

ROADMAP FOR A RESILIENT AND SUSTAINABLE MELBOURNE FOODBOWL

A Foodprint Melbourne Report
March 2019



Funder

This research was funded by the Lord Mayor's Charitable Foundation.

Project partners

University of Melbourne
Lord Mayor's Charitable Foundation
Cardinia Shire
City of Melbourne
City of Whittlesea
Interface Councils
LeadWest
Mornington Peninsula Shire Council
Peri-urban Group of Rural Councils
Port Phillip and Westernport Catchment Management Authority
Wyndham City

This report can be cited as:

Carey, R., Larsen, K. and Sheridan, J. (2019) Roadmap for a resilient and sustainable Melbourne foodbowl. University of Melbourne. doi.10.26188/5c92e85dd6edf

Acknowledgements

Design Kate Harrison, Studio Eleveses

Photography Matthew Carey, Christian Duell, US Department of Agriculture, Stanley Zimny, Greenbelt Alliance, Local Compost, Moffits Farm, normanack

Research Assistance Andrew Knox

Our thanks to a number of expert reviewers from a variety of private consultancies, universities, and government departments.

For enquiries about this report, contact:

Dr Rachel Carey in the Faculty of Veterinary and Agricultural Sciences at the University of Melbourne
rachel.carey@unimelb.edu.au
+61 3 8344 1567

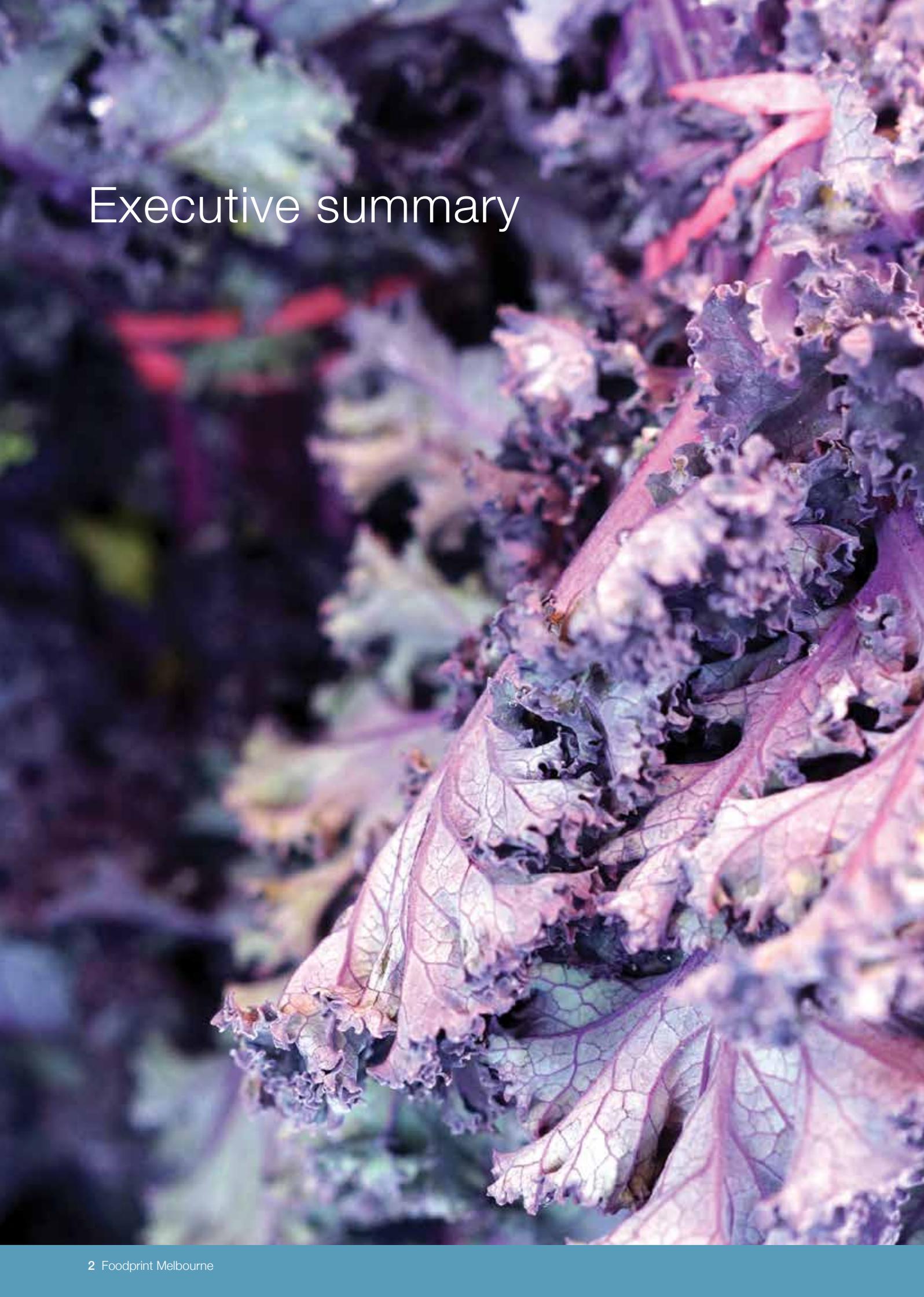
This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License. Photographs remain copyright of the photographers and may not be reused. Unless specified other images and infographics are licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.

**Disclaimer**

The opinions in this report are those of the authors and do not necessarily represent the views of the University of Melbourne or project partners. While care has been taken in preparing the content of this material, the University of Melbourne cannot accept any liability, including for any loss or damage, resulting from the reliance on the content, or for its accuracy, currency and completeness. Any remaining errors or omissions are the responsibility of the authors.

Table of Contents

Executive summary	2
1 Introduction	4
1.1 About this report	7
1.2 About the Foodprint Melbourne project	7
1.3 Our approach	8
2 Challenges to Melbourne's foodbowl	10
2.1 Land and soil	11
2.2 Farm viability	12
2.3 Climate change	13
2.4 Water	15
2.5 Fertilisers and fossil fuels	16
2.6 Biodiversity	17
3 Roadmap for a resilient Melbourne foodbowl	18
3.1 An integrated approach	19
3.2 Farmland protection	27
3.3 Farm viability	36
3.4 Water access	46
3.5 Nutrient recycling	55
3.6 Sustainable farming	63
4 Evidence gaps and future research	74

A close-up photograph of various leafy greens, including purple and red varieties, filling the background. The leaves are detailed, showing veins and textures. The colors range from deep purple to bright red, with some green leaves visible in the background.

Executive summary

This report outlines a vision and roadmap for preserving Melbourne's foodbowl for current and future generations as a fundamental building block in a healthy, resilient, sustainable and fair food system. This vision and 'roadmap' was developed through a collaborative process involving stakeholders. Key elements include:

- **Five key pillars of policy action** underpin a resilient and sustainable city foodbowl – farmland protection, farm viability, water access, nutrient recycling and sustainable farming
- **Farmland should be permanently protected** on Melbourne's fringe by maintaining Melbourne's Urban Growth Boundary, mapping agricultural land and introducing a new food production 'zone' that strengthens farmland protection
- **Promoting the viability of farming in Melbourne's foodbowl** is as important as protecting farmland
- Farm viability should be promoted by **investing in infrastructure that enables small-medium scale farmers to gain greater control** of supply chains, ensuring that peri-urban producers are able to access relevant funding streams and applying differential government 'farm rates' to all actively farmed land
- **Water reuse for food production should be increased** to address water scarcity in a warming climate
- Water reuse should be increased by adopting an **integrated water management approach** to managing water assets in farming areas, developing integrated assessment frameworks to cost delivery of recycled water and investigating options for greater reuse of storm water
- City foodbowls offer opportunities to close the loop by **returning valuable nutrients from city organic waste back to the soil**
- **Nutrient recycling on farm should be promoted by** preventing contamination of organic waste streams, collaborating with farmers to develop 'fit for purpose' compost products and establishing a Melbourne Nutrient Recycling Network
- **Sustainable farming should be incentivised** in Melbourne's foodbowl through **local government rate rebates**, direct payments and extension services aimed at peri-urban farmers
- **A diverse range of sustainable farming approaches should be promoted** to increase the resilience of the city's food system, including regenerative and agroecological approaches, sustainable intensification and closed-environment agriculture
- **A local government alliance should be established** to support sustainable food production in Melbourne's foodbowl
- Planning for a sustainable and resilient city foodbowl requires **an integrated policy approach**
- **A food systems planning strategy** should be developed for Melbourne that aims to promote a resilient, sustainable, healthy and fair food system for the city

