PORTSMOUTH GREENING STRATEGY and DELIVERY PLAN

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Introduction

In order for Portsmouth to improve its resident's health and adapt to changes in its climate there is a requirement for a planned and managed green infrastructure programme. This is not something that only Portsmouth is striving to accomplish, the whole world is required to make changes to achieve sustainable cities and communities. This is the focus of UN sustainable development goal 11, two of its key points are: [1]

- *6 – "By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management."*
- *7 - "By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities"*

This Greening Strategy evidence review and action plan addresses the requirement to provide new, inclusive and equitable greenspace alongside improving, maintaining and protecting our existing green space.]The current strategy focuses on increasing tree canopy cover on both public and private land as well as consultation and engagement. If greening is going to achieve maximum impact we need to use a mix of approaches, including planting trees, to improve green infrastructure and experience the benefits that this will provide to the local population.

What is Green Infrastructure (GI)

The National Planning Policy Framework defines GI as 'a network of multi-functional green and blue spaces and other natural features, urban and rural, which is capable of delivering a wide range of environmental, economic, health and wellbeing benefits for nature, climate, local and wider communities and prosperity.'[2] National Planning Practice Guidance (NPPG) acts as supporting guidance to the Framework and further explains that GI is 'a range of spaces and assets that provide multiple benefits, at a range of scales. The benefits can include enhanced health and wellbeing, reduced inequalities, enhanced biodiversity, food and energy production, urban cooling, improved air quality and the management of flood risk. GI can, for example, include parks, playing fields, other areas of open space, woodland, allotments, private gardens, sustainable drainage features, green roofs and walls, street trees and 'blue infrastructure' such as streams, ponds, canals and other water bodies.'[3]

Natural England's new Green Infrastructure Framework was launched in January 2023.[4] The Framework is a commitment in the Government's 25 Year Environment Plan. It supports the greening of towns and cities and connections with the surrounding landscape as part of the Nature Recovery Network. The Green Infrastructure Framework comprises:

- Green Infrastructure Principles: the why, what and how of good green infrastructure.
- Green Infrastructure Standards: guidance on national standards for green infrastructure quantity and quality.
- Green Infrastructure Maps: mapped environmental, socio-economic datasets to support the standards.

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[1] Sustainable Development Goals | United Nations Development Programme (undp.org) (accessed 02/02/2023)
[2] National Planning Policy Framework - GOV.UK (www.gov.uk) (accessed 13/06/2023)
[3] Natural environment - GOV.UK (www.gov.uk) (accessed 02/02/2023)
[4] Natural England. Green Infrastructure Framework - GOV.UK (www.gov.uk) (accessed 13/06/2023)

- Green Infrastructure Planning and Design Guide: practical, evidence-based advice on how to design good quality green infrastructure.
- Green Infrastructure Process Journeys: guides on how to apply all the products in the Green Infrastructure Framework.

Benefits of Green Infrastructure

Health and Wellbeing

The evidence base linking health and greenspace is compelling. Lack of accessible greenspace, poor air quality and urban heat islands are correlated with higher mortality and poor health.[5] A review for the WHO in 2017 showed that interventions to increase or improve urban green space can deliver positive health, social and environmental outcomes for all population groups, particularly among lower socioeconomic status groups. There are very few, if any, other public health interventions that can achieve all of this providing a compelling reason to drive the agenda forwards.

In 2021 an umbrella review study looked at the health evidence for greening using a pooled sample of 40 systematic reviews.[6] This methodology allows a comprehensive comparison of large amounts of evidence. Overall, they found that exposure to green space was beneficially associated with all-cause mortality, total cardiovascular disease morbidity, cardiometabolic factors, mental health, low birth weight, and physical inactivity. They also observed that greenspace exposure was beneficially associated with sleep problems, urban crime rate, and immunological health parameters. The mechanisms are multifactorial with green space found to both improve exercise levels and mitigate environmental hazards, such as air pollution, noise, and air temperature, which are well-documented risk factors for a range of health outcomes.

Green space engagement has been shown to have significant importance for some of our more vulnerable populations. A wide mixed studies review found that for those living in the community with dementia green space can help to facilitate ongoing meaningful life.[7] The mechanisms for this include social interaction in outdoor community spaces alongside the power of green space to reinforce identity, enable positive risk taking and create a sense of empowerment.

Children and adolescents have also been found to benefit emotionally and behaviourally from green space exposure and emotional and behavioural problems in children and adolescents.[8] These beneficial associations were resistant to confounder adjustment, suggesting an independent link to green spaces. The evidence suggests potential partial mediation via physical activity, buffering of air pollution and social interaction opportunities provided by green spaces. Green space supports the development of skills and capabilities in children, a review in 2020 found green space to be associated with a range of benefits including improved motor skills, better academic performance and increased concentration.[9] In order for children to participate in outdoor activity during the summer months in the UK it is vital that school playgrounds offer access to shade and shelter. Providing canopy cover has the mutually beneficial advantage of adding green space to school playgrounds and also offers opportunities to grow fruits and learn about healthy eating. A key

[5] Urban green space interventions and health: A review of impacts and effectiveness. Full report (who.int) 2017

[6] Bo-Yi Yang, et al Greenspace and human health: An umbrella review, The Innovation, Vol 2, Issue 4,2021, 100164, ISSN 2666-6758, https://doi.org/10.1016/j.xinn.2021.100164.

[7] Nkolika Janet Mmako et al. Green spaces, dementia and a meaningful life in the community: A mixed studies review, Health & Place, Volume 63,2020, 102344, ISSN 1353-8292, https://doi.org/10.1016/j.healthplace.2020.102344.

[8] Vanaken GJ, Danckaerts M. Impact of Green Space Exposure on Children's and Adolescents' Mental Health: A Systematic Review. Int J Environ Res Public Health. 2018 Nov 27;15(12):2668. doi: 10.3390/ijerph15122668. PMID: 30486416; PMCID: PMC6313536.

[9] Public Health England Improving access to greenspace: 2020 review (publishing.service.gov.uk) March 2020 GW-1158

commitment in the Government's 25-year Environment plan is to encourage children to be close to nature to benefit their health and wellbeing.[10]

A People and Nature survey carried out by Natural England in January 2022 recorded that 90% of adults viewed green and natural spaces as good places for mental health and wellbeing.[11] Thus, the benefits are felt and described by the British population, not just measured in research studies. Recent valuations have estimated that £2.1 billion per year could be saved in NHS health costs if everyone in England had good access to greenspace.[12]

Health Inequalities and Community Gains

Overall, it seems that individuals from lower socioeconomic backgrounds gain increased benefits from living near green areas.[13] Disproportionate benefits of green space are seen in disadvantaged groups, and socioeconomic-related inequalities in health are lower in areas with greater access to greenspace.[14] It is crucial that the health inequalities and areas of deprivation highlighted in the Council's Joint Strategic Needs Assessment[15] are reflected in the greening strategy to maximise the benefits of green space in 'levelling up'. Greener communities are places where people have more desire to live, they can promote social contact and connectivity. To help improve health inequalities locally areas of deprivation or where there is poor or unequal access to greenspace must be key targets for creating greener communities. Green space can also boost economic development in an area by making places more attractive to new investment and boosting local property values.

Green Social Prescribing

Green Social Prescribing (GSP) is a way for health professionals, including link workers based at GP surgeries, to connect people to a varied range of nature-based community activities with the aim of improving their mental and physical health. The starting point is identifying the needs of the local population and mapping what is currently available. GSP helps to provide an holistic approach to health and care and can be particularly effective in those who do not use green space to enable them to start. Evidence shows that nature- based interventions, specifically gardening, green exercise and nature-based therapy, are effective for improving well-being and mental health outcomes in adults, including those with pre-existing mental health problems.[16] Outdoor exercise also has additional physical health benefits, crucial to improving population health and reducing the pressure on the NHS. There is a need for substantial and sustained investment in community and place-based solutions such as nature-based interventions, cross sector partnerships and shared rather than statutory funding are likely to contribute to success. GSP initiatives are likely to play important role in addressing a post-pandemic surge in demand for mental health support alongside

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[10] HM Government, Policy Paper A Green Future: Our 25 , Policy Paper; A Green Future: Our 25 Year Plan to Improve the Environment 25-year-environment-plan.pdf (publishing.service.gov.uk)

[11] The People and Nature Survey for England: Monthly interim indicators for May 2020 (Experimental Statistics) - GOV.UK (www.gov.uk) (accessed 03/02/2023)

[12] Public Health England Improving access to greenspace: 2020 review (publishing.service.gov.uk) March 2020 GW-1158

[13] Gascon, Mireia et al. "Mental health benefits of long-term exposure to residential green and blue spaces: a systematic review." *International journal of environmental research and public health* vol. 12,4 4354-79. 22 Apr. 2015, doi:10.3390/ijerph120404354

[14] Public Health England Improving access to greenspace: 2020 review (publishing.service.gov.uk) March 2020 GW-1158

[15] Portsmouth City Council. Joint Strategic Needs Assessment. www.portsmouth.gov.uk/services/health-and-care/health/joint-strategic-needs-assessment/ (Accessed 13/06/2023)

