Sheffield City Council Proposal

Growing within the city: How unproductive space within Sheffield can help improve the health of citizens and help meet rising food demands.

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Executive summary

Currently, there is more than enough unproductive space within Sheffield to meet the food requirements of the population without disrupting existing urban infrastructure. Urban horticulture is the small-scale growing of crops within urban environments and is increasingly being seen as the solution to meeting food requirements more sustainably. A recent study has revealed Sheffield has up to 98m² per person of unutilised space available to grow crops - this is over 4x of what is used nationally for commercial farming[1]. This proposal advocates for the utilisation of these spaces, including council-owned land, for the growth of crops within the city. It is recommended the council alter land allocation and planning permission to encourage the implementation of community gardens, allotments and hydroponic systems. The proposal also emphasises the need for a council-led public engagement and education program to ensure residents participate in the initiative. Strategic implementation of urban horticulture in Sheffield presents a compelling opportunity to connect residents to nutritious, locally grown food, enhance green spaces within the city and boost the economy,

Introduction

Currently, one of the most prevalent issues in the UK is food insecurity. Specifically in Sheffield, 2.5% of adults in the city dealt with hunger from lack of food, whilst a further 11.43% worried about accessing enough food[2]. Additionally, Sheffield is an urban area, but most agricultural activity resides in the countryside or abroad. This means there is a disconnect between where food is grown and the people who need it. Increasingly, this disconnect will widen as climate change continues to exacerbate, shortening growing seasons and disrupting supply chains. Resulting in a pressing need to develop new food systems which can withstand oncoming environmental pressures and increase availability to healthy produce.

However, there is an exciting opportunity to connect the residents of Sheffield directly to locally grown, nutritious crops by integrating horticulture into the urban infrastructure. In Sheffield alone, green infrastructure covers an astounding 10,600 ha[3], demonstrating the huge potential to utilise these spaces for food production without disrupting the existing urban fabric. Growing crops within the city will revolutionise Sheffield's food production system, providing residents with the unique luxury of not just knowing where their food comes from but having it grown right on their doorstep.

Moreover, implementing these strategies can help Sheffield reach the five strategic outcomes outlined in the Sheffield City Council plan 2024-2028[4]. These five outcomes revolve around three policy drivers: the welfare of people, prosperity and the planet, and growing food locally can aid all three.

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[1] Edmondson, J., et al. (2020). 'The hidden potential of urban horticulture'. *Nature Food*, 1:3, 155-159.
[2] Sheffield City Council (2022). *Fairer, Healthier, Greener: A Food Strategy for Sheffield*
[3] Edmondson, J., et al. (2020). 'The hidden potential of urban horticulture'. *Nature Food*, 1:3, 155-159.
[4] Sheffield City Council (2024). *Sheffield City Council 2024-2028.*

Figure 1: 'Policy Drivers' (Sheffield City Council, 2024)[5].

Specifically related to the planet policy driver, Sheffield Council states:

'Sheffield will be a successful, accessible city which prospers while protecting the environment for future generations. We have an opportunity to play a leading role in a just transition to a low-carbon future for Sheffield, with a growing green economy, respecting our Outdoor City and treating our planet well, creating a sustainable future with communities.

Integrating urban horticulture into Sheffield can support a reduction in carbon emissions, elevate green space within the city and contribute towards job creation in a new green sector, as well as a host of other benefits. This proposal will demonstrate the evidence of space to grow in Sheffield, propose actional steps for implementation, and outline the potential social, environmental, and economic impacts of urban horticulture, ensuring a sustainable and community-driven approach to greening Sheffield.

Contextual information

The case study focuses on utilising peri-urban areas, which can be defined as non-urban landscapes adjacent to or surrounding urban areas[6]. Peri-urban space comprises both green and grey infrastructure, where green infrastructure includes parks, gardens, roadside verges and woodland, and grey infrastructure describes buildings.

[5] Sheffield City Council (2024). *Policy drivers*, Sheffield City Council Plan 2024-2028

[6] Buxton, M. (2022). 'Connecting peri-urban theory with policy: implications for practice', *Mapping and Forecasting Land Use*, 55-94.

The case study investigates soil-based horticulture as the primary growing system, occurring within green infrastructure, which occupies 45% of peri-urban space[7]. This would involve utilising urban allotments (rented plots specifically for use by individuals) private and community gardens for growing produce.

However, another growing system, although smaller scale, which could contribute to meeting demands is controlled environment horticulture. Otherwise known as hydroponics, it is a growing technique where plants are grown in a nutrient and water solution as opposed to soil in greenhouse systems[8]. This technique enables the production of high-yield, high-value crops such as tomatoes and its controlled environment allows year-round growing. Hydroponics can be implemented into unproductive grey infrastructure such as flat rooftops.