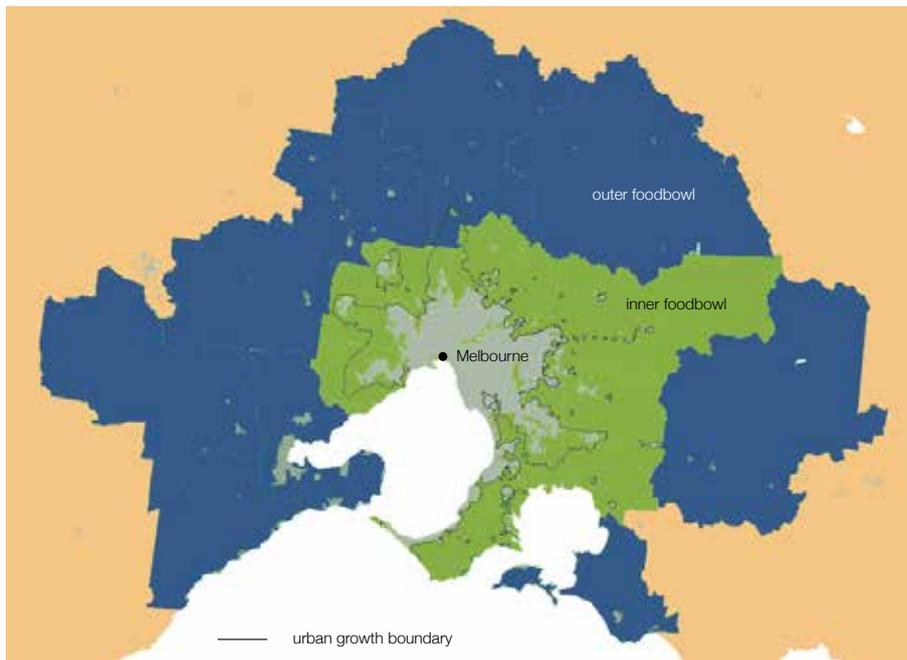
A close-up photograph of rosemary leaves, showing their characteristic needle-like shape and silvery undersides. The leaves are densely packed and have a vibrant green color with some silvery tones. The background is dark and out of focus, making the rosemary the central focus of the image.

SECTION 1

Introduction

Melbourne is ringed by a highly productive foodbowl that produces a wide variety of fresh foods for city residents, as well as contributing to national and global food supply. For much of its history, Melbourne's 'hinterland' has been managed in a way that enabled it to provide food for the people settled there. The peoples of the Kulin nation carefully managed the ecosystems in the region and their natural resources for tens of thousands of years. After European settlement, the city was virtually self-sufficient in fresh vegetables (and many other foods were supplied mainly from within the state) until the Second World War.¹ City planners then created Melbourne's 'green wedges' in the 1970s, preserving some of the most productive farmland in the state.²

Figure 1 Melbourne's foodbowl



- 1 Carey, R, Larsen, K, Sheridan, J and Candy, S (2016) *Melbourne's food future: Planning a resilient city foodbowl*. Melbourne: Victorian Eco-Innovation Lab.
- 2 Carey, R, Sheridan, J and Larsen, K (2018) *Food for Thought: Challenges and opportunities for farming in Melbourne's foodbowl*. Melbourne: University of Melbourne. doi:10.26188/5b46f9ab37a94 Sheridan, J, Larsen, K, and Carey, R (2015) *Melbourne's foodbowl: Now and at 7 million*. Melbourne: Victorian Eco-Innovation Lab.

Melbourne's foodbowl is still an important source of fresh food. In 2015, it had the capacity to meet around 41% of Greater Melbourne's food needs and over 80% of its fresh vegetable needs.³ However, while the city's demand for food is increasing due to rapid population growth, the capacity of Melbourne's foodbowl to meet this demand is falling, as farmland is displaced for new housing. Melbourne is predicted to reach a population of at least 8.6 million by 2066.⁴ If the city continues to grow as it has in the past, by the time it reaches a population of 7 million, the capacity of Melbourne's foodbowl to meet the city's food needs could fall from 41% to 18%.⁵ The legacy of previous generations, who preserved the capacity of the city's hinterland to help meet the food needs of residents, is at risk.

Yet if Melbourne can retain its foodbowl as the city grows, the potential rewards are significant. Melbourne's foodbowl could form a fundamental building block in a resilient, sustainable, healthy and fair food supply for the city. In particular, it could help the city to address increasing pressures on its food supply from population growth, climate change (see section 2.3) and declining availability of the natural resources that underpin food production, such as land, water and fossil fuels (see sections 2.1, 2.4 and 2.5). Farmers close to cities not only have access to markets, labour and transport infrastructure. They also have access to water and nutrients from city waste streams (see section 3.4 and 3.5). More of the city's wastewater could be made available to farmers in Melbourne's foodbowl to counter water scarcity for food production in a drying climate, and more of the city's organic waste could be processed into compost and biofertilisers for use on nearby farms to counter tightening supply of conventional fertilisers and their environmental impact.

These strategies to increase the resilience of the city's food system will only be available in future if a precautionary approach is adopted now to retaining the city's farmland and promoting the viability of its farmers. This report outlines a vision and roadmap for preserving Melbourne's foodbowl as a source of fresh food for current and future generations, so that it can support the city's goal of ensuring access to healthy food for all⁶ and can continue to support Melbourne's liveability and vibrant food culture.

If Melbourne can retain its foodbowl as the city grows, the potential rewards are significant

Farmers close to cities have access to water and nutrients from city waste streams

3 Sheridan, J, Larsen, K, and Carey, R (2015) As above.

4 ABS (2018) 3222.0 – Population projections, Australia, 2017 (base) – 2066. November 2018. Canberra: Australian Bureau of Statistics.

5 Sheridan, J, Larsen, K, and Carey, R (2015) As above.

6 City of Melbourne (2012) Food city: City of Melbourne food policy. Melbourne: City of Melbourne.

1.1 About this report

This report from the Foodprint Melbourne project summarises the challenges facing Melbourne's foodbowl and outlines a roadmap of strategies and policy approaches for strengthening the resilience of the region. The report presents recommendations in five key areas: farmland protection, farm viability, water access, nutrient recycling and sustainable farming. Each of these areas needs to be addressed to promote a resilient and sustainable foodbowl for Melbourne. It is also important that an integrated policy approach is implemented that makes connections between these areas.

The report builds on the findings of previous reports from the Foodprint Melbourne project (see below), and particularly on the report *Food for Thought: Challenges and opportunities for farming in Melbourne's foodbowl*, which identified the policy challenges facing Melbourne's foodbowl and opportunities to strengthen food production in the region.

1.2 About the Foodprint Melbourne project

The Foodprint Melbourne project is led by an inter-faculty team at the University of Melbourne, with team members based in the Faculty of Veterinary and Agricultural Sciences and the Melbourne Sustainable Society Institute. The project is funded by the Lord Mayor's Charitable Foundation and involves local governments as key partners.

The previous phase of the Foodprint Melbourne project generated an evidence base about the significance of Melbourne's foodbowl to the city's food supply in the context of a rapidly growing population and pressures on food supply from climate change and declining supplies of the natural resources (such as land, water and fossil fuels) that underpin food production. Three reports⁷ made the case that Melbourne's foodbowl is a fundamental building block in a resilient and sustainable food system for Melbourne.

This phase of the project builds on the evidence base generated in the previous phase. It aims to develop a *roadmap* of potential strategies and policies to address the issues and challenges identified previously in order to strengthen the resilience of Melbourne's foodbowl.

⁷ Sheridan, J, Larsen, K, and Carey, R (2015) As above; Sheridan, J, Carey, R and Candy, S (2016) *Melbourne's foodprint: What does it take to feed a city?* Melbourne: Victorian Eco-innovation Lab; Carey, R, Larsen, K, Sheridan, J and Candy, S (2016) As above.