[16]Peter A. Coventry et al.Nature-based outdoor activities for mental and physical health: Systematic review and meta-analysis, SSM - Population Health, Volume 16,2021,100934,ISSN 2352 8273, https://doi.org/10.1016/j.ssmph.2021.100934.

a need tackle the current health crisis of obesity and related diseases that are spread unevenly through the population. GSP is supported by the Government's 25-year environment plan.[17]

It has been shown that activities associated with growing food for local consumption have a positive impact on mental health. A systematic review looking at the benefits of gardening and food growing for health and wellbeing found that regular involvement increases physical fitness, aids healthy weight management, improves diet and children's approach to healthy eating, helps people to cope with mentally and physically challenging circumstances, reduces stress and improves community cohesion.[18]

Biodiversity

Overall, biodiversity and ecological resilience in the UK has been in decline over the past 50 years, largely due to agricultural intensification and urbanisation leading to destruction and fragmentation of habitats. There is great concern regarding the declines in the number and diversity of both plant and animal species.[19] Urban biodiversity delivers many services to humans and the majority of human-nature interaction occurs within cities.[20] The land area, corridors between areas and vegetation factors are the key determinants of species richness in an urban environment. Species that are urban adaptors require smaller areas in order to thrive whereas urban avoiders typically need much greater areas. Vegetation cover below 10% has been found to cause rapid declines in biodiversity and it has been suggested that intact vegetation cover is the strongest explanatory variable for bird and plant species density amongst cities worldwide.[21] Biodiversity is vital to sustaining wellbeing and future social and economic development, thus it must be protected.

One method for improving diversity is the use of green corridors to link habitats or green stepping-stones for those that can fly. Evidence suggests that corridors are more effective than stepping-stones, perhaps because of the increased number of species who can utilise them. The species diversity that can use green corridors is influenced by the vegetation type, setting, structure, substrate depth and age.[22] Biodiversity corridors can be dual purpose as active transport corridors, linking key sites within the city as well as green spaces.

Green roofs have been shown to increase biodiversity, the type and amount of biodiversity will depend on the type of roof installed.[23] Green roofs are usually relatively small in area and can be isolated and exposed, providing additional wildlife spaces in urban environments mainly for invertebrates, birds and bats. These species can adapt and develop survival strategies for extreme local conditions and are also mobile enough to reach habitats on roofs. There is evidence that green roofs can play a role in the conservation of rare and endangered species.[24] One type of green roof that was first used in Utrecht, Netherlands and has since been rolled out in other cities in including

[17] HM Government, Policy Paper A Green Future: Our 25 , Policy Paper; A Green Future: Our 25 Year Plan to Improve the Environment 25-year-environment-plan.pdf (publishing.service.gov.uk)

[18] The benefits of gardening and food growing for health and wellbeing. Garden Organic and Sustain. April 2014 Microsoft Word - ReportCopy.doc (sustainweb.org) (accessed 03/02/2023)

[19] State of Nature | Conservation Project - The RSPB (accessed 03/02/2023)

[20] Joscha, Beninde & Veith, Michael & Hochkirch, Axel. (2015). Biodiversity in cities needs space: A meta-analysis of factors determining intra-urban biodiversity variation. Ecology Letters. 18. 10.1111/ele.12427.

[21] Aronson, Myla & La Sorte. (2014). Aronson et al. 2014. Global urban biodiversity, Proc R Soc B.

[22] 2019_london_living_roofs_walls_report.pdf 10 years of urban greening in London and beyond (accessed 12/01/2023)

[23] Biodiversity and green roofs - green roof service in action (livingroofs.org) (accessed 12/01/2023)

[24] URBAN HABITATS, VOLUME 4, NUMBER 1 ISSN 1541-7115 http://www.urbanhabitats.org Rare Invertebrates Colonizing Green Roofs in London. Urban Habitats -- Rare Invertebrates Colonizing Green Roofs in London

in the UK is on bus-shelters.[25] This is something that Clear Channel, who manage 30000 commercial shelters on behalf of UK councils, aim to roll out across the UK but only when shelters need replacing.[26] The evidence from Utrecht is that the bus stop roofs have helped to stabilise bee populations and they also contribute to flood prevention and storm water drainage.[27] The Royal Society of Wildlife Trusts have labelled the initiative as having high strategic significance likely to make a significant contribution to biodiversity net gain.[28] There are other options for green roofs including bin stores, particularly on housing estates and cycle shelters.[29]

Biodiversity Net Gain (BNG)

Under the Environment act 2021 almost all planning permissions granted in England will have to deliver at least 10% biodiversity net gain, this legislation is likely to come into force in November 2023 for all Town and Country Planning Act Developments.[30] BNG will be measured using Defra's biodiversity metric and habitats will need to be secured for at least 30 years. Portsmouth will need to be ready to receive and determine planning applications that deliver at least 10% BNG as a statutory minimum once the BNG becomes mandatory. There is a real opportunity here for Portsmouth to work with developers to use schemes to enhance green and blue infrastructure in a way that supports the GI strategy.[31] There will be decisions to be made about when off-site vs on-site gain is acceptable, the importance of maintaining wildlife corridors through developments and opportunities for habitat creation. This could be particularly important if protected species are involved.

Climate Change and Net Zero Carbon

Climate change means that we are more likely to experience extreme weather events and suffer disruption to transport and communication systems. GI makes places more resilient and adaptive to climate change and helps to meet zero carbon and air quality targets.[32] Many GI interventions can support more than one climate change objective. Street trees, hedges, living roofs and walls can influence dispersal patterns and aid the deposition and removal of airborne pollutants. They may also act as sustainable drainage systems, reducing flood risks by aiding stormwater drainage as well as providing heat island mitigation, reducing energy consumption and improving biodiversity. Reducing carbon dioxide can also be achieved by the implementation of green corridors providing active travel options. GI interventions themselves need to be able to adapt to climate change to ensure they are resilient in the long term.

Air Quality

Green infrastructure can act as a barrier to air pollution and mitigate its effects provided the appropriate species are planted in appropriate places.[33] Many studies have shown that vegetation is effective in reducing gaseous pollutants such as O_3, NO_2, SO_2 and also CO_2 by uptake through the leaf stomata and that it can also reduce particulate matter through deposition on the leaf surface. However, the Air Quality Expert group for DEFRA found that the effects of removing pollutants by

[25] Green-roofed bus shelters in Utrecht | Gemeente Utrecht (accessed 10/01/2023)
[26] Living Roofs | Sustainable Infrastructure | Clear Channel (accessed 10/01/2023)
[27] Microsoft Word - Wild Bees Research Project-2.rtf (b-cdn.net) The Natural Roof (NADA)- Research Project Report on the Use of Extensive Green Roofs by Wild Bees University of Wädenswil, November 2005
[28] New bee bus stops coming soon to a street near you | The Wildlife Trusts (accessed 08/01/2023)
[29] Introduction to Green Roof Shelters (accessed 09/01/2023)
[30] Biodiversity Net Gain for local authorities | Local Government Association (accessed 19/02/2023)
[31] Microsoft PowerPoint - House Briefing Digital BNG conference 220628 (local.gov.uk) Sharing lessons learned as an early adopter of Biodiversity Net Gain, in Cornwall Dr. Helen Fearnley: County Ecologist
[32] Green Infrastructure Principles (naturalengland.org.uk) (accessed 13/02/2023)
[33] K.V. Abhijith, Prashant Kumar et al Air pollution abatement performances of green infrastructure in open road and built-up street canyon environments – A review,Atmospheric Environment,Volume 162, 2017, Pages 71-86, ISSN 1352-2310, https://doi.org/10.1016/j.atmosenv.2017.05.014.

deposition were likely to be no more than a few percent (2-10%) when looking at practical urban tree planting schemes and particulate matter from all sources. Thus, at an urban local level trees can act to successfully redistribute pollutants but are unlikely to remove a significant amount. When introducing trees careful planning is required to ensure that they act to enhance rather than reduce dispersal of pollutants.[34] It is also important to avoid species of trees or types of vegetation that are known to produce allergenic pollen or block cross-ventilation in streets and public places.

There has been some concern about the potential for increasing reactive carbon in the atmosphere due to biogenic volatile organic compound (BVOC) emission from urban tree planting. Of potential relevance to UK planting, oak, aspen and willow species should be avoided since these are estimated to being highest BVOC emitting species. The potential ozone increase from additional urban tree planting appears entirely avoidable however through selection of low BVOC emitting species, of which many varieties are reported in literature.

Redistribution of air pollution within an urban area can still have positive benefits on health by improving air quality. Where vegetation is acting as a barrier close to a source, for example a hedge or a green screen next to a school, concentrations immediately behind the barrier from the source are reduced, typically to a factor of around 2, compared to having no barrier.[31] On the other side of the barrier concentrations are increased. A review looking at interventions for improving air quality around schools found that green barriers can reduce PM10, PM2.5 and NO2 up to 60%, 44% and 59% on the school side of the barrier respectively.[35] As well as improving air quality, green infrastructure within and surrounding schools can provide shade, act as a means of sustainable drainage and has been shown to improve alertness in children with attention deficit hyperactivity disorder.[36] Greater impact on reducing the exposure to poor air quality for children around schools can be seen when greening is combined with the creation of clean air zones around schools, promotion of active travel to and from school, avoiding major traffic routes on the school commute and scheduling of outdoor learning and play away from peak traffic hours.[37] Selecting plants that are suitable for use around schools, for example with low pollen counts is important to minimise any adverse side effects. Plant selection can also be used to maximise biodiversity and act as a sustainable drainage solution.