Figure 2: '*The hydroponic lab on the roof' (Madden, 2010)*[9]*. Figure shows a model of a hydroponic growing system on a flat rooftop.*

Evidence of space

A recent study analysed the potential space in Sheffield for growing crops, revealing there is more than enough space available to feed the population[10].

Green infrastructure in Sheffield covers 10,600ha, of this, 5752ha (54%) is suitable for growing crops. This represents 98m² of space per person in Sheffield. This is an upper estimate given that all land would not be usable in practice. However, in the UK, an average of 23m² of land per person is used for commercial farming of fruit and vegetables. Therefore, even using less than a quarter of this suitable land would be enough to meet the requirements of the population. If 100% of the suitable 5752ha was used for growing, this could feed approximately 709,000 people per year on their '5 a day' diet, or 122% of the population of Sheffield. More realistically, if only 10% of

[7] Edmondson, J., et al. (2020). 'The hidden potential of urban horticulture'. *Nature Food*, 1:3, 155-159.
[8] Palande, V., Zaheer, A. & George, K. (20180 'Fully Automated Hydroponic System for Indoor Plant Growth', *Procedia Computer Science*, 129, Pages 482-488.
[9] Madden, N. (2010). *TechNewsWorld.*
[10] Edmondson, J., et al. (2020). 'The hidden potential of urban horticulture'. *Nature Food*, 1:3, 155-159.

domestic gardens, 10% of the potential land identified and allotment plots were used, it could feed 12% of Sheffield's population per year.

The commercial city centre covers 229ha, and flat rooftops to be used for controlled environment horticulture comprise 13.9% (32ha) of this area. This would equal just 0.5m² per person; however, the high yield of hydroponics means this could still significantly contribute to crop production. For instance, tomatoes account for 21% of vegetables imported into the UK. If only 10% of flat rooftops identified were used for hydroponics, it is possible to grow enough tomatoes to feed 2% of the population on a 'five a day diet'. This increases to 12% of the population if 75% of rooftops were used.

These results demonstrate there is considerable space for urban horticulture to be implemented in Sheffield without disrupting existing urban systems. Analysis of growth potential within these spaces reveals that yields produced could significantly contribute towards meeting population dietary demands.

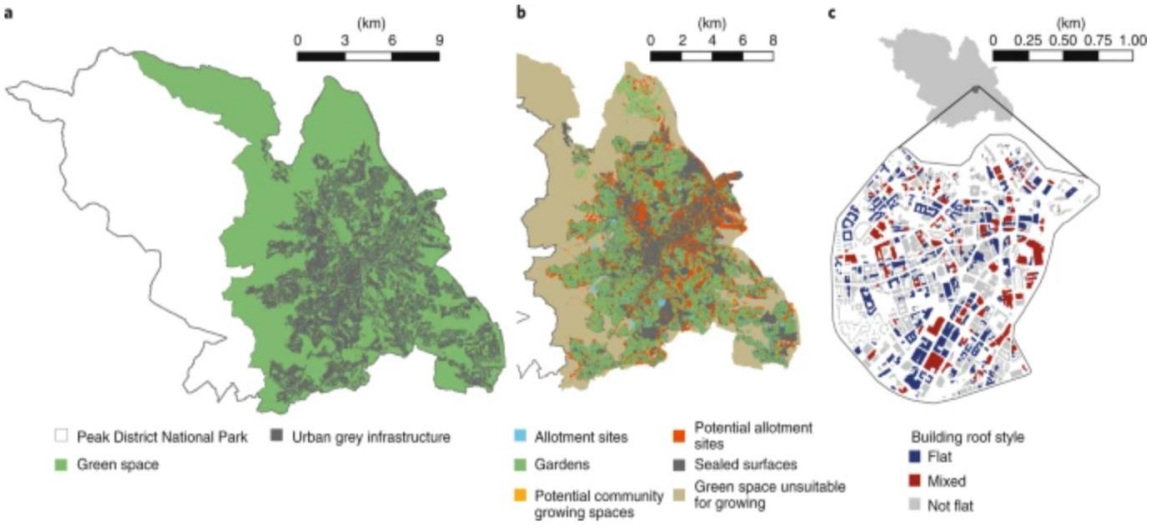

Figure 3: *'The city of Sheffield' (Edmonson et al., 2020)*[11]*. The figure shows a) the current land use of green and grey infrastructure within the local authority boundary, b) the current land available and green infrastructure suitable for urban horticulture, and c) grey infrastructure with flat roofs suitable for urban horticulture within the city centre.*