1.3 Our approach

The recommendations presented in this report have been informed by (i) desktop review of Victorian state government and local government policy, (ii) interviews with Victorian stakeholders about the challenges facing Melbourne's foodbowl and potential approaches for addressing the challenges, (iii) case studies of three examples of international best practice to identify policy approaches of relevance to Melbourne, and (iv) workshops with Victorian stakeholders, including a workshop to review a set of draft recommendations.

Desktop review included a review of the state and local government policy influences on farmland protection, water access and farm viability in Melbourne's foodbowl. This included analysis of relevant policy documents, legislation, reports of government inquiries, media releases and websites of government departments.

Interviews were conducted with 24 stakeholders (21 interviews, some involving more than one participant). Participants came from state and local government, industry (including farmers) and civil society groups. Interviews lasted 45-60 minutes and were recorded with the consent of interviewees.

Case studies of international best practice focused on Toronto (Ontario, Canada), Vancouver (British Columbia, Canada) and Portland (Oregon, USA). These cities were chosen because they face similar challenges to Melbourne (e.g. rapid population growth and pressure on the urban fringe) and because each is recognised as an international leader in protecting the region of food production on its fringe. The case studies involved desktop review of relevant policy documents and interviews with representatives of organisations involved in aspects of the governance of city fringe foodbowls and some academics. Eight interviews were conducted in total via video conference or phone. Interviews lasted 45-60 minutes and were recorded with the consent of participants.

Workshops were conducted between July 2018 and February 2019. Five workshops were conducted with around 20 participants per workshop, and 62 participants were involved in total (some participants attended more than one workshop). During workshops, participants were asked to work in cross-sector teams (involving stakeholders from local and state government departments, farmers, industry and civil society groups) to identify strategies to strengthen the resilience of Melbourne's foodbowl. Christian Duell of Whitelight Education facilitated and helped design the workshops, working alongside the Foodprint Melbourne team. A 'co-design' approach was adopted, in which representatives of key stakeholder groups collaborated in the workshops on developing solutions. To create a safe space for participants to work together and share their views openly, they were asked to consent to the use of the 'Chatham House Rule' during workshops, in which they were free to use information gained during the workshop, but not to reveal the identity of participants. The participants and organisations involved are also not identified here.



SECTION 2

Challenges to Melbourne's foodbowl

Melbourne's foodbowl faces a range of challenges, including climate change, unreliable supplies of the natural resources that underpin food production (land, water, fossil fuels and phosphate rock), the impacts of unsustainable farming practices on natural ecosystems and pressures on the viability of farming in the region. Many of these pressures are likely to increase in future (particularly pressures related to climate change and contested supplies of natural resources). If Melbourne's foodbowl is to continue to meet the needs of current and future generations for fresh, healthy food, it is important to plan now for actions to address these challenges.

2.1 Land and soil

Melbourne's foodbowl faces challenges from loss of agricultural land to other uses and from degradation of soils. Loss of farmland due to urban expansion on Melbourne's fringe is an ongoing risk that has the potential to impact both the productive capacity of Melbourne's foodbowl and the region's economy.⁸ Melbourne is Australia's most rapidly growing city and is predicted to reach a population of between 8.6 and 12.2 million by 2066 to become the nation's largest city.⁹ Population growth has historically occurred mainly on the city fringe at relatively low rates of urban density. If the city continues to grow as it has in the past, by the time it reaches a population of 7 million, the capacity of Melbourne's foodbowl to feed the city could fall from 41% to around 18%, due to a combination of increasing population, loss of farmland and land degradation.¹⁰

Soils provide a range of important ecosystem services, including supporting food production, providing habitat for native plants and animals, cycling nutrients, decomposing waste, storing carbon and supporting the ecosystem services that provide clean air and water.¹¹ Good soil health also underpins the state's economy: Victoria's soils support around \$14 billion in agricultural production.¹² Soils form over thousands of years, but damage occurs more rapidly.¹³ The Victorian Catchment Management Council has assessed soil condition as poor in three out of ten of Victoria's catchments (including Port Phillip and Westernport) and moderate in five other catchments.¹⁴ In view of the increasing impacts of climate change, soil condition has also been assessed as 'declining' across the state.¹⁵ Key issues affecting Victoria's soils include salinity, acidification, erosion and loss of soil structure, and low carbon content.¹⁶ Many of these issues are caused or exacerbated by intensive agricultural production.

The capacity of Melbourne's foodbowl to feed the city could fall from 41% to around 18% by the time it reaches a population of 7 million

8 Carey, R, Larsen, K, Sheridan, J and Candy, S (2016) As above.

9 ABS (2018) As above.

10 Sheridan, J, Larsen, K and Carey, R (2015) As above.

11 Department of Sustainability and Environment (2012) *Soil health strategy: Protecting soil health for environmental values on public and private land*. July 2012. Melbourne: DSE.

12 Value of agriculture in Victoria in 2016-17. See ABARES (2019) *About my region – Victoria, value of agricultural production*. Available: <http://www.agriculture.gov.au/abares/research-topics/aboutmyregion/vic#agricultural-sector> (accessed 11 March 2019).

13 Australian Government (2016) *Australia State of the Environment 2016*. Canberra: Australian Government.

14 VCMC (2017) *Catchment Condition and Management Report – 2017*, The State of Victoria, Victorian Catchment Management Council, p4.

15 Commissioner for Environmental Sustainability Victoria (2018) *Interim Victorian State of the Environment report*. Melbourne: Victorian State Government.

16 Commissioner for Environmental Sustainability Victoria (2013) As above.

Salinity (high salt levels) in soils is caused by the removal of native vegetation and over-irrigation. It has a significant effect on both agricultural production and biodiversity as most plants are not adapted to grow in saline soils. The prevalence of soil salinity in Victoria is unclear due to lack of data.¹⁷ Acidification of soils is a natural process that is exacerbated by over-application of synthetic fertilisers and clearing of vegetation. Soil acidification affects around half of Australia's agricultural soils, reducing productivity and limiting the range of crops that can be grown.¹⁸ Soil erosion and loss of soil structure occurs mainly through the effects of water and wind.

There is a need to shift to more sustainable farming approaches

Farm practices that make soils vulnerable to erosion and loss of structure include removal of ground cover and cultivation of the soil. It is estimated that around 60% of Victoria's soils are vulnerable to erosion and loss of soil structure.¹⁹ Soil carbon is mostly found in organic matter. It helps to build soil structure, supports water retention and also reduces the amount of carbon released to the atmosphere. Carbon levels are low in Australian topsoils by international standards, but estimated to be relatively high in Victoria compared to other parts of the country.²⁰ There is a need to shift to more sustainable farming approaches that promote retention of native vegetation and continuous ground cover, and that reduce soil disturbance, over-irrigation of crops and over-application of conventional fertilisers (see section 3.6).²¹

2.2 Farm viability

Farmers across Victoria are caught in a tight 'cost price squeeze' as the cost of inputs (like fertilisers, labour, fuel and water) rises and the farmgate price for their produce falls. Farmgate prices have fallen as a result of downward pressure from the major retailers and competition from cheap imports.²² The cost of inputs (such as water and fertilisers) will continue to rise as a result of climate change and declining supplies of the natural resources that underpin food production (such as phosphate rock and fossil fuels) (see sections 2.3, 2.4 and 2.5). In addition to these pressures, farmers in Melbourne's foodbowl face additional challenges due to the high costs of farming close to the city and the conflicts that can arise in farming close to residential areas.²³

Farmers across Victoria are caught in a tight cost-price squeeze

The cost of farmland on Melbourne's fringe is higher than in other areas of Victoria, fuelled by speculative investment in land close to the Urban Growth Boundary. This makes it difficult for new and young farmers to enter farming in the region and also increases the cost of local government rates.²⁴ The limited availability of land on the city fringe and the relatively small parcels of land make it difficult for farmers to expand in order to gain economies of scale, so they need to look to other strategies to increase their profitability.

17 Commissioner for Environmental Sustainability Victoria (2013) *Victoria: State of the Environment*. Melbourne: Victorian State Government.