Green walls and green roofs are also reported to reduce air pollutants by filtering and capturing particulates, with green walls thought to be more effective than roofs. [38] The pollutant removal potential of green walls and roofs depends on several factors including plant characteristics, wind speed, humidity and leaf area index. The location of green roofs and walls is key if the main aim is to reduce air pollution. Further research is required in order to quantify how much particulate matter is likely to be captured.

[34] 1807251306_180509_Effects_of_vegetation_on_urban_air_pollution_v12_final.pdf (defra.gov.uk) Air Quality Expert Group (accesssed 10/01/2023)

[35] Nidhi Rawat, Prashant Kumar,Interventions for improving indoor and outdoor air quality in and around schools, Science of The Total Environment, Volume 858, Part 2, 2023, 159813, ISSN 0048-9697, https://doi.org/10.1016/j.scitotenv.2022.159813.

[36] Pataki, D.E., Carreiro, M.M., Cherrier, J., Grulke, N.E., Jennings, V., Pincetl, S., Pouyat, R.V., Whitlow, T.H. and Zipperer, W.C. (2011), Coupling biogeochemical cycles in urban environments: ecosystem services, green solutions, and misconceptions. Frontiers in Ecology and the Environment, 9: 27-36. https://doi.org/10.1890/090220

[37] Stephanie Osborne, Onyekachi Uche, Christina Mitsakou, Karen Exley, Sani Dimitroulopoulou,
Air quality around schools: Part I - A comprehensive literature review across high-income countries, Environmental Research, Volume 196, 2021,110817, ISSN 0013-9351, https://doi.org/10.1016/j.envres.2021.110817.

[38] K.V. Abhijith, Prashant Kumar et al Air pollution abatement performances of green infrastructure in open road and built-up street canyon environments – A review,Atmospheric Environment,Volume 162, 2017, Pages 71-86, ISSN 1352-2310, https://doi.org/10.1016/j.atmosenv.2017.05.014.

Novel methods for improving air quality and cooling are being developed including the world's first biotech fine dust filter for urban spaces.[39] These novel solutions for cleaning and cooling city air are worth further investigation and analysis to consider their use in areas that are unsuitable for natural solutions.

GI is one method for reducing the impacts of air pollution in a city. It needs to be combined with efforts to remove air pollutants at source, for example clean air zones and encouragement of active transport. This GI strategy must link with the Air Quality Strategy and Transport Plan in order to ensure that methods are maximised to improve the air quality.[40]

Flood mitigation through soakaway and sustainable drainage systems

GI, if correctly planned and placed, can greatly reduce the amount of water reaching drains, sewers and water courses, particularly after heavy rains. This in turn reduces the local risk of flooding. Sustainable Drainage Systems (SuDS) are a method of positive water management that help to manage water run off by providing permeable surfaces so that water can be held back where it falls or absorbed into the ground. There are various methods of achieving this, including green roofs and walls, soakaways, permeable pavements and various other water features. SuDS require long term management and the responsibility for this must be secured at the outset of any project. They must fit in with drainage and waste-water management plans in order to reduce flooding at catchment sites and local scales.[41] The Susdrain website has lots of information and case studies of SuDs in urban areas that could be used to plan appropriate approaches in local target areas within Portsmouth.[42]

Green roofs have the advantage over other SuDs systems that they have no additional land requirement other than the footprint of the building. The ability of green roofs to absorb rainfall varies by season and climate as well as by the depth of the substrate, composition of the vegetation, their size, aspect and slope. Extensive green roofs are typically a carpet of plants on a lightweight growing media and overlaying a drainage layer, intensive green roofs incorporate more deeply-planted vegetation. Generally the deeper the substrate the more water they can hold and run off reductions tend to be higher in summer when the substrate has chance to dry out. In the UK 80mm green roofs have been shown to be able to retain up to 80% of rainfall when 10mm or less falls, their capacity reduces as rain becomes heavier.[43] Green walls can have rain gardens created at their base, their functionality however is limited by the available space for a permeable surface to be installed.

Climate mitigation (cooling opportunities)

The urban heat island (UHI) effect occurs in city centres where materials that absorb and re-radiate heat such as concrete, masonry and asphalt predominate, and where waste heat is discharged from buildings, transport and infrastructure.[44] As a result of these processes, town and city centres can be several degrees warmer than rural areas. This temperature rise exacerbates heat stress and air pollution during hot weather, increasing mortality in the young and old, particularly affecting people with breathing conditions and cardiovascular disease. The health impacts of the UHI effect are becoming worse with climate change.

[39] CITYTREE - Green City Solutions (accessed 14/02/2023)
[40] Air quality in Portsmouth - Portsmouth City Council (accessed 05/01/2023)
[41] GI Why Principles (naturalengland.org.uk) (accessed 13/02/2023)
[42] Enabling retrofitting (susdrain.org) (accessed 14/02/2023)
[43] Virginia Stovin, Gianni Vesuviano, Hartini Kasmin, The hydrological performance of a green roof test bed under UK climatic conditions, Journal of Hydrology, Volumes 414–415, 2012, Pages 148-161, ISSN 0022-1694, https://doi.org/10.1016/j.jhydrol.2011.10.022.
[44] 2019_london_living_roofs_walls_report.pdf 10 years of urban greening in London and beyond (accessed 12/01/2023)

Green roofs and walls can both act to insulate and cool down buildings, reducing the energy required to heat them in winter and cool them in summer. Analysis of green roofs from around the world has shown significant reductions in temperature in buildings with green roofs and also effects on surrounding ambient air temperature, reducing the UHI affect.[41] Green walls have been shown to reduce the mean radiant and indoor temperatures as well as having a street cooling effect.[45] A recent review found that in street canyons green walls may reduce air temperature by up to eight degrees and that large scale installation of green walls my fully mitigate the UHI affect.[46] South facing walls should be used to maximise building energy savings. Trees can also act to reduce daytime temperatures through evapotranspiration and by shading buildings, reducing the need for air con in the summer months, thus saving carbon.[47]

Objectives of the Strategy

High Level Vision for a Greener Portsmouth

In conjunction with the aim of becoming carbon neutral by 2030 Portsmouth will develop into a climate resilient, healthy, active city. We will work to achieve cleaner air and cooler streets with access to green space for health, wellbeing and connecting with nature within easy walking distance of all resident's homes. Sustainable drainage systems will aid the city's flood defences and biodiversity will increase with the addition of wildlife corridors and nature areas. Active travel will become the easiest option in the city, with safe and clean routes between key sights. In achieving these goals we will seek to reduce the inequalities faced by Portsmouth's residents and increase the standard of living for all.

Green Infrastructure Objectives

1. **Create**: Install new multi-functional GI, prioritising those areas with the poorest access
2. **Improve:** Improve and develop existing GI to better suit the needs of the population and wildlife.
3. **Protect:** prevent removal of or damage to existing GI during building works
4. **Maintain:** Ensure areas are well maintained and that plans are in place for effective funding, governance and stewardship of GI to enable long term sustainability.
5. **Connect:** Improve connectivity of GI within Portsmouth. Reducing habitat fragmentation and improving opportunities for active travel.
6. **Access**: Promote and provide healthy, accessible facilities across all social group and areas of the city.
7. **Active:** Increase use of GI by developing activity programmes and green social prescribing.

[45] Rabah Djedjig et al Green wall impacts inside and outside buildings: experimental study, Energy Procedia, Volume 139, 2017, Pages 578-583, ISSN 1876-6102, https://doi.org/10.1016/j.egypro.2017.11.256.
[46] T. Susca et al Effect of green wall installation on urban heat island and building energy use: A climate-informed systematic literature review, Renewable and Sustainable Energy Reviews, Volume 159, 2022, 112100, ISSN 1364-0321, https://doi.org/10.1016/j.rser.2022.112100.
[47] GI Why Principles (naturalengland.org.uk) (accessed 13/02/2023)

8. **Evaluate**: Ensure systems in place for the evaluation of new GI projects so that benefits can be measured and informed decisions can be made in future.

Priorities and functions

When considering options for installation of and improvements to GI the primary and secondary functions of the site must be considered. The list below highlights the different priorities for GI installation, different primary functions will be relevant in different areas.

- Health and wellbeing
- Health inequalities and community gains
- Climate change
  - Air quality
  - Flood mitigation
  - Cooling opportunities
- Biodiversity gains

National Drivers

- National Planning Policy Framework, revised 20 July 2021[48]
- 25-year Environment Plan, 2018[49] and Environment Bill
- Green Infrastructure Framework – Principles and Standards for England, 2022[50]

The Green Infrastructure Headline Standards

The Green Infrastructure Headline Standards, published as part of the Green Infrastructure framework in 2022 recommend that everyone should have access to good quality green and blue spaces close to home for health and wellbeing, with an initial focus on green and blue spaces within 15 minutes' walk of home.[51] The Accessible Greenspace Standards define good provision based on

> Size Proximity Criteria
>
> Within 15 minutes' walk:
>
> EITHER a Doorstep OR Local Accessible Greenspace
>
> - A doorstep greenspace of at least 0.5ha within 200 metres, or
> - A local natural greenspace of at least 2ha within 300 metres walk from home.
>
> AND
>
> - A medium sized neighbourhood natural greenspace (10ha) within 1km.
>
> AND, beyond 15 minutes' walk:
> - A medium/large wider neighbourhood natural greenspace (20ha) within 2km. and
> - And large district natural greenspace (100ha) within 5-km. and
> - A very large subregional greenspace within (500 ha) within 10 km.

