutants Removed Annually



# SOILS

Researchers are only just coming to realise how important soils are to ecosystem health and to climate mitigation and adaptation. Studies of urban park soils in Finland have shown that soils contribute significantly to sequestering carbon and nitrogen, with mature soils (100 years undisturbed) under evergreen trees holding the most carbon (35.5 kg carbon per m<sup>2</sup>) and disturbed soils (within 10 years) under grass holding the least.

Soils are also important to water management. Healthy, organic-matter rich soils absorb rain that could otherwise contribute to flooding, retain water and make it available to plants and the rest of the soil ecosystem. Managing both floods and droughts will be key to ecosystem health as climate change continues to develop.

Looking at the history of Roseburn Park, much of it has been undisturbed for 100 years. The alluvial deposits from the river, intentional spreading of sewage and manure from cows and sheep will have given the soil a good foundation of organic matter. In addition, amenity grasslands on the east side are treated by leaving grass clippings in situ, adding more organic matter.



100 year old amenity grassland soil can store 22kg of carbon per m<sup>2</sup>  
Estimated that this type of soil in Roseburn Park holds 560 tons of carbon.



10 year old amenity grassland soil can store 14.9kg of carbon per m<sup>2</sup>  
Estimated that this type of soil in Roseburn Park holds 388 tons of carbon. Disturbances to park soil in the last 10 years estimated to have removed 161 tons of carbon from storage.



# IMPROVING NATURAL CAPITAL

Roseburn Park is used by two sports organisations, as well as by Roseburn Primary School and by the general public for exercise and sports activities. The dominance of sports has resulted in amenity grasslands being the dominant landscape type.

The Scottish Wildlife Trust recognises the importance of amenity grasslands as green infrastructure. Maintaining this character of Roseburn Park going forward is key. The recommendations of this report focus on valuing the edges of the park, where there is scope for plantings that increase the biodiversity and ecological services the park provides. Nearby Saughton Park provides a useful model of a sports park that maximises the biodiversity and natural capital of its edges.

## **Ecological services provided by Amenity Grasslands**

flood regulation  
soil quality regulation  
carbon storage

## **Ecological services that Amenity Grasslands provides less of**

biodiversity  
local climate regulation  
water quality  
erosion and sediment control  
pollination  
air quality regulation  
noise regulations

## **This report suggests that Friends of Roseburn Park do the following**

- maintain and improve amenity grasslands for biodiversity and ecological services
- undertake plantings around the edges of amenity grasslands that provide complementary ecological services and which have higher GI weightings
- advocate that any future changes made to the park maintain or improve the park's overall GI score



# AMENITY GRASSLAND WITH BULBS GI 0.6

## Current location

Currently, daffodil bulbs are planted in the grass surrounding trees. These current areas have, therefore, been counted in the GI survey under 'retained trees'.

## Explant in space

Plant bulbs further away from the edges into amenity grassland areas.

## Expand in time

Plant a diversity of flowering bulbs to provide food for pollinators over a greater period of time. Autumn bulbs in particular should be planted:

- Autumn crocus,
- Meadow saffron
- Cyclamen
- Sternbergia



# MIXED NATIVE HEDGEROW OR SHRUB AREAS GI 0.8

## Stadium hedgerow

There are already some bushes and small trees on the stadium side of the fence. This could be improved in terms of the biodiversity and ecological services it provides by planting a narrow native hedgerow on the park side as well.

## Embankments

Planting diverse native shrubs would further stabilise the embankments built for flood protection by providing year round root support. The western wildlife escape by the ice arena is particularly in need of stabilising and may need some rebuilding and a change of slope before it is planted.

## Beech hedge

The value of the single-species beech hedge around the play area could be enhanced by interplanting with some native species





# PLANT A GROVE OF 10+ NATIVE TREES GI 0.8

## Linear Tree Planting

Currently, most trees at the park are planted in rows.

While this makes good use of edges, and individual trees are important, newly planted trees in this formation only rate a weighting of 0.4, the same as for amenity grassland.

## Making use of corners

There are areas in the park where planting a diverse range of native trees could be done in a grove formation, making use of trees that are already there. The western entrance corner could support a grove of trees without impinging on sports activities. The old play structure area could be transformed into a grove of trees, as could the area to the southeast of the eastern entrance.



# WILDFLOWER MEADOW GI 0.8

## Value Poor Soil

The floodworks left behind compacted soil, sometimes replaced with building rubble. Wildflowers thrive on poor soils and are good for pollinators and biodiversity in general.

## Establish a meadow

Establishing and maintaining a wildflower meadow is quite labour intensive. However, such floral displays have high amenity value for humans as well as for insect life.