18 Australian Government (2016) As above.

19 Commissioner for Environmental Sustainability Victoria (2013) As above.

20 Commissioner for Environmental Sustainability Victoria (2013) As above.

21 Australian Government (2016) As above; Commissioner for Environmental Sustainability Victoria (2013) As above.

22 James, S (2016) Beyond local food: How supermarkets and consumer choice affect the economic reality of small scale family farms in Sydney. Area 48: 103-110.

23 Carey, R, Sheridan, J and Larsen, K (2018) As above.

24 Carey, R, Sheridan, J and Larsen, K (2018) As above.

There are farms in Melbourne's foodbowl of all sizes, but there is a relatively high proportion of small scale farms and part-time farmers, who may not produce at a scale that enables them to sell through conventional retail channels, such as through the major retailers. Farmers on the city fringe often find other sales channels and routes to profitability, such as producing high value or quality products and diversifying into agritourism activities.²⁵ Farms in Melbourne's foodbowl have the advantage of proximity to city markets and the opportunity to sell direct into local and regional markets. Yet they may lack access to appropriate infrastructure that enables them to take advantage of these opportunities (such as micro-abattoirs or community processing facilities).²⁶

One of the key lessons of the international best practice case studies conducted for this research is that farmers on the fringes of cities can thrive and reap the rewards of their proximity to markets²⁷ if strategies are implemented to actively promote the viability of farming in these areas and to address the particular challenges that they face (see section 3.3).

Farmers on the fringes of cities can thrive and reap the rewards of their proximity to markets

2.3 Climate change

The impacts of climate change on Australian agriculture are already being felt and climate change will continue to have a profound impact on agriculture in Victoria, including in Melbourne's foodbowl.²⁸ Australia's climate has experienced around 1°C of warming since 1910, with an increase in extreme heat days and a worsening of drought conditions. There has been a reduction in Autumn-Winter rainfall in south-eastern Australia, but also an increase in intense (and damaging) rainfall events.²⁹ Heatwaves and drought in the region have reduced crop yields and increased food prices, particularly for fresh foods. Between 2002 and 2009 (during the Millennium Drought), wheat yields in the Murray-Darling Basin were 18-22% lower than would have otherwise been expected³⁰, and in 2009, a heatwave led to the loss of 60-80% of the strawberry crop and 20-25% of the apple crop in the Port Phillip region of Victoria (in Melbourne's foodbowl). Between 2007 and 2009, at the height of the Millennium Drought, the price of fresh vegetables in Australia increased by 33% and the price of fresh fruit by 43%.³¹

25 Carey, R, Sheridan, J and Larsen, K (2018) As above.

26 Carey, R, Sheridan, J and Larsen, K (2018) As above.

27 Carey, R, Sheridan, J and Larsen, K (2018) As above.

28 Steffen, W, Vertessy, R, Dean, A, Hughes, L, Bambrick, H, Gergis, J and Rice, M (2018) *Deluge and drought: Australia's water security in a changing climate*. Climate Council of Australia.

29 Bureau of Meteorology/CSIRO (2018) *State of the climate 2018*. Canberra: Bureau of Meteorology/CSIRO.

30 Van Dijk, A, Beck, H, Crosbie, R, de Jeu, R, Liu, Y, Podger, G, Timbal, B and Viney, N (2013) The millennium drought in southeast Australia (2001-2009): Natural and human causes, and implications for water resources, ecosystems, economy and society. *Water resources research* 49: 1040-1057.

31 Quiggan J (2007) *Drought, climate change and food prices in Australia*. Melbourne: Australian Conservation Foundation.

If global warming continues at its current rate, global temperature increase is likely to reach 1.5°C sometime between 2030 and 2052.³² Climate projections indicate that over coming decades Australia will experience an increase in heatwaves (with extreme temperatures around 3°C higher than now), a decrease in rainfall during cool seasons and more time in drought (but also more extreme rainfall events).³³ The risks to food production and food security will increase with further warming above 1.5°C and will depend on the rate of warming and on mitigation and adaptation efforts.³⁴ Estimates of the impacts of climate change on food production in Australia range from a 17% drop in overall production to a 92% reduction in irrigated production³⁵ in the Murray-Darling Basin (Australia's main foodbowl) by 2100 if there is a high rate of warming and no global adaptation.³⁶

Global food availability is expected to be more limited if global warming reaches 2 °C (compared to warming of 1.5 °C), and there are significant potential benefits for food security if global warming can be limited to 1.5 °C.³⁷ However, some of the pathways currently proposed for limiting global warming to 1.5 °C (with no or limited overshoot) are based on a significant reduction in the availability of agricultural land for food production in order to increase the amount of land planted to energy crops and forests.³⁸ Implementation of these pathways would pose profound challenges for food security. Other analyses point to a critical role for agriculture in actively drawing down carbon and storing it in biomass and soils. In one analysis, changed agricultural practices (together with dietary change and reducing food waste) make up eight of the top twenty global solutions available to limit temperature rise to 1.5 °C and begin drawing down carbon.³⁹

Projections of the likely future impact of climate change on food production and evidence of existing impacts underline the need to increase both mitigation and adaptation efforts. There are a number of implications for food production in Melbourne's foodbowl. Food production in the region will need to adapt to these challenging conditions through a range of sustainable farming approaches (see section 3.6). Long term planning is needed to put infrastructure in place that will enable farms in Melbourne's foodbowl to thrive under these conditions, including infrastructure to increase water reuse for food production (see sections 2.4 and 3.4). However, the proximity of Melbourne's foodbowl to the city, and its access to valuable urban waste streams (particularly wastewater and organic waste) mean that it could play an important role in future in increasing the resilience of the city's food supply to climate change.⁴⁰ A precautionary approach should be taken now to protecting Melbourne's foodbowl to provide flexibility to address future challenges to the city's food security due to climate impacts.

32 Allen, M et al. (2018) Global warming of 1.5°C: Summary for policymakers. Intergovernmental Panel on Climate Change. Switzerland: IPCC.

33 Bureau of Meteorology/CSIRO (2018) As above.

34 Allen, M et al. (2018) As above.

35 Cline (2007), cited in Hughes, L., Steffen, W. Rice, M. and Pearce, A. (2015) Feeding a Hungry Nation: Climate Change, Food and Farming in Australia. Climate Council of Australia.

36 Garnaut (2008), cited in Hughes et al. (2015) As above.

37 Allen, M et al. (2018) As above.

38 Allen, M et al. (2018) As above.

39 Project Drawdown (2107) Summary of Solutions by Overall Rank. Available: <https://www.drawdown.org/solutions-summary-by-rank> (accessed 16 March 2019).

40 See Carey, R, Larsen, K, Sheridan, J and Candy, S (2016) As above.

2.4 Water

Water availability and reliability is one of the main constraints on food production in Melbourne's foodbowl and elsewhere in the state. Melbourne is situated in a water-scarce region of the world, with increasing pressures on water supply from a rapidly growing population (see section 1), the need to restore environmental flows in stressed river systems, and climate change (see section 2.3). As a result, less water is available for food production.

The Murray-Darling Basin, Australia's most important river basin and foodbowl, is once again in drought in 2019. Rainfall was below average across the entire river basin during 2018 and inflows into the River Murray were in the lowest 10% since records began.⁴¹ As a result, the national winter crop (of cereals, oilseeds and pulses) for 2018-19 is expected to be around 20% lower than average.⁴² Recurring algal blooms and fish kills in the Murray-Darling Basin are widely seen as signs of a river system in crisis, and there are calls to reduce the amount of water diverted for irrigated agriculture to return more water to the river system.⁴³ The Basin is expected to experience additional reductions in water inflows in future due to climate change, which is likely to further reduce the availability and reliability of water for food production.⁴⁴

Food production in Melbourne's foodbowl has also been affected by water scarcity. During the Millennium Drought, farmers in Werribee Irrigation District came close to running out of water, when their river water allocations were reduced to 10% of their usual levels. They were able to continue production, because of investment in a scheme to supply recycled water from the nearby Western Treatment Plant, and a recycled water scheme for agriculture has also since been introduced at the Eastern Treatment Plant.⁴⁵ These recycled water schemes have had their challenges, including the high cost of the water, matching the availability of water to demand during the growing season, and delivering recycled water of sufficient quality (high salinity levels have been an issue for some farmers).⁴⁶ However, schemes to reuse urban wastewater for food production are likely to become more important in future in a warming climate.