Framework for implementation

Implementing urban horticulture in Sheffield involves a multi-faceted plan, tackling various growing methods and infrastructure types. Food production encompasses growing, harvesting, postharvest handling, storage and distributing before consumption[12]. (Primarily, this report proposes the establishment of soil-based horticulture into green infrastructure, focusing on seasonal crops to be consumed by the individual, household, or community. This is to be supplemented with controlled environment horticulture, namely hydroponics, situated on unused rooftops within the city centre. This framework will outline prominent

[11] Edmondson, J., et al. (2020). 'The hidden potential of urban horticulture'. *Nature Food*, 1:3, 155-159.
[12] Congreves, K.A. (2022). '*Urban horticulture for sustainable food systems*'. Frontiers in Sustainable Food Systems.

stakeholders, mechanisms of public engagement, potential challenges, an approximate budget, and a proposed timeline of implementation.

Principle objectives

1. Increase local food production within the city to reduce dependence on external supply chains.
2. Soil-based growing by individuals, households, and communities is to be expanded into allotments, private gardens, and community gardens.
3. Hydroponic growing systems to be situated on flat rooftops within the city centre
4. Change land allocation and planning permission to encourage the use of extra-urban spaces for food production.
5. Foster community engagement and social cohesion via gardening programs.
6. Support local economies through urban agriculture initiatives, such as markets or sales to local venue operators.

Stakeholders and Engagement

There is a variety of stakeholders who will have a vested interest in the project. Sheffield City Council should aim to consider the interests of these parties to establish a system that aligns with the goals of all involved. Moreover, communication and partnership with these stakeholders are essential to gather diverse experiences and foster cohesion throughout the community.

Primarily, the residents of Sheffield will be the most important stakeholders, as the success of urban horticulture relies on their willingness to participate in growing food. Public engagement with the project is certain to be one of the biggest challenges in establishing a productive system. Raising awareness about the impacts of climate change on food security can help people understand the critical need for local food production and the motivations behind this initiative. Historical UK campaigns such as the 'Dig for Victory' initiative during WW2 demonstrate that public commitment to food production can be achieved when driven by a strong collective need[13].

Education on the social, environmental, and economic benefits associated with local food production can also bolster community support for the project. These strategies can be supported via engagement tools such as the 'Edible Mapping Project'[14]an interactive project, which can help residents visualise their environment differently.

Training programs and workshops should also be accessible to residents to teach residents the basic horticultural techniques. This will not only elevate the yields and quality of crops grown but also foster a community-orientated approach to growing food. The development of local hubs will enable tool sharing, seed exchanges, and collaborative gardening. Community enterprises in Sheffield, such as ‘Oasis’, demonstrate the benefits this can have for mental well-being[15].

Other important stakeholders will be local businesses, who should be utilised for possible sponsorship of the project, aligning with their goals of community improvement and

[13] Ginn, F. (2012). 'Dig for Victory! New histories of wartime gardening in Britain', *Journal of Historical Geography*, 38:3, 294-305.

[14] Tomkins, M. (2024). *The Edible Mapping project.*

[15] Sheffield Flourish (2024). *Oasis*.

corporate social responsibility[16]. Restaurants, cafés and shops could also potentially create a market for urban horticulture output, strengthening the local economy.

Keystone institutions such as universities and schools can support education and awareness of urban horticulture by integrating it into their curriculum or running events for their students. Specifically, the University of Sheffield would be an influential partner to have on the project. The university is an 'Institute for Sustainable Food', undertaking pioneering research to explore alternative mechanisms of food production[17]. These shared principles with the initiative indicate a strong alignment of values, making them likely to be open and enthusiastic about participating. Organisations such as ShefFood[18] also provide an excellent framework for cross-sector partnerships, working together to create a sustainable food system within Sheffield.

Policy and regulatory framework

The Sheffield City Council 'City Policies and Sites' document emphasises the need to conserve its natural environment and outlines a key aspect of the city's plan as 'guiding new development which helps protect the environment'[19].

Moreover, the Sheffield Food Strategy 2014-2017 highlights the importance of community greenspaces in encouraging residents to grow their own food. Here, the council recognises 'there is the opportunity to do more' regarding the provision of allotments and access to other parcels of land which offer the potential for growing food[20]. This ethos is emulated in the updated ''Fairer, Healthier, Greener: A Food Strategy for Sheffield: 2024-2029", including creating spaces for community food growing and holding contracts with local venue operators to buy the produce[21].