Figure 1 Size Proximity Criteria Taken from Green Infrastructure Standards for England. (naturalengland.org.uk)

different proximity, capacity and quality criteria. The size and proximity criteria are shown in figure 1. The walking speed used is 60 metres per minute, equivalent to around 1 kilometre in 15 minutes. The capacity criteria recommend that local authorities have at least 3 hectares of publicly accessible greenspace per 1000 population and there is no net loss or reduction in capacity of accessible green

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[48] National Planning Policy Framework (publishing.service.gov.uk) (accessed 05/01/2023)

[49] HM Government, Policy Paper A Green Future: Our 25 , Policy Paper; A Green Future: Our 25 Year Plan to Improve the Environment 25-year-environment-plan.pdf (publishing.service.gov.uk)

[50] Green Infrastructure Principles (naturalengland.org.uk) (accessed 13/02/2023)

[51] Green Infrastructure Standards for England Summary v1.1.pdf (naturalengland.org.uk) Jan 2023 (accessed 13/02/2023)

space per 1000 population at an area wide scale. Accessible greenspace should meet the Green Flag award criteria[52] and best practice in accessibility for all.[53]

Any major developments must also meet the size, proximity, capacity and quality criteria. As well as increasing accessible green space in Portsmouth it is vital that there is a proportion of GI used for nature recovery, including wildlife rich habitats to increase biodiversity in the city, in an ideal world these would also be accessible but can take the form of inaccessible green roofs and wildlife areas. The aim for an urban area is to have at least 40% average green cover in urban residential neighbourhoods. There should also be an agreement to increase local tree canopy cover, considering local needs and constraints.

Local Consultation

GI cross cuts many agendas and responsibilities. It is clear that in order to have the greatest effect this greening strategy must link with other local strategies including the Local Transport Plan, The Air Quality Strategy, the Climate Action Plan the New Local Plan, the Surface Water Management Plan and the Health and Wellbeing strategy. Consultation with both internal and external stakeholders is vital. Surveys of users of GI assets will also be required in some cases to gather local knowledge and assess the levels of use of local green spaces. Successful delivery will then depend on continued collaboration with partners and community groups.

Evidence for where GI is needed?

Mapping Requirements

To introduce the most appropriate type of GI in the most appropriate places it is important to understand the city's natural profile and characteristics:[54] Assessments of current GI need to be undertaken to provide a clear understanding of the quantity, quality, character and distribution of green space, including gaps in access across the city. An understanding of native vegetation helps to ensure the correct plants for the natural ecosystems are used. Ideally mapping of permeable and non-permeable surfaces would be included in this to understand areas of action for flooding. Understanding natural water courses, even if they have been built over, is valuable for designing nature-based flood risk solutions. Overlaying this with maps of air quality can help to determine where interventions would be best suited to tackling local hotspots of poor air quality. From a biodiversity perspective understanding the connectedness of green spaces and the position of any corridors is important in the aim of strengthening ecological networks and reducing habitat fragmentation. Pollinator and individual species recovery plans will require additional insight.

Alongside understanding where the gaps in accessibility to quality greenspace are in the city we must compare these with the areas of deprivation to understand where the biggest benefits to health, wellbeing and community are likely to be achieved by introduction of green space. Understanding if there are any green social prescribing initiatives running locally will also help to target areas of greatest need. Local active transport networks will give an idea of the areas of the city where it may not be possible to travel actively, these may correlate with areas of poor air quality. It is also important to look at locations of schools as young people are a key target group.

[52] https://www.greenflagaward.org/media/1019/green-flag-award-guidelines.pdf 2016 (accessed 15/02/2023)
[53] https://www.sensorytrust.org.uk/uploads/documents/ByAllReasonableMeansEnglandAug2020.pdf (accessed 10/01/2023)
[54] Nature-based solutions: How cities can use nature to manage climate risks (c40knowledgehub.org) (accessed 13/01/2023)

Getting input from community groups once target areas have been identified will then help to understand what kind of green space the community feel would benefit them the most and also begin discussions about ongoing maintenance.
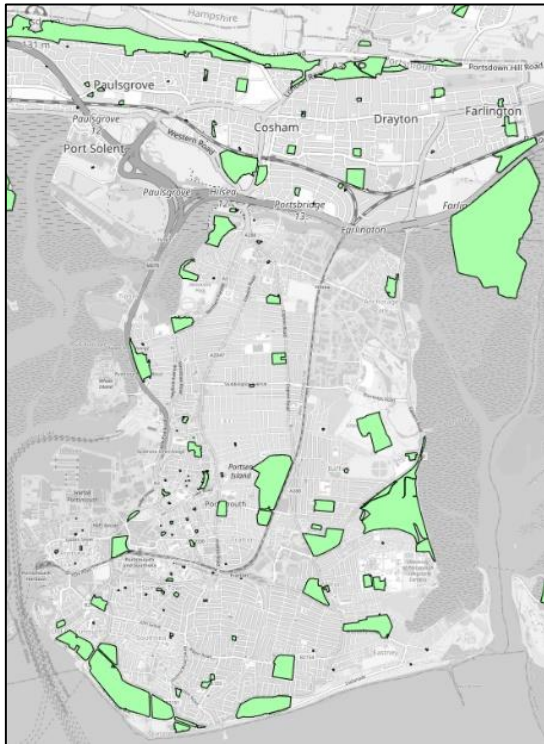
Green Infrastructure in Portsmouth

Figure 2 All accessible green space in Portsmouth. Source Natural England 2021 Green Infrastructure Map (naturalengland.org.uk)

Green infrastructure mapping has been undertaken with the use of tools from Natural England and maps from other strategy's including air quality and flooding. Currently there is variety in the GI coverage of the city with more green space in the northern and coastal areas of the city than the central sections of Portsea Island. Blue infrastructure in the form of the open coast is also an important part of the network and the character of Portsmouth. Tree canopy cover within Portsmouth was estimated to be 9.8% (86,500 trees) in 2017, this is lower than other comparative cities.[55] In 2012 the Parks and Open spaces strategy concluded that there were 760 hectares of publicly accessible open space in Portsmouth, which is 3.86 hectares per 1000 population. The largest area of open space, Portsdown Hill, runs along the northern boundary of the city, 30 hectares of this space is designated a Site of Special Scientific Interest (SSSI). There are two further legally protected SSSI's within Portsmouth; Portsmouth Harbour and Langstone Harbour, encompassing Farlington Marshes Local Nature reserve.

The map in Figure 2 shows all accessible green space in Portsmouth. It is taken from the Natural England mapping tool.[56] It is important to note that assumptions and generalisations have been used when producing these maps and thus there may be errors. It is recommended to double check them with local knowledge, particularly around how accessible green space is. It is classed as accessible if there is public access to it. This does not mean that all residents will be able to access it due to physical ability to use the access routes. This is something that needs to be considered when looking at current usage and how to improve access.

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[55] Portsmouth Local Plan 2038 'Regulation 18' Consultation Document. Draft for Consultation September 2021

[56] Green Infrastructure Map (naturalengland.org.uk) accessed (18/02/2023)