Only a fraction of Melbourne's wastewater is currently reused for food production. Around 6% of the recycled water available from the Western and Eastern Treatment Plants was used for food production in 2014 to 2015, while 84% was disposed of at sea.⁴⁷ As Melbourne's population increases (see section 1), more wastewater will be processed at the city's water treatment plants. Stormwater runoff will also increase, due to the expansion of hard surfaces in new suburbs, increasing the risk of flooding.⁴⁸ More wastewater is likely to be produced than can be reused in new suburbs, and this water will need to be disposed of safely. There is an opportunity to harness more of this water for agriculture in Melbourne's foodbowl to support both the regional economy and the city's food security in a warming climate. The integrated water management framework introduced in 2017 by the Victorian Government as part of the *Water for Victoria* policy⁴⁹ offers an approach for assessing the multiple social, environmental and economic benefits of doing this (see section 3.4).

Schemes to reuse urban wastewater for food production are likely to become more important in future in a warming climate

41 Murray-Darling Basin Authority (2019a) Discover the basin – climate. Available: <https://www.mdba.gov.au/discover-basin/landscape/climate> (accessed 12 March 2019).

42 Hatfield-Dodds, S, Hughes, N, Cameron, A, Miller, M and Jackson, T (2018) Analysis of 2018 drought. ABARES. Available: <http://www.agriculture.gov.au/abares/publications/insights/2018-drought-analysis#the-current-drought-is-severe-in-some-regions-but-covers-a-smaller-area-than-previous-events> (accessed 12 March 2019).

43 E.g. Sheldon, F (2019) The Darling River is simply not supposed to dry out, even in drought. The Conversation 16 January 2019. Available: <https://theconversation.com/the-darling-river-is-simply-not-supposed-to-dry-out-even-in-drought-109880> (accessed 12 March 2019).

44 Murray-Darling Basin Authority (2019a) Discover the basin – climate. Available: <https://www.mdba.gov.au/discover-basin/landscape/climate> (accessed 12 March 2019).

45 Carey, R, Larsen, K, Sheridan, J and Candy, S (2016) As above.

46 Carey, R, Larsen, K, Sheridan, J and Candy, S (2016) As above.

47 Sheridan, J, Carey, R and Candy, S (2016) As above.

48 See Carey, R, Sheridan, J and Larsen, K (2018) As above.

49 DELWP (2016) *Water for Victoria*. Melbourne: Department of Environment, Land, Water and Planning.

2.5 Fertilisers and fossil fuels

Global food production is heavily dependent on synthetic fertilisers, which provide essential nutrients for plant growth (including nitrogen and phosphorous).⁵⁰ Food production is also dependent on fossil fuels, which provide the energy to manufacture conventional fertilisers, fuel farm machinery, and to transport and refrigerate food.⁵¹ Over-use of synthetic fertilisers and continued use of fossil fuels for food production has damaging environmental impacts, and supplies of these resources will become increasingly constrained (and more expensive) in future.⁵² A resilient and sustainable Melbourne foodbowl will need to turn to alternatives.

Synthetic fertilisers deliver phosphorous, nitrogen and other nutrients to boost crop yields. Phosphorous for fertilisers is derived from mined phosphate rock, a non-renewable resource. It is unclear how much phosphate rock remains, but it is likely to become increasingly scarce in future (around 75% is also controlled by one country, Morocco).⁵³ The nitrogen in fertilisers is manufactured using the Haber-Bosch process, an energy-intensive process dependent on fossil fuels that increases GHG emissions. Over-application of fertilisers containing these nutrients has a range of negative environmental impacts, including soil acidification⁵⁴ and pollution of waterways leading to eutrophication and algal bloom.⁵⁵

Dependence on synthetic fertilisers can be reduced by replacing them with biofertilisers derived from organic waste (including food waste), use of animal manures and through building soils by applying organic matter.⁵⁶ City foodbowls have the advantage of being close to abundant sources of organic waste and food waste from urban waste streams that can be converted into alternative sources of fertilisers (see section 3.5). Decoupling food systems from fossil fuels will be challenging. However, some Victorian farmers are generating renewable energy on farm by installing solar systems and producing their own bioenergy.⁵⁷ City foodbowls have the advantage of being close to markets, which reduces energy demand for transporting food and for refrigeration during transportation. City foodbowls also offer many opportunities for closing the loop to return valuable nutrients from city waste back to the soil, reducing the use of non-renewable resources.⁵⁸

50 Kuokkanen, A, Mikkilä, M, Kuisma, M, Kahiluoto, H and Linnanen, L (2017) The need for policy to address the food system lock-in: A case study of the Finnish context. *Journal of Cleaner Production* 140: 933-944.

51 Woods, J, Williams, A, Hughes, J, Black, M and Murphy, R (2010) Energy and the food system. *Philosophical Transactions of the Royal Society B* 365: 2991-3006.

52 Springman, M et al. (2018) Options for keeping the food system within environmental limits. *Nature* 562: 519-525. Cordell, D and White, S (2015) Tracking phosphorous security: indicators of phosphorous vulnerability in the global food system. *Food Security* 7: 337-350.

53 Cordell, D and White, S (2015) As above.

54 Australian Government (2016) *Australia State of the Environment 2016*. Canberra: Australian Government.

55 Commissioner for Environmental Sustainability Victoria (2013) *Victoria: State of the Environment*. Melbourne: Victorian State Government.

56 Du, C, Abdullah, J, Greetham, D, Fu, D, Yu, M, Ren, L, Li, S and Lu, D (2018) Valorization of food waste into biofertilizer and its field application. *Journal of Cleaner Production*. Available online 23 March 2018. <https://doi.org/10.1016/j.jclepro.2018.03.211>.

57 Agriculture Victoria (2017) *Agriculture energy investment plan*. Melbourne: DEDJTR; DELWP (2017) *Farm grown energy – BE Bioenergy*, Kaniva, Victoria. Available: <https://www.energy.vic.gov.au/renewable-energy/bioenergy/farm-grown-energy> (accessed 13 March 2019).

58 Ellen MacArthur Foundation (2019) *Cities and circular economy for food*. Cowes: Ellen MacArthur Foundation

2.6 Biodiversity

Biodiverse ecosystems provide many services to communities and to agriculture, including cleaning and filtration of water, pollination, pest and weed control.⁵⁹ Yet agriculture is one of the main drivers of biodiversity loss globally through land clearing (which leads to the loss of habitats), over-exploitation of resources (e.g. over-extraction of water from river systems) and pollution (e.g. through over-application of fertilisers).⁶⁰ Clearing of native vegetation for agriculture in Victoria has led to the loss of around half of Victoria's native vegetation (much of it on privately held land) and widespread loss of habitats. This has particularly affected grassy woodlands and native grasslands.⁶¹

Melbourne's foodbowl contains a particularly high diversity of native plants, birds and animals. The Port Phillip and Westernport region alone (which covers much of the eastern and northern parts of Melbourne's foodbowl) contains more than 1860 species of native flora and 600 species of native vertebrate fauna. Around 19% of the flora and 30% of fauna are listed as threatened (as at 2005)⁶², and around 40% of the pre-European vegetation remains in the region.⁶³

The greatest threats to biodiversity in the Port Phillip and Westernport region are from urban development (due to Melbourne's rapid growth), intensive farming, removal of native vegetation, pest plants and animals and climate change.⁶⁴ There is a need to prevent further loss of native vegetation in the region. Most of the region's remaining native vegetation is on privately held land (only around a third is in conservation areas),⁶⁵ so it is important that private landowners are engaged in programs to prevent further clearing, manage pest plants and animals and to revegetate areas. Adoption of sustainable farming approaches should also be encouraged and incentivised (see section 3.6), including integration of native biodiversity into productive farming systems e.g. perennial native grasslands and grazing grassy woodlands as part of regenerative farming approaches.