Sheffield City Council's estate is divided into four categories, 2 of which should be allocated for urban growth. The first is 'Land and Property held for regeneration and development', and the second is 'Surplus Estate', which is land or buildings that are no longer used and can be utilised to deliver benefits for the city and generate income[22]. To meet the repeated commitments the council has made throughout recent years, it is advised that a significant portion of this land be designated for urban growing. The council will also need to amend planning regulations to encourage the use of urban spaces, such as flat rooftops, for horticulture.

Costings

Council budget

'Fairer, Healthier, Greener', the proposed new Food Strategy for Sheffield, includes an allocation of £658,000 per year between 2024-2029 (£3.29m in total) for the proposals

[16] Fernando, J. (2024). *What Is CSR? Corporate Social Responsibility Explained*.
[17] University of Sheffield (2024). *Institute for Sustainable Food*.
[18] ShefFood (2024). *Welcome to ShefFood.*
[19] Sheffield City Council (2013). *City Policies and Sites (Pre-Submission).*
[20] Sheffield City Council (2013). *The Sheffield Food Strategy 2014-2017.*
[21] Sheffield City Council (2022). *Fairer, Healthier, Greener: A Food Strategy for Sheffield.*
[22] Sheffield City Council (2013). *City Policies and Sites (Pre-Submission).*

included in strategy[23]. One such was creating spaces for community growth; of course, not all of the budget will be directed towards this initiative, but it provides a solid foundation to implement urban horticulture.

Data collection

As unutilised green and grey infrastructure has already been identified by the study 'The hidden potential of urban horticulture'[24], the council will avoid costs associated with land mapping and identification of potential growing sites.

Land space and development

There will be costs associated with clearing and preparing vacant spaces for horticulture. These will vary between individual spaces and the level of work required to make them suitable. However, not all space will need preparation; the council should leverage existing resources, such as established community gardens and allotments, which will require little to no start-up costs.

Materials and equipment

Materials necessary for soil-based growing could cost between £1000-£3000 per community garden, including water storage tanks, plant beds and gardening tools. However, sharing tools and resources between gardens that are already present in the community or are donated to the project could significantly reduce these costs.

In contrast, hydroponic systems are more expensive and can cost anywhere from £500 for a small-scale system to over £100,000 for a commercial operation[25]. However, in the long term, it usually offers lower costs and higher yields than traditional agriculture[26]. There is also the potential to rent this space out to private companies, on the basis the food produced is sold locally, to recuperate some costs.

Community engagement campaigns

The workshops and training programs will be priced depending on the scale and extent of their implementation. Partnerships with schools, universities, and organisations such as ShefFood in the delivery stages will help reduce these costs. The pooling of resources, expertise and venues will create a cooperative effort that makes the programs more accessible and sustainable for the wider community. The success of this will likely determine the amount of community engagement and, thus, voluntary growing from residents, reducing labour costs.

[23] Sheffield City Council (2022). *Fairer, Healthier, Greener: A Food Strategy for Sheffield.*
[24] Edmondson, J., et al. (2020). 'The hidden potential of urban horticulture'. *Nature Food,* 1:3, 155-159.
[25] Eden Green (2024). *Analyzing the Cost and Sustainability of Hydroponic Growing Systems.*
[26] Yang, T., Altland, J.E. & Samarakoon, U.C (2023) 'Evaluation of substrates for cucumber production in the Dutch bucket hydroponic system', Scientia Horticulture, Vol 308.