Figure 3, from the same source shows all green space, excluding private gardens, accessible or not. The combined greenspace and public rights of way are low to medium across Portsmouth with the areas on Portsea Island scoring more poorly than those on the mainland. The majority of Portsmouth is currently in the worst performing decile for accessibility to green space.[57] This is evident when looking at the lack of green in the centre of Portsea Island. The majority of the island is in the top four deciles for accessibility to blue space. The density of trees per hectare also varies with fewer to the south of Portsea Island and more on the mainland areas. Drayton and Farlington ward to the north have the highest ratio of trees per head of ward population at about one tree per head and Central Southsea ward in the south the has poorest ratio at one tree to ten heads of the population. There is more detail on the type and location of green spaces in Portsmouth from page 18 in the Green-Infrastructure-background-paper-Sep21_compressed.pdf (portsmouth.gov.uk). This should be used in conjunction with the above mapping to understand the local context.
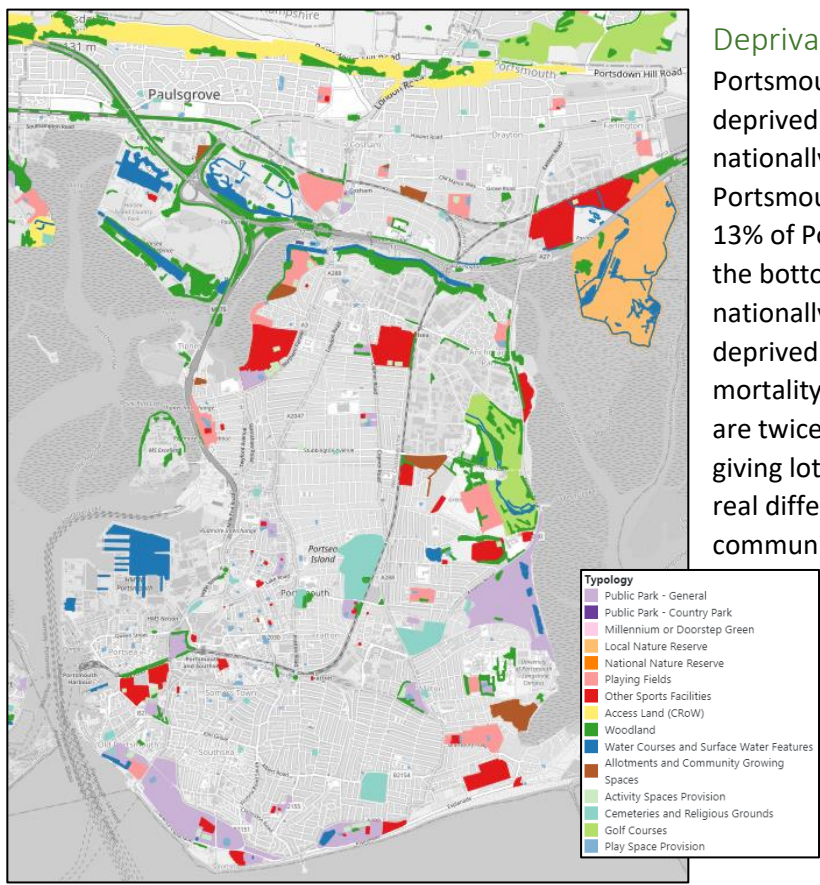
Deprivation and Social Inequality

Portsmouth is ranked 57th most deprived out of 317 local authorities nationally with 25% of households in Portsmouth living in relative poverty. 13% of Portsmouth's population live in the bottom 10% of most deprived areas nationally, and over 60% are in the most deprived two quintiles. Standardised mortality ratios in more deprived areas are twice that of the England average, giving lots of opportunity for making a real difference to lives in these communities.

Figure 3 All green space, excluding private gardens, in Portsmouth. Source Natural England 2021 Green Infrastructure Map

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[57] CDRC Mapmaker: Access to Healthy Assets & Hazards (Green Space (Passive) Accessibility) accessed (18/02/2023)

Premature mortality rates (2015-2019)

Standardised mortality ratio for deaths from all causes aged under 75 years, by middle super output area (MSOA), Portsmouth, 2015 to 2019 (pooled). England: 100.0 Standardised mortality ratio (SMR)

Source: Public Health England analysis of ONS (crown copyright) death registration data and mid-year population estimates via PHE "Local Health" tool http://www.localhealth.org.uk.
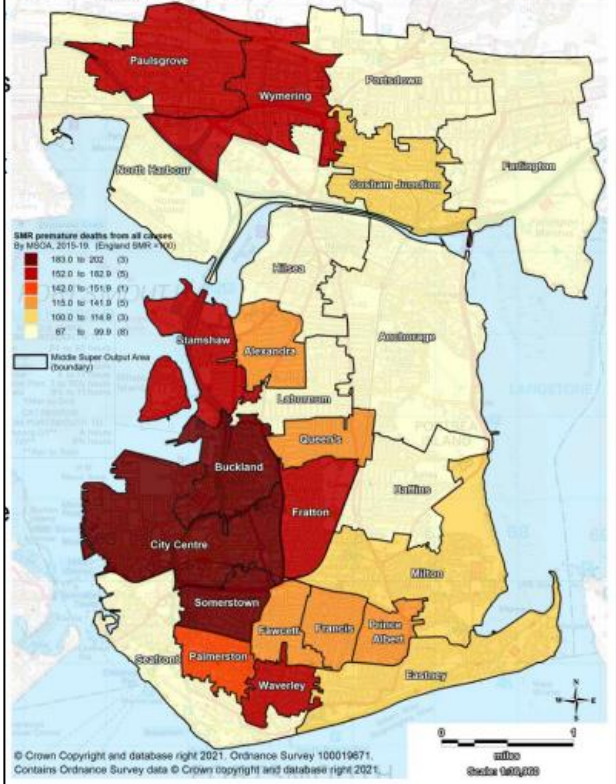
Indices of Deprivation (2019)

Indices of deprivation (ID) 2019 - map of Portsmouth with the England rank of Index of Multiple Deprivation (IMD) 2019 score in deciles by 2011 Census Lower Super Output Areas (LSOAs) overlaid with electoral wards.

Source: Ministry of Housing, Communities and Local Government, English Indices of Deprivation 2019.
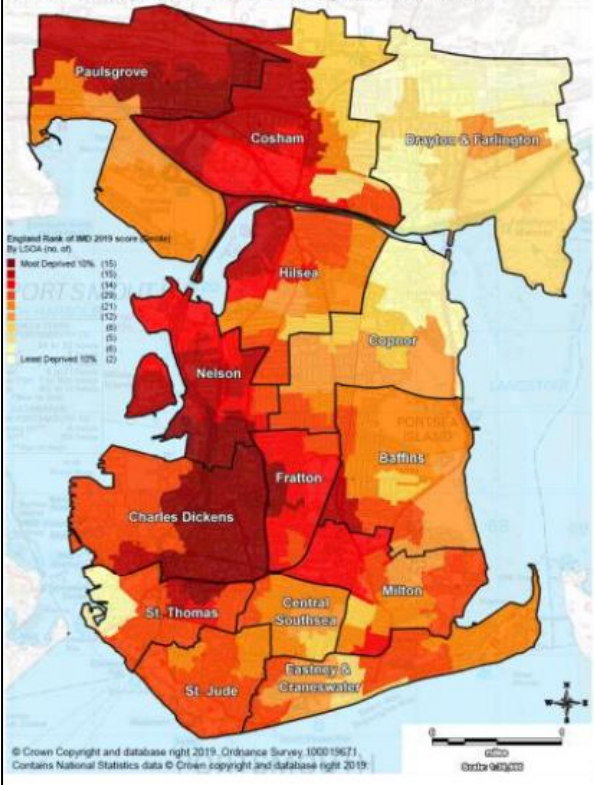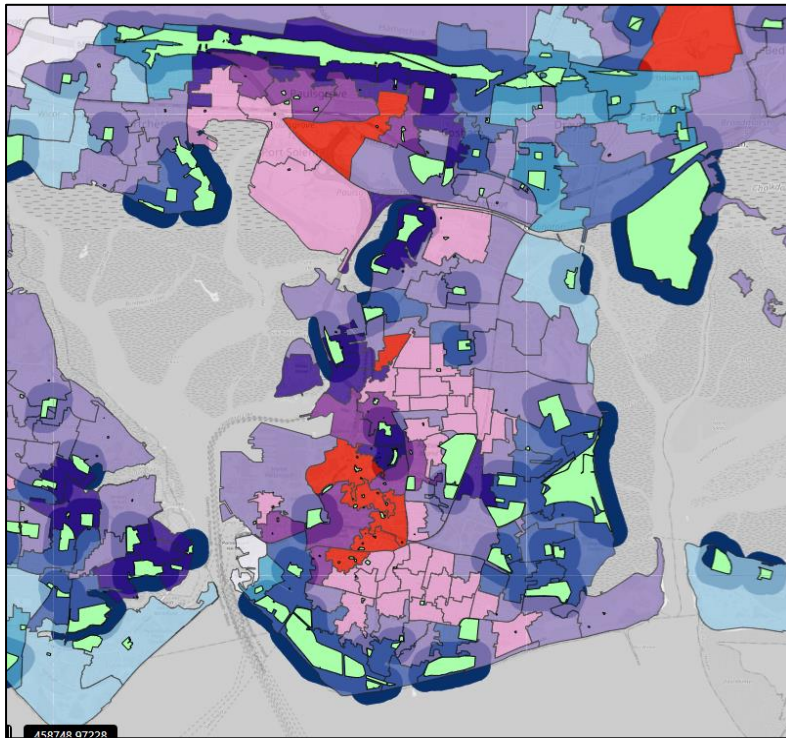
Comparing the maps there is a clear correlation between premature mortality (under 75yrs) and deprivation. The areas ranked as the 10% most deprived have higher mortality rates when compared to the 10% least deprived areas. The most deprived areas are around Charles Dicken's, Nelson and Paulsgrove. When overlaying the areas of deprivation with access to green space we can see that there is a correlation.