Any areas of disturbed soil with little organic matter could be made into a wildflower meadow.





# COMMUNITY ORCHARD GI 0.8

## Eastern Entrance

The fenced area at the eastern entrance to the park could be planted with orchard trees and soft-fruit bushes. A nearby example of a community orchard can be seen in the photo below taken behind Haymarket station.

## Educational Amenity

Roseburn Primary School, which has a lovely garden on their own property, may wish to be involved in the learning opportunity offered by a community orchard.



# MAINTENANCE

## **Climate Change**

As climate change progresses, Edinburgh can expect more extreme weather events, longer dry spells in the summer and heavier rainfalls throughout the year.

## **Water Management**

Newly planted areas will need to be watered during dry periods. Improving the organic matter in soil helps to keep water in the soil. Mulching, which is already being done, assists with preventing evaporation from the soil and eventually gets incorporated into the soil, improving organic matter. Bio-drilling, planting plants with deep taproots, helps to break-up compacted soil and helps water penetrate.

## **Strimmer damage**

There is noticeable damage from strimmers to mature and newly-planted trees. Damage to the bark and tissues just under the bark reduces tree ability to take up water, to develop and grow and may eventually kill the tree. If the effort and funds are put into planting trees, then equal effort should be put into keeping these trees healthy so they grow into mature trees, thereby moving from a GI weighting of 0.4 to 0.8.



# USEFUL LINKS

Further support for maintaining and improving biodiversity and natural capital can be found on the following websites, includes references for this report:

Edinburgh Biodiversity Action Plan 2019-2021

<https://www.edinburgh.gov.uk/downloads/file/26216/edinburgh-biodiversity-action-plan-2019-2021>

Edinburgh Biodiversity Partnership <https://edinburghbiodiversity.org/>

Edinburgh Living Landscapes <https://edinburghlivinglandscape.org.uk/>

Edinburgh and Lothians Greenspace Trust <http://www.elgt.org.uk/>

Nature Scot <https://www.nature.scot/>

The natural capital definition was taken from this website on 21/12/2021:

<https://www.nature.scot/professional-advice/social-and-economic-benefits-nature/natural-capital>

Open Street Maps:

<https://www.openstreetmap.org/#map=18/55.94383/-3.23838&layers=N>

Setälä, H M, et al. (2016) Vegetation Type and Age Drive Changes in Soil Properties, Nitrogen and Carbon Sequestration in Urban Parks under Cold Climate. *Frontiers in Ecology and Evolution* 4:93. doi: 10.3389/fevo.2016.00093

Treezilla.org: <https://treezilla.org/>

There is a Tree Survey Guide on this page: <https://treezilla.org/resources>

# GI SCORES

From 'The Natural Capital Standard for Green Infrastructure -A tool for assessing the quality of green and blue elements in development 24 April, 2017, Final Draft', Scottish Wildlife Trust.

- Stand of 10+ trees/woodland retained High Biodiversity (HBV) 1
- Retained native hedgerow ( $\geq 3$  native species) 1
- Retained native hedgerow ( $\leq 2$  species) 0.8
- Stand of 10+ trees / woodland retained Low Biodiversity (LBV) 0.8
- Retained species-rich meadow 0.8
- Retained non-native hedgerow 0.8
- Retained native tree 0.8
- Sustainable drainage system HBV 0.8
- Community growing area/allotment 0.8
- Rain garden HBV 0.8
- Retained non-native tree 0.8
- Shrub bed HBV 0.8
- Stand of 10+ trees/woodland planted HBV 0.8
- Green roof HBV 0.8
- Established wildflower meadow 0.8
- Vertical greening HBV 0.6
- Stand of 10+ trees/woodland planted LBV 0.6
- Water feature (e.g. pond) - naturalised, HBV 0.6
- Amenity grassland with bulbs/naturalised grassland 0.6
- Shrub bed LBV 0.4
- Sustainable Drainage System LBV 0.4
- Amenity grassland 0.4
- Green roof LBV 0.4
- Rain garden LBV 0.4
- Planted native tree 0.4
- Planted native hedgerow ( $\geq 3$  native species) 0.4
- Planted native hedgerow ( $\leq 2$  species) 0.3
- Vertical greening LBV+ high maintenance 0.3
- Planted non-native hedgerow 0.3
- Planted non-native tree 0.3
- Naturalised play area 0.3
- Permeable paving/gravel/ with green element 0.2
- Herbaceous flower bed border 0.2
- Permeable paving/gravel/partially porous surface 0.2
- Water feature LBV 0.2
- Sealed areas e.g. tarmac, concrete surfaces 0