In addition to native biodiversity, biodiversity is also important in the species that support the food system. There has been a significant decline globally in the biodiversity of livestock species, food plant species, wild food species, pollinators and soil organisms.⁶⁶ Biodiversity in the plant and animal species that contribute to food supply increases the resilience of the food system to shocks and stresses, including shocks and stresses from climate change.⁶⁷ In addition to encouraging and incentivising sustainable approaches to agriculture in Melbourne's foodbowl, production of a wide range of plant and animal species should be encouraged in the region.

Agriculture is one of the main drivers of biodiversity loss globally through land clearing, over-exploitation of resources and pollution.

59 FAO (2019) *The state of the world's biodiversity for food and agriculture*. J Belanger and D Pilling (eds.). FAO Commission on Genetic Resources for Food and Agriculture Assessments. Rome: Food and Agriculture Organization of the United Nations.

60 Nellemann, C, MacDevette, M, Manders, T, Eickhout, B, Svihus, B, Prins, A, Kaltenborn, B (2009) (eds) *The environmental food crisis: The environment's role in averting future food crises*. A UNEP rapid response assessment. United Nations Environment Programme, GRID-Arendal

61 Commissioner for Environmental Sustainability Victoria (2013) As above.

62 PPWCMA (2019) *Plants and Animals*, Port Phillip and Westernport CMA. Accessed: <https://www.ppwcm.vic.gov.au/our-region/plants-animals/> (12 March 2019).

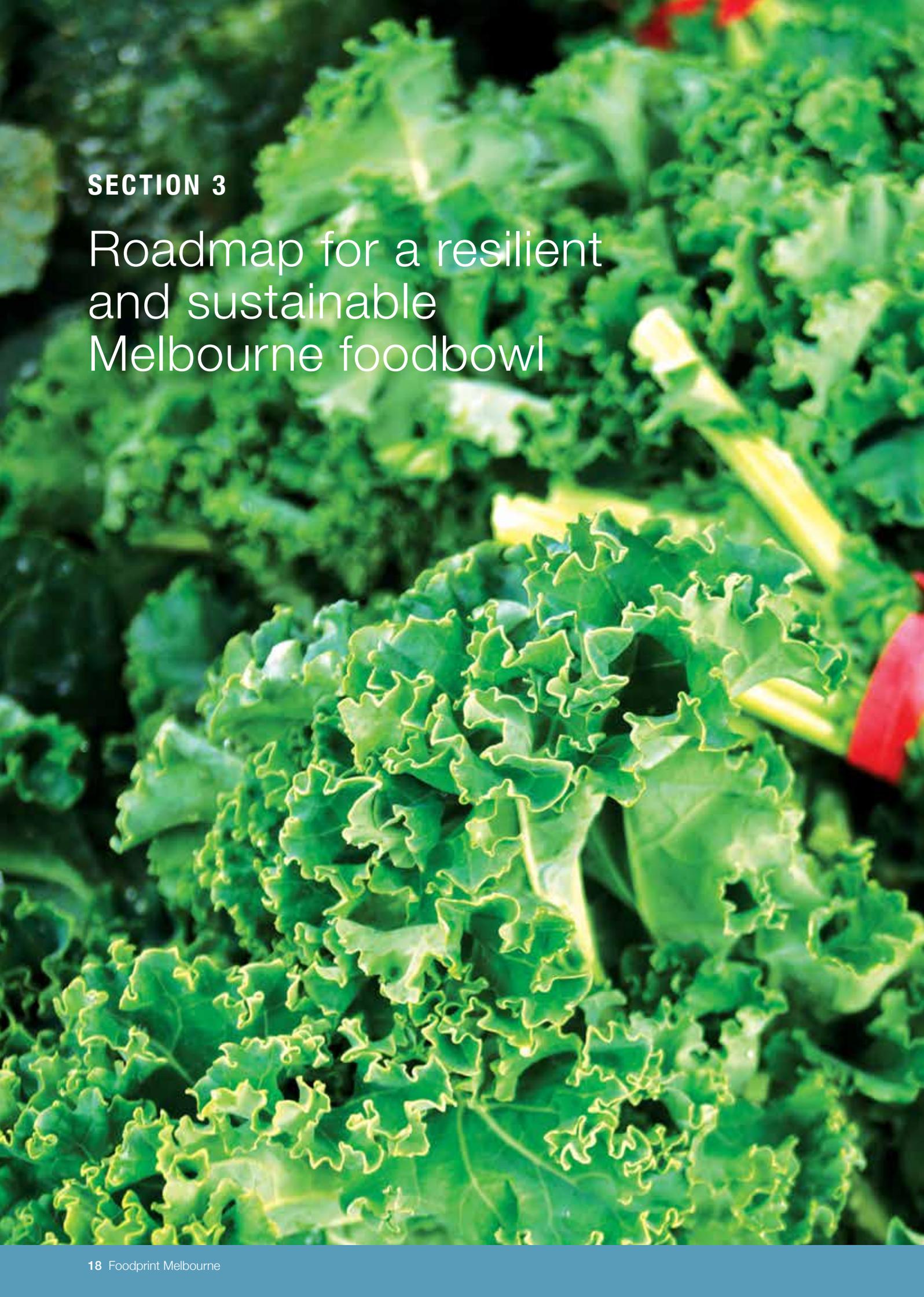
63 PPWCMA (2018) *Port Phillip and Westernport Catchment Condition Report 2017-18*. Accessed: <https://www.ppwrcs.vic.gov.au/wp-content/uploads/sites/5/2018/11/PPWCMA-catchment-condition-report-2017-18.pdf> (12 March 2019).

64 PPWCMA (2018) As above.

65 PPWCMA (2018) As above.

66 FAO (2019) As above.

67 FAO (2018a) *Biodiversity for sustainable agriculture: FAO's work on biodiversity for food and agriculture*. Rome: Food and Agriculture Organization of the United Nations.