Figure 5 is a composite map assessing accessibility to Doorstep standard green space (at least 0.5 ha within 200m) and indices of multiple deprivation. Areas with high deprivation and low access are highlighted in red, L1 is the least favourable scenario and H3 the most favourable. Charles Dickens and Cosham wards are the most affected.
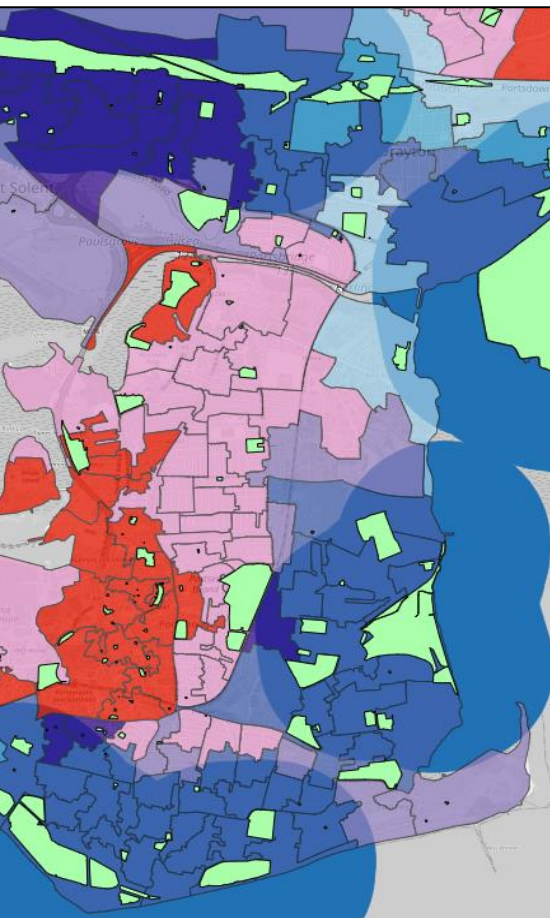
Figure 6 is a composite map assessing accessibility to neighbourhood green space (at least 10 ha within 1km) and indices of multiple deprivation. We can see that the areas of red extend further north from Charles Dickens ward into Nelson ward because the smaller areas of green space within Nelson do not meet the 10 ha neighbourhood benchmark. The more northerly areas of Cosham are no longer red because of access within 1km to the green space of Portsdown Hill.
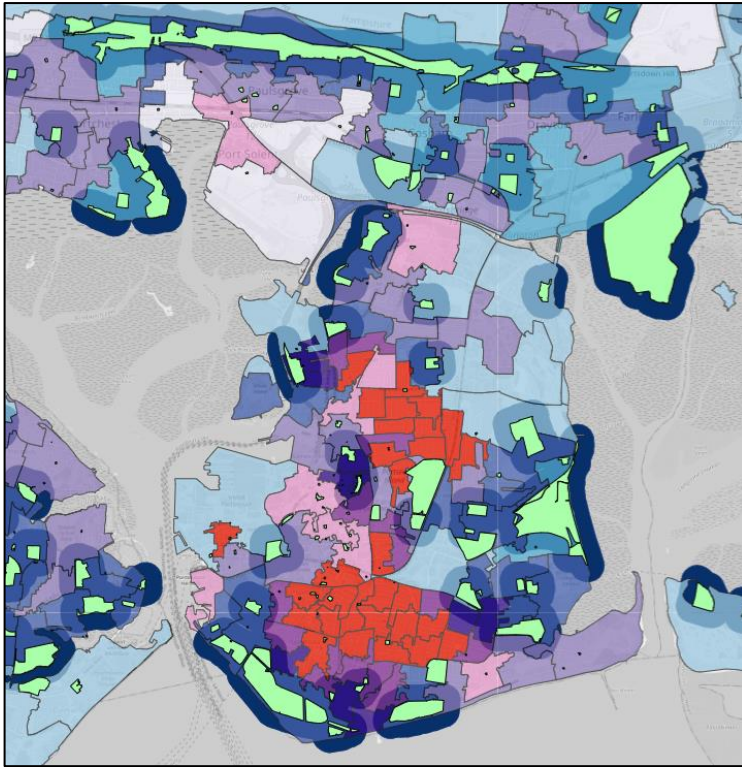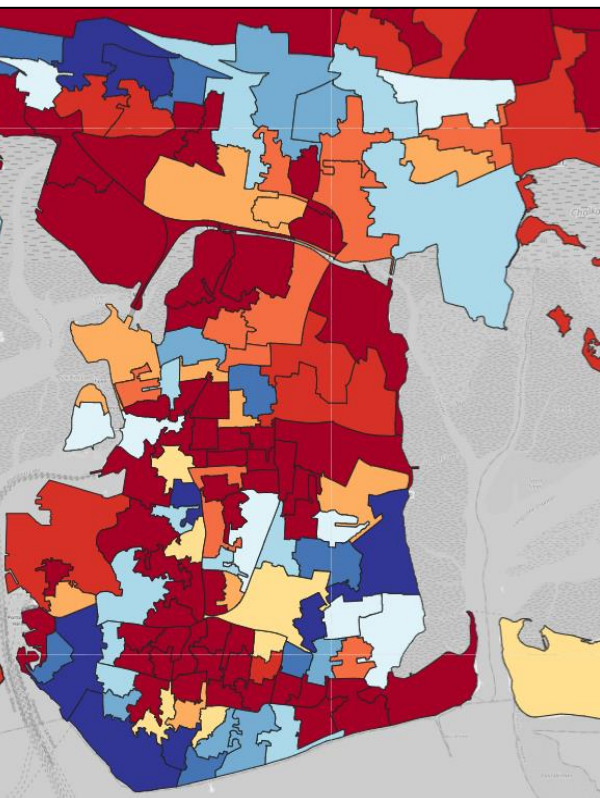
Figure 7 Accessibility to green space and population density. Source Natural England 2021 Green Infrastructure Map (naturalengland.org.uk)

Figure 7 shows accessibility to Doorstep standard green space (at least 0.5 ha within 200m) in relation to population density. Doorstep Green spaces with a 200m buffer are shown overlaid on top of the population density map. Areas with high population density and low access are highlighted in red. We can see that the areas of high population in Central Southsea, Fratton and the south-west of Copnor have the worst access per capita. These maps are based on census 2011. data.

It is estimated that across Portsmouth 30-40% of children under 16 and adults over 65 live within 300m of a greenspace. Figure 8 shows that percentage broken down by LSOA. As we can see there are large areas where fewer than 10% of children under 16 and adults over 65 live within 300m of a natural greenspace. These are concentrated where the areas of higher population density have poor access. Under 16's and over 65's are vulnerable groups when considering the effects of poor air quality and the temperature from urban heat islands. It is important to note that some of these green spaces will not be accessible to all, particularly those over 65 who may have mobility difficulties.

From looking at these maps it is clear where investments to increase GI with a priority focus on health, wellbeing and community inequalities should be. Charles Dickens, Nelson and Cosham wards should be targeted due to the levels of deprivation and Central Southsea, Fratton and south-west

Figure 8 % of children and young people under 16 and % people over 65 who probably live within 300m of a natural greenspace. Source Natural England2021 Green Infrastructure Map (naturalengland.org.uk)

Copnor should be additional targets due to the high population density in relation to accessible green space.

Air Quality Mapping

The map in Figure 9 of air quality in Portsmouth from the Consumer Data research centre shows that the air quality in the centre of Portsea Island is in the worst performing decile with the areas towards the south coast improving towards the fifth decile. The areas to the North of the city around Paulsgrove and Cosham are also in the worst performing decile nationally.
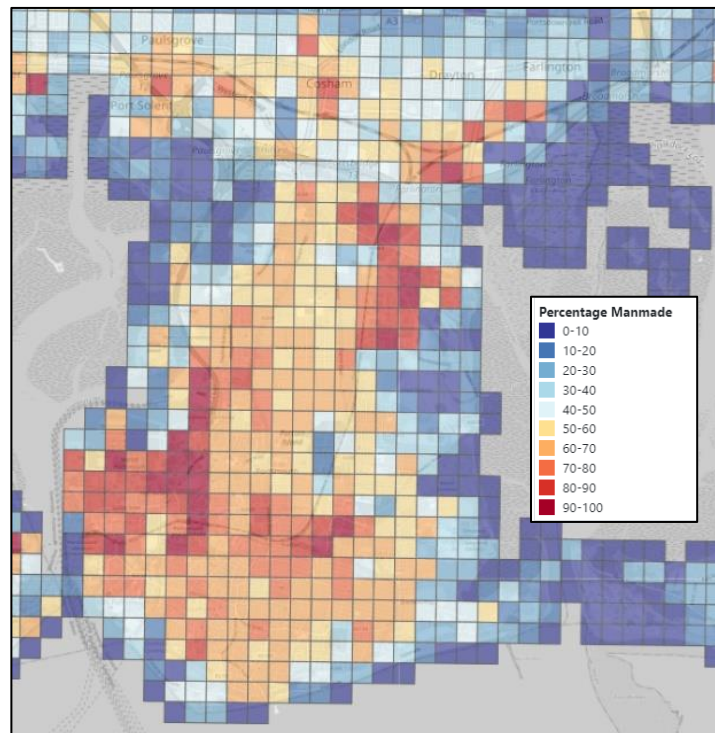
Water Courses and areas of high

Figure 9 Map of air quality in Portsmouth Image taken from: CDRC Mapmaker: Access to Healthy Assets & Hazards (Air Quality Domain)

flood risk

The local flood risk management strategy for Portsmouth has clear ward by ward descriptions of flood risk and its likely cause.[58] Using this strategy areas that are more susceptible to surface water flooding can be identif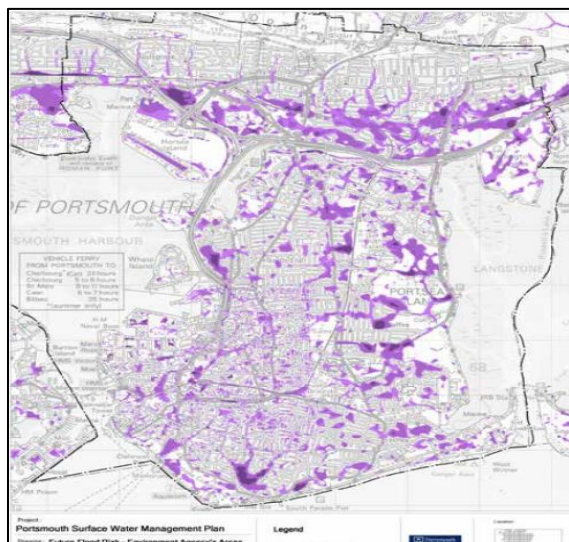ied, a surface water flood risk map is shown in figure 10. Coastal flooding affects different areas, is generally well understood and can be predicted and managed using flood defences. Portsmouth's surface water management plan considers a SuDs hierarchy for managing excess surface water and has an action plan for improving surface water drainage.[59] When looking at options for improving drainage using SuDs the areas targeted should be discussed to ensure we are maximising the benefits of GI.