Timeline of implementation

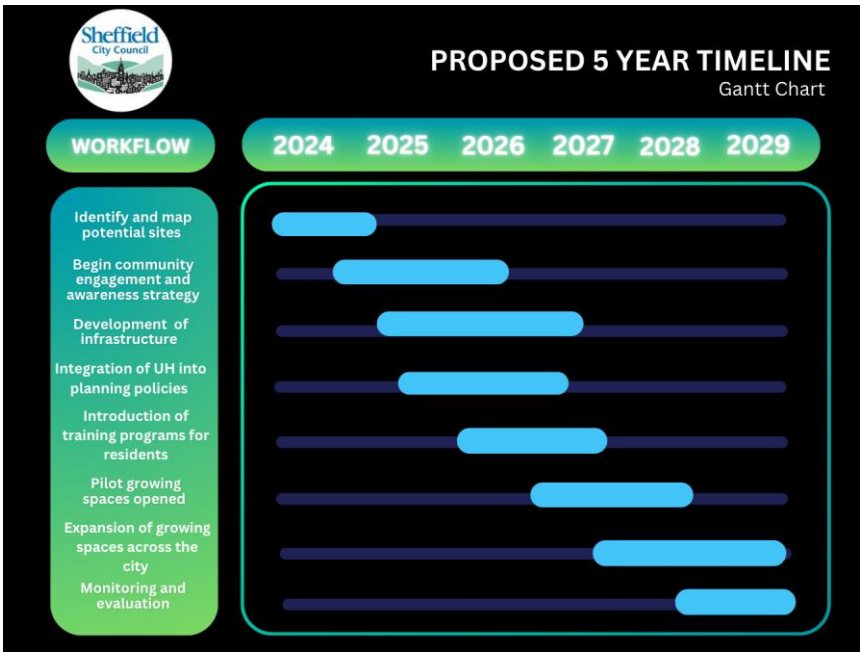

Figure 4: *Vigers, E. (2024) 'Proposed 5-year timeline'. Made with Canva. Accessible at: https://www.canva.com/graphs/templates/gantt-charts/*

Impact on the community and environment

The principal objective of urban horticulture is to improve access to nutritious food for the residents of Sheffield. This will act to reduce malnutrition and improve the health of the population whilst mitigating rising food insecurity. However, transforming the food production system can also result in a variety of other benefits.

Urban horticulture has been demonstrated to improve the well-being of individuals via the reduction of obesity, stress and community fragmentation[27]. Community gardens and shared allotment plots promote the collaboration of neighbourhoods working together to achieve a shared outcome. As a result, urban horticulture can be seen as much of a community development tool as it is a means of sustainable food production.

Community gardens also pose multiple benefits for the local environment, growing sites support physical regeneration by improving the visual quality of neglected land[28]. This can elevate Sheffield's urban landscape, creating new public spaces that connect residents with nature. Urban horticulture can also support ecosystem services such as increased carbon

[27] White, J. T. & Bunn, C. (2017). 'Growing in Glasgow: Innovative practices and emerging policy pathways for urban agriculture'. *Land Use Policy*, 68, 334–344.

[28] Thibert, J. (2012). 'Making Local Planning Work for Urban Agriculture in the North American Context: A View from the Ground' . *Journal of Planning Education and Research*, 32:3, 349-357.

storage[29], improved air quality and water regulation[30]. Therefore, investing in this initiative can have secondary benefits that improve the health and quality of Sheffield's environment.

Moving beyond theory to case studies

Increasingly, cities have the power to influence the conventional global food system more sustainably. 209 cities have joined the Milan Urban Food Policy Pact (MUFPP), which commits them to 'develop sustainable food systems which are inclusive, resilient, safe and diverse'[31]. Whilst Sheffield hasn't joined the MUFPP yet, it could explore collaboration with UK cities such as Manchester and Birmingham, which are participating in the program. This would enable the transfer of expertise in what is effective when establishing sustainable food systems.

Sheffield can also take inspiration from other city-led food projects such as "Keep Growing Detroit', which focuses on growing crops within community gardens. Their goal is to have the majority of fruits and vegetables grown by residents within the city's limits. This is facilitated by their Garden Resource Program, which supports a network of over 2,000 urban gardens and farms within the city and the opportunity for growers to sell their crops at local market outlets[32].

Conclusions

In conclusion, Sheffield encompasses more than enough available space for urban growing to meet the fruit and vegetable requirements of its population. There is huge potential to utilise this unproductive space to establish a network of sustainable, locally grown crops, which not only enhance the diet but also the broader well-being of its residents. This proposal has recommended the conversion of these areas, specifically council-owned land, to community gardens, allotments, and hydroponic systems. When realising this proposal, it will be critical to involve the residents of Sheffield as much as possible to encourage support and participation in the project. This can be done via education, training programs, engagement events and much more. Moreover, the role of stakeholders such as keystone institutions, local businesses and community enterprises will be essential to establishing a collaborative, multi-faceted network that can most successfully drive the initiative forward. Urban horticulture can become a cornerstone of a greener, healthier and more resilient city. This project has the power to position Sheffield as a pioneering city in sustainable urban horticulture and inspire similar initiatives across the UK.

[29]Edmondson, J., et al. (2014). 'Urban cultivation in allotments maintains soil qualities adversely affected by conventional agriculture', *Journal of Applied Ecology*, 51:4, 880-889.

[30] Lin, B.B., Philpott, S. M. & Jha, S. (2015). 'The future of urban agriculture and biodiversity-ecosystem services: Challenges and next steps', *Basic and Applied Ecology*, 16:3, 189-201.

[31] Milan Urban Food Policy Pact (2024*). Home*

[32] Keep Growing Detroit, (2024). *About Us*.

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