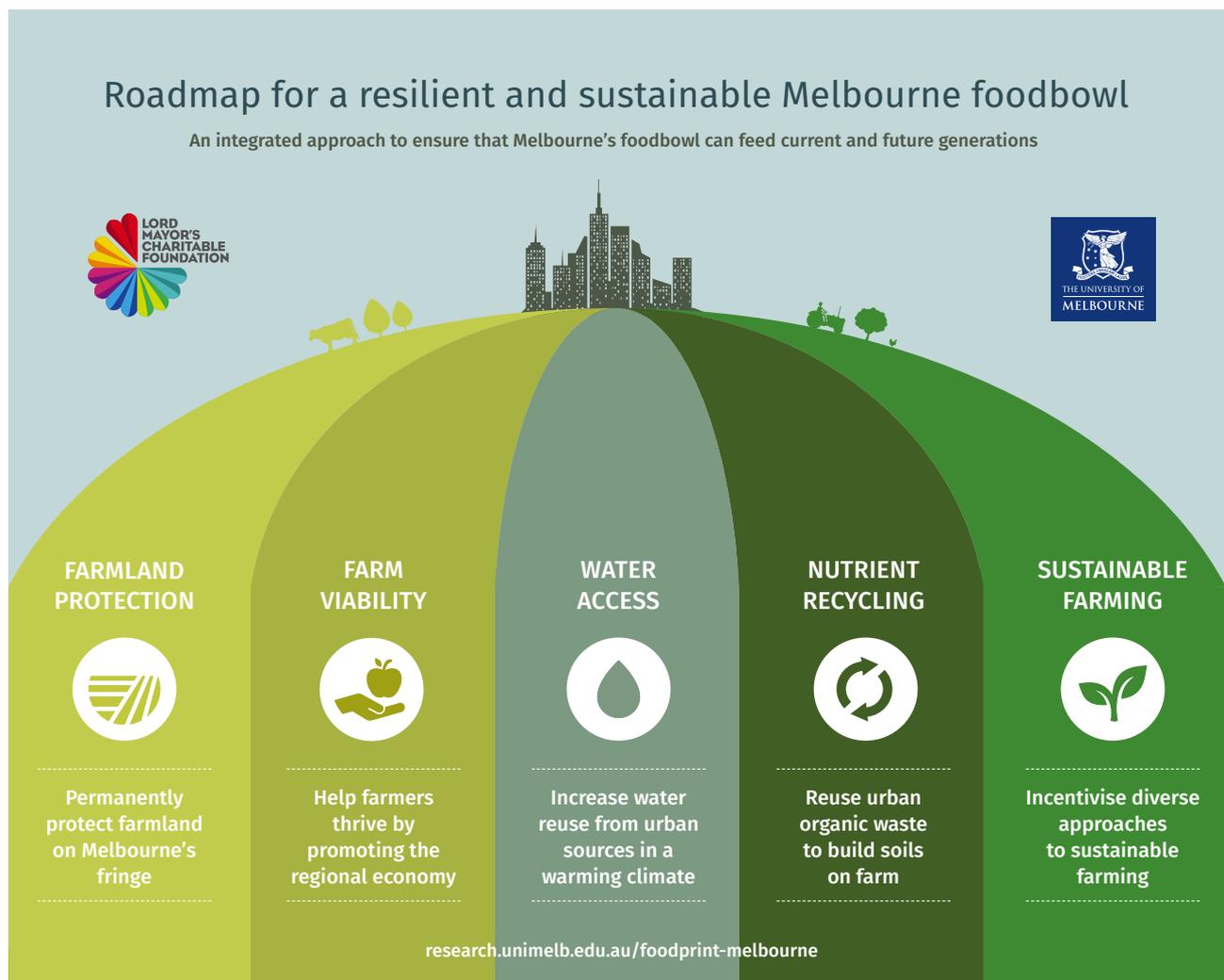
SECTION 3

Roadmap for a resilient
and sustainable
Melbourne foodbowl

3.1 An integrated approach

3.1.1 Introduction

Planning for a resilient and sustainable city foodbowl requires an integrated policy approach that involves all relevant policy portfolios, including land use planning, agriculture, economic development, water, waste and energy. The findings of this project show clearly that protecting Melbourne's foodbowl is about much more than preserving farmland. If the land is to be actively farmed, policies must be implemented to promote the viability of farming in the region and to ensure that farmers have access to water. For the long term resilience and sustainability of Melbourne's foodbowl, it is also important that farmers use sustainable approaches to farming (see section 3.6) and can access nutrients from city waste streams (see section 3.5).



A 'joined up' policy approach is needed that involves co-ordination between relevant government departments, between multiple levels of government (federal, state and local), and with other stakeholders. It is also important that policy teams in relevant government departments (at all levels of government) develop skills in *food systems planning*⁶⁸, so that they can assess the implications of policy actions for the resilience and sustainability of Melbourne's foodbowl and can undertake long term planning to promote a resilient, sustainable, healthy and fair food system for the city. Many of the recommendations from this project address multiple dimensions of a resilient and sustainable food system, highlighting the need for and benefits of an integrated policy approach (see table 1).

Table 1 Recommendations for a resilient and sustainable Melbourne foodbowl – an integrated approach

No.	Recommendation	Goals this recommendation supports				
		Farmland protection	Farm viability	Water access	Nutrient recycling	Sustainable agriculture
Overarching recommendations						
	Develop a food systems planning strategy	●	●	●	●	●
	Develop skills in food systems planning	●	●	●	●	●
	Establish a local government alliance to support sustainable food production in Melbourne's foodbowl	●	●	●	●	●
	Raise public awareness of the importance of Melbourne's foodbowl and farmers	●	●	●	●	●
Farmland protection: Permanently protect farmland on Melbourne's fringe						
	Maintain Melbourne's Urban Growth Boundary	●	●	●		●
	Map agricultural land on Melbourne's fringe	●	●	●		
	Introduce a new 'food production zone' to protect farmland on Melbourne's fringe	●	●			
	Promote Melbourne's green wedges to the general public	●	●			
	Strengthen the effectiveness of green wedge management plans	●	●	●		
	Create multi-functional urban-rural buffer zones	●	●	●		●
Farm viability: Help farmers thrive by promoting the regional economy						
	Invest in infrastructure that enables small-medium scale farmers to gain greater control of supply chains and to sell direct to consumers and businesses		●			●

68 The American Planning association describes food system planning as "multi-disciplinary and cross-divisional, involving issues related to the environment, transportation, social equity, public health, land use and economic development" – APA food system planning white paper, prepared for the American Planning Association's Legislative and Governance Committee.

Ensure that producers and support agencies in the peri-urban Melbourne area are eligible to access relevant funding streams		●	●	●	●
Apply differential 'farm rates' to actively farmed land in all areas of Melbourne's foodbowl	●	●			●
Provide economic development officers with agribusiness skills in Melbourne's foodbowl		●			●
Support new farmers to access land in Melbourne's foodbowl and retiring farmers to transition out	●	●			
Strengthen government food procurement standards to give preference to Victorian produce and to pay farmers a fair price		●			
Develop an agricultural prospectus for the Melbourne metropolitan region	●	●			●
Protect the rights of farmers in foodbowl areas	●	●			●
Promote agritourism initiatives in Melbourne's foodbowl and support farmers to develop agritourism initiatives		●			
Promote farmer wellbeing in peri-urban farming areas		●			●
Water access: Increase water reuse from urban sources in a warming climate					
Implement a holistic approach to managing water assets in farming areas using an integrated water management framework	●	●	●	●	●
Develop integrated assessment frameworks for costing the delivery and benefits of recycled water for agriculture		●	●		
Investigate options for greater re-use of stormwater in and around Melbourne			●		
Set targets for water reuse and stormwater use		●	●		●
Strengthen protection for Melbourne's green wedges	●		●		●
Undertake water infrastructure planning now for water to support food production in and around Melbourne in a warming climate	●	●	●		●
Increase investment in fit-for-purpose water projects for agriculture		●	●		
Invest in opening up new areas of Melbourne's foodbowl for irrigated agriculture using recycled water	●	●	●		●
Local governments should collaborate to drive investment in infrastructure that delivers fit-for-purpose water to farmers		●	●		●

Educate water customers to build understanding of the role of water re-use for agriculture	●	●	●
Investigate options for better matching the quality of water needed for different types of agriculture and crops as part of a 'fit-for-purpose' water framework	●	●	●
Support greater uptake of water-efficient crops	●	●	●
Explore with Indigenous Australians the potential for research into water-efficient indigenous food crops		●	●
Nutrient recycling: Reuse urban organic waste streams to build soils on farm			
Develop approaches to prevent and manage contamination of organic resource streams	●		●
Collaborate with farmers to develop fit-for-purpose compost products that meet industry needs	●		●
Establish a Melbourne Nutrient Recycling Network to help match known sources of nutrients in Melbourne and the city's foodbowl with demand for these nutrients			●
Support practice change to enable farmers to effectively use recycled organic products			●
Develop a scheme to accredit agricultural consultants who advise farmers on recycled organic products	●		●
Develop recycled nutrient products for use in controlled-environment agriculture			●
Conduct field trials to demonstrate the productivity and environmental benefits of using organic composts for agricultural industries			●
Stimulate the development of new agricultural markets for recycled organics			●
Sustainable farming: Incentivise diverse approaches to sustainable farming			
Incentivise sustainable farming practices through local government rate rebates and direct payments	●		●
Promote a diverse range of approaches to sustainable farming in Melbourne's foodbowl			●
Provide extension services in sustainable farming to peri-urban producers	●		●
Establish a Cooperative Research Centre or Rural Research and Development Corporation for sustainable peri-urban farming	●	●	●
Assess how existing financial supports to farmers affect environmental outcomes			●

3.1.2 Vision

This vision for a resilient and sustainable Melbourne foodbowl in 2040 was created through an iterative process involving the Foodprint Melbourne project team and stakeholders from across sectors:

Vision for a resilient and sustainable Melbourne foodbowl in 2040

In 2040, Melbourne has an international reputation for its innovative and resilient local food system. The city celebrates healthy, sustainable and fair food, and Melbourne's foodbowl is recognised as an essential part of the city's vibrant food culture and liveability:

- Melbourne's foodbowl supports access to nutritious food for all and the city's long term food security
- The farmers on Melbourne's fringe are thriving, supported by Melbournians, who seek out healthy and sustainable food, produced locally
- Soils are seen as a valuable resource, and the farmland that surrounds the city is protected permanently as a source of fresh, healthy food for current and future generations
- Farmers use a diverse range of sustainable farming approaches that are well-adapted to climate impacts, regenerate natural ecosystems, make efficient use of natural resources, reduce greenhouse gas emissions and sequester carbon
- Re-use of city wastewater and organic waste on farms in Melbourne's foodbowl increases the resilience of the city's food system to shocks and stresses, including climate change



This section outlines a set of overarching recommendations focused on promoting an integrated policy approach.