Figure 11 Is a 250m greenness grid-based assessment of the % manmade area (surface that is not water, vegetation or soils) within the grid squares.[60] The areas with a higher percentage of

Figure 9 Map of surface water flood risk in Portsmouth taken from Local-flood-risk-management-strategy.pdf (portsmouth.gov.uk)

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[58] Local-flood-risk-management-strategy.pdf (portsmouth.gov.uk) (accessed 24/01/23)

[59] Report Template v2.4 (portsmouth.gov.uk) Surface Water management Plan 2019 Update report (accessed 24/01/23)

[60] Green Infrastructure Map (naturalengland.org.uk)

manmade area will have less opportunity for surface water to drain naturally and will rely entirely on the sewerage system to remove any rainwater. Thus it would be expected that these areas may suffer more from surface water flooding, although there is some correlation between the two maps this is not clear cut. However, when looking at SUDs systems those areas with a high % of manmade area would be a sensible initial target.

Figure 10 Greenness grid of Portsmouth, source Natural England 2021 Green Infrastructure Map (naturalengland.org.uk)

Green Infrastructure Planning for Portsmouth

Figure 12, showing current and proposed GI in Portsmouth is taken from the Local Plan which supports the objectives of the Greening Strategy.

It shows areas that will be designated Urban Centre Greening Factor (UGF) zones (see below). A completed UGF assessment will need to accompany any development in these areas, outside of these areas the UGF is still a recommended tool to estimate the GI gains for all proposals across Portsmouth.[61] In addition to this by the end of 2023 it is likely that the BNG legislation will have become mandatory so all new developments will have to deliver 10% BNG.

Figure 11 Map taken from green space and corrido...
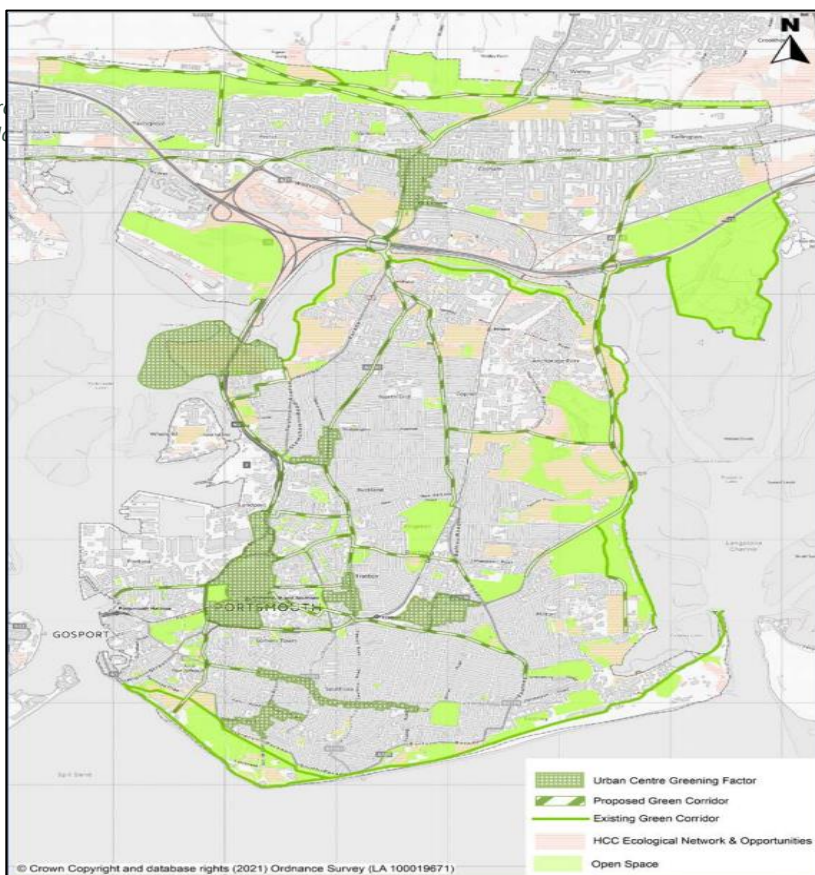
It can be seen that existing green corridors are minimal and that new ones, particularly running north-south through the city are planned. In order to develop this plan further and have the greatest positive impact we must consider all of the factors highlighted in the maps above to identify targets for health and well-being benefits, community cohesion, biodiversity, climate change, flooding and air quality management.

Urban Greening Factor

The Urban Centre Greening Factor (UGF) areas are those that have been identified as having potential for delivering additional greening due to either current lack of green

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[61] Portsmouth Local Plan 2038 'Regulation 18' Consultation Document. Draft for Consultation September 2021

space or proposals for significant redevelopment. The UGF tool allows for a simple assessment process comparing green infrastructure coverage on a proposed development site, pre and post development.[62] Betterment in GI provision through on-site net gains is required, though there is flexibility for how this is achieved.

Good Practice in Initiating Urban Green Space Interventions

A review of impacts and effectiveness of urban green space interventions and health was conducted by the World Health Organisation in 2017.[63] Good practices taken from this review alongside advice from Natural England[64] regarding GI with relevance for local action are listed below:

- Establish many urban green spaces throughout the city, there should be a variety of types and sizes to fulfil differing primary goals.
- Interventions should be based on the needs of the area (e.g. flood risk management, children's play) which should guide the type of intervention, the function of the green space, and the type of vegetation applied.
- Early engagement with user groups and the local neighbourhood community helps to assess their needs and demands (and to potentially inform evaluation procedures).
- A multidisciplinary team is needed for adequate designing, long term planning and managing of the urban green space interventions.
- Design the urban green space intervention within the context of the whole urban area and surrounding environment. Consider the connectivity of the intervention with other green spaces and urban destination points.
- Opportunities must be taken to integrate GI together into core elements of new and existing grey infrastructure.
- Provide practical design of urban green spaces, take into account seasonal variation.
- Enhanced and visible access points and use features can be highly effective and cost-efficient for improving use of the green space.
- As urban green spaces develop overtime, long-term perspectives are needed for both maintenance and management, and the respective funding.
- The WHO intervention review suggests dual approaches including both physical changes to the urban environment and promotional/engagement activities have the most impact on health.

Funding Considerations

GI requires sustainable management and maintenance if it is to maintain its benefits long term. It is vital that funding arrangements are identified as early as possible and that costs of ongoing maintenance are factored into the design and implementation, balancing the costs with the benefits. Local community engagement can assist with management and tailoring provision to local needs.[65]

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[62] Green Infrastructure Standards for England Summary v1.1.pdf (naturalengland.org.uk) Jan 2023 (accessed 13/02/2023)
[63] Urban green space interventions and health: A review of impacts and effectiveness. Full report (who.int) 2017
[64] GI What Principles (naturalengland.org.uk) (accessed 13/02/2023)
[65] Natural environment - GOV.UK (www.gov.uk) July 2019 update, accessed (26/01/2023)

Evaluation

To assess whether GI interventions are having the intended impacts on the multiple factors they can influence can be difficult. Appropriate qualitative and quantitative assessments or tools should be used to try and capture these so that collective benefit can be realised.

Monitoring and evaluating local changes in access to greenspace, in conjunction with health data over time, will provide a better understanding of the benefits and value of greenspace for health.[66] Valid and reliable methods must be used for data collection and if possible an evaluation plan should be in place at the start of an intervention, including baseline data to compare the intervention effects. Urban green spaces can take time to develop and their usage may also change overtime so realistic longitudinal evaluations should be commenced.

Conclusion

Green infrastructure is a vital tool for improving health, reducing social inequalities, increasing biodiversity and tackling climate change. It also contributes towards the goal of becoming Carbon Neutral by 2030. There are many types of GI with different primary aims, however the majority can have multiple benefits in a way that other interventions do not.