3.1.3 Recommendations

1 Develop a food systems planning strategy

What Develop an integrated food systems planning strategy for metropolitan Melbourne that is linked to Plan Melbourne 2017-2050. The strategy should have the overarching aim of promoting a resilient, sustainable, healthy and fair food system for city residents and should aim to promote actions that support the objective to protect farmland on Melbourne's fringe, but that lie outside of the land use planning portfolio (such as promoting farm viability and securing water access). The strategy should be developed with involvement from representatives of relevant policy portfolios and should indicate clearly which government agencies are responsible for actions to achieve these broader goals.

Who State government in collaboration with local governments.

Why Promoting farm viability, securing water access, promoting sustainable farming and recycling nutrients are as important to protecting farmland and soils in Melbourne's foodbowl as land use planning measures. However, there is currently no policy framework that recognises the links between the objective to protect farmland and necessary policy objectives in related portfolios (such as agriculture, economic development, water and waste). A food systems approach is needed that identifies priority policy objectives across multiple portfolios to protect Melbourne's foodbowl. See the case study of Metro Vancouver's regional food system strategy (linked to its metropolitan planning strategy) for an example of such an approach.

2 Develop skills in food systems planning

What Develop skills in integrated *food system planning* in order to work with communities and stakeholders across the food system to plan for resilient, sustainable, healthy and fair food systems that provide access to sufficient nutritious food for all and can withstand and recover from emerging pressures on food supply.

Who Urban planners; public health professionals; infrastructure planners in the water, waste and energy sectors; local, state and federal government.

Why The community's ability to access healthy and sustainable food is shaped by policy actions taken across many different government departments, but people taking these policy decisions may lack the skills to assess their implications for the food system. Resilient, sustainable, healthy and fair food systems can be promoted through collaborative planning processes that involve stakeholders from across the food system.

3 Establish a local government alliance to support sustainable food production in Melbourne's foodbowl

What Establish an alliance of local governments to share best practice and develop common actions to strengthen Melbourne's foodbowl. This could include best practice and actions related to protecting farmland, promoting the viability of farming, securing water access, recycling nutrients and promoting sustainable farming.

Who Local governments with representation from other relevant agencies (such as catchment management authorities) and state government departments (such as the Department of Environment, Land, Water and Planning and Agriculture Victoria).

Why There are pockets of excellent local government practice in strengthening Melbourne's foodbowl (e.g. employing agribusiness officers, incentivising sustainable farming, applying differential farming rates, including goals to protect farmland in municipal strategic statements etc.), and these practices should be shared more widely. Each of the cities in our best practice review has a mechanism for local governments to share best practice and develop common actions to strengthen peri-urban farming. See Foodprint Melbourne *Food for Thought* report p87.

4 Raise public awareness of the importance of Melbourne's foodbowl and farmers

What Run public-facing campaigns to raise awareness of the importance of Melbourne's foodbowl to the city's food supply and vibrant food culture. Introduce programs that aim to strengthen relationships between farmers and the community and raise awareness of the many additional services that farmers in Melbourne's foodbowl provide to the city, including maintaining landscapes and environmental stewardship through sustainable farming approaches.

Who State and local government

Why Public understanding of the value of farming areas in Melbourne's foodbowl is important to their long-term protection. Encouraging people to buy fresh, local food from Melbourne's foodbowl is also important to the region's economic viability. See Foodprint Melbourne *Food for Thought* report, p41-42.

Metro Vancouver Regional Food System Strategy

In 2011, Metro Vancouver (a collaborative federation of 21 municipalities, one Electoral Area and one Treaty First Nation) adopted a Regional Food System strategy, which focuses on the role of stakeholders across the entire food system in supporting a “a sustainable, resilient and healthy food system that will contribute to the well-being of all residents and the economic prosperity of the region while conserving our ecological legacy”.⁶⁹ The strategy supports collaboration between different agencies and groups of stakeholders to achieve these objectives.

The strategy identifies five key goals:

- 1 Increased capacity to produce food close to home (which includes farmland protection, sustainable fishing strategies, increasing access to irrigation water and labour, new farmer programs, and increasing urban agriculture)
- 2 Improve the financial viability of the food sector (including increased capacity for processing and distribution, institutional procurement, direct marketing and facilitating local food sector expansion)
- 3 People make healthy and sustainable food choices
- 4 Everyone has access to healthy, culturally diverse and affordable food
- 5 A food system consistent with ecological health (including adopting sustainable agricultural practices, reducing waste, and preparing for climate change)

Following its adoption, a range of partners across the region (including Metro Vancouver partners and the British Columbia Ministry of Agriculture) created the Metro Vancouver Regional Food System Action Plan.⁷⁰ The plan focuses on actions that local governments will take to advance the strategy in the next 3-5 years.

The actions range from broad (e.g. “represent regional interests in regulatory and policy changes to provincial legislation and federal development proposals impacting agriculture”) to very specific (e.g. “support the Golden Ears Feast that provides cooking education programs for parents of low income families and host an Educational Speakers Series”). The Action Plan draws together all local government actions across Metro Vancouver that contribute to the goals, and also suggests new actions that are needed.

69 Metro Vancouver (2011) *Regional Food System Strategy*

70 Metro Vancouver (2016) *Regional Food System Action Plan*

3.2 Farmland protection

3.2.1 Introduction

Increasing protection for farmland is one of the most important steps to strengthen the resilience of Melbourne's foodbowl. There is a limited supply of soil suitable for food production on Melbourne's fringe (see section 2.1) and a rising demand for food from a growing population. Remaining areas of farmland on the city's fringe should be permanently protected so that current and future generations can continue to meet some of their food needs (particularly for fresh and perishable foods) from areas close to the city. Providing *long term certainty* about the future of farming areas on Melbourne's fringe is also essential to build stakeholder confidence to invest in farms and infrastructure (e.g. infrastructure to deliver recycled water).

Although the current Victorian planning policy framework aims to protect farmland on Melbourne's fringe, it hasn't prevented farmland from being lost to other uses (particularly residential development),⁷¹ and the planning mechanisms to protect farmland now need to be strengthened. The Victorian state government has committed to map "strategic agricultural land" on Melbourne's fringe⁷² and this process is underway. It has also committed to strengthen protection for "strategic agricultural land".⁷³ It is important that a precautionary approach is taken to ensure that all (non-conservation) land suitable for agriculture is protected in order to provide flexibility to address future challenges to the city's food supply.



**Permanently
protect farmland
on Melbourne's
fringe**

What should policy aim to achieve?

This narrative describes the outcomes that policy should aim to achieve by 2040:

In 2040, a cross-party commitment exists in the Victorian state parliament to protect farmland on Melbourne's fringe for current and future generations. Melbourne's foodbowl is recognised as a fundamental building block in a resilient food supply for the city, and there is a high level of public awareness of the importance of this region of food production. Designated areas of productive farmland on Melbourne's fringe are permanently protected, and maps indicate clearly to all stakeholders which areas have protection.

Melbourne's Urban Growth Boundary has been maintained for over 25 years without expansion and is now seen widely as a permanent boundary. Speculative investment and landbanking in city fringe farming areas has slowed as a result, and the price of farmland has stabilised. Farmers have confidence to invest in their farms and water authorities are investing in infrastructure to 'drought proof' farms in the region. Urban density has risen significantly in existing urban areas, and there is bipartisan political support for strong urban density targets. There is also high public demand for a wide variety of housing types (such as apartments, units and townhouses) in existing urban areas, where they have the benefit of being close to services, transport and employment. The rate of new land releases on the city fringe has slowed as a result, reducing pressure on the Urban Growth Boundary.

71 See Carey, R., Sheridan, J. and Larsen, K. (2018) p As above.

72 DELWP (2017) Plan Melbourne implementation actions: Plan Melbourne 2017-2050. Available: https://www.planmelbourne.vic.gov.au/__data/assets/pdf_file/0007/377125/Plan_Melbourne_2017_Implementation_Actions.pdf (accessed on 