Mapping of the city enables us to understand where the initial priorities for new or improved GI should be and to determine how we can work towards meeting the Government's Green Infrastructure Headline Standards. Visualising current green space allows us to understand the best approaches to reducing fragmentation of habitats and improving connectivity so that Biodiversity Net Gain legislation can be used to the best opportunity. Areas of poor air quality around vulnerable populations can be improved and flood risk reduced by appropriate placement of interventions. Social inequalities can be reduced by strategic interventions with green infrastructure.

Key to all interventions is multidisciplinary collaboration and stakeholder engagement, for many community participation will be vital. Long term funding and maintenance plans alongside evaluation procedures must be established.

We must strive to make GI a consideration for all Local Plans and strategies moving forwards. Engagement between sectors will ensure that GI usage can be maximised and beneficial to society.

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[66] Public Health England Improving access to greenspace: 2020 review (publishing.service.gov.uk) (24/01/2023)

Appendix: Delivery Plan

Objective	Priority	Proposals	Actions	Potential Stakeholders to consider (not exhaustive)
Protect, Improve	Improving and protecting total accessible GI in Portsmouth	Assess current accessible GI and ensure it is fit for purpose as well as protected from destruction from developments.	• Update map with local information. • Conduct community research on accessibility and usage of current infrastructure. • Consider improvement proposals to existing GI to increase usage, including PCC-owned GI, parks and open spaces, maintaining balance between accessibility and greening / BNG. • Ensure Local Plan is in place for building applications and planning with regard to GI. (UGF and BNG, for example). • Monitor any change in the amount of GI in the city. • Continue use of Tree Protection Orders where appropriate.	Public Health, Planning, Housing, Neighbourhood & Building Services (HNBS), Cultural, Leisure & Regulatory services (CLS), Community Groups, Local Councillors.
Create, Access	Increasing total GI	Increase the total amount of GI within Portsmouth both accessible and inaccessible (assessment of inaccessible green infrastructure will also be required).	• Urban Greening Factor assessments on new planning proposals. • Urban Nature Recovery Standard • Urban Tree Canopy Cover Standard • Develop a Green Infrastructure Strategy • Accessible Greenspace Standards	Public Health, Planning, HNBS, CLS, Local Community Groups, Local Councillors, Environmental Health.

			• Look at mapping and local areas to determine initial priorities for both accessible and inaccessible GI. • Creating the new Horsea Island Ecological Reserve. • New green spaces created as Local Plan Strategic Development sites.	
Connect, Active	Health: Active transport	Look for potential areas to add to the active transport network. Where might these be useful? Look at potential routes between key city sites.	• Link with Local Transport Plan, Air Quality Plan, Local Walking and Cycling Infrastructure Plan and other relevant plans. • Understand active transport trails that may also be able to function as wildlife corridors. •	Public Health, Transport Planning Officers, Environmental Health, Integrated Care Boards, Health And Wellbeing Boards. Community Safety Officers, The Police, Local Community Groups And Single Interest Groups.
Active	Health: Green social prescribing	Harness the benefits of GI for health and wellbeing by increasing the exposure that people have to activities in nature.	• Look at evidence from green social prescribing schemes rolled out nationwide and map current use of such schemes in Portsmouth to understand what and where may be most suitable for rollout. • Understand the views of local GP's • Connect with national green social prescribing initiatives	Public Health, HNBS, CLS, General Practitioners, Environmental Health, Integrated Care Boards, Health And Wellbeing Boards, Local Community Groups And Single Interest Groups.

Active	Health: Physical Activity	Increase the amount of physical activities on offer in green space and ensure they are accessible and inclusive.	• Explore links with PCC's Leisure and Physical Activity Strategy for outdoor opportunities. • Explore links with the voluntary sector • Look for examples of evidence based practice nationwide that may be suitable for implementation in Portsmouth. • Consider activities such as gardening and food production alongside sport/exercise related activities.	Public Health, HNBS, CLS, Physical Activity Providers, Sports And Leisure Board, Integrated Care Boards, Health And Wellbeing Boards, Local Community Groups And Single Interest Groups.
Access	Health – Mental Health	Consider the benefits of GI on mental health	• Use evidence for benefits to those with dementia in the community to consider social events and access to green space for this group. • Consider the impacts on children's emotional and behavioural development when considering sites for new/improved green infrastructure	Public Health, Integrated Care Boards, Health And Wellbeing Boards, Old Age and dementia charities, children's charities, Local Community Groups And Single Interest Groups.
Create, Improve, Access	Health: Healthcare facilities	Greening hospital/medical facility sites to increase benefits to physical and mental health for inpatients and to make them more pleasant places to visit.	• Assess the GI at Portsmouth's hospital and large general practice/outpatient sites. • Look for options to improve, green roofs, walls, hospital garden space.	Public Health, Integrated Care Boards, Health And Wellbeing Boards, Hospital Trust, General Practitioners, Local Community Groups And Single Interest Groups.
Create, Improve, Access	Health: Access to green space	Ensure everyone in the city has access to a variety of good quality green and blue spaces within easy walking distance of their home. This could take the form of either a Doorstep or Local Accessible green	• Use Natural England mapping tool to identify areas that do not meet the Green Infrastructure Headline Standards. • Target these for further analysis and community consultation as to the most appropriate green space for installation.	Public Health, Planning, HNBS, CLS, Landowners And Land Managers, Local Councillors, Local Community Groups And Single Interest Groups.

		space and a neighbourhood Accessible Greenspace.[67]	• Identify target dates for meeting the standards.	
Access, Create, Improve	**Community cohesion**	Target areas with the lowest access to greenspace to understand what interventions could be successful and welcomed by the community.	• Wards with the highest levels of deprivation and lowest amount of greenspace should be targeted for community consultation and engagement. • Focus GI improvements to open spaces in Wards with the highest levels of deprivation. • Improve community environments by greening existing grey infrastructure (walls, roofs, shelters and community de-paving projects). • Improve community cohesion by developing community greening projects.	Public Health, Planning, HNBS, CLS, Landowners And Land Managers, Local Councillors, Local Community Groups And Single Interest Groups.
Improve, Create	**Air Quality - Trees**	Public and private realm tree planting to reduce pollution and improve character and sense of place.	• Assess current progress against GI strategy 2020 forward planning for trees planted. • Update Tree Charter and work towards Tree Cities of the World. • Ensure assessment of planned planting sites to ensure that trees will not trap pollution in street canyons.	Public Health, Air Quality Leads, Transport Planners, Planning, Forestry Agency/Environment Agency/Tree Experts

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[67] Green Infrastructure Standards for England Summary v1.1.pdf (naturalengland.org.uk)

Create, Improve	Air Quality - Schools	Improve the air quality within school grounds and at the same time consider planting trees for shade and shelter in school playing fields.	• Analyse the air quality and GI around local schools. • Consider planting hedges or green screens around schools where appropriate. • Consider planting trees in school yards for shade and shelter if none is currently available. • Involve pupils in the design and planting of GI at their schools.	Public Health, Air Quality Leads, School Heads and Boards Of Councillors,
Create, Improve	Air Quality	Consider both natural and manufactured air quality solutions in areas where the air quality is poor.	• Look at options for addition of green walls to either new or existing infrastructure. • Consider cost benefit of manufactured green air quality solutions for improving air quality locally where it is not practical to plant trees or to add green walls. • Use AQMA data to target areas. • Investigate air quality impacts from non-vehicular sources (wood burning etc).	Public Health, Air Quality Leads, Planning, Local Councillors.
Connect, Create	Biodiversity	Fully understand current nature corridors and plan to expand the network. Look at the proposed new green corridors and establish any additional routes that may be beneficial to link green spaces and reduce fragmentation.	• Mapping of current and proposed corridors. • Understand the plants/space required to provide corridors for specific species. Targeting those under threat. • Ensure plans are in place to optimise the enforcement of the BNG for new	Public Health, Planning, Environment Agency, Wildlife Specialists.

			developments when it becomes mandatory. • Consider and promote background evidence to support a higher than 10% standard of BNG for Portsmouth.	
Connect, create	**Biodiversity**	Improve biodiversity by increasing green space in the city by greening urban infrastructure.	• Consider installation of green roofs on PCC estate, other public and private buildings. • Explore potential for green bus stops/bin sheds etc	Public Health, Planning, HNBS, CLS, Environment Agency, Wildlife Specialists, Building Owners.
Create	**Cooling**	Reduce the urban heat island effect in Portsmouth by greening existing buildings and introducing shade using trees. Greening buildings will also reduce energy expenditure and work towards carbon neutrality.	• Identify suitable areas in the city centre and other areas of dense buildings where the urban heat island effects will be greatest. • Update tree planting progress and ensure correct trees in correct locations. • Consider novel cooling solutions in UHI areas unsuitable for planting trees.	Public Health, Planning, HNBS, CLS, Environment Agency, Wildlife Specialists, Building Owners.
Create, Improve	**Flooding**	Target areas most at risk of surface water flooding for intervention with natural flood management techniques. Create green spaces that also function as sustainable drainage systems.	• Link with Flood Prevention strategy to identify key local sites for SuDs systems. • Consider installation of green roofs/walls on PCC estate, other public and private buildings. • Consider community de-paving projects • Look at examples of solutions used elsewhere in the UK and understand best practice for installation of new SuDs sites.	Public Health, Planning, Lead Local Flood Authorities, Water Companies, Local Resilience Forums, Environment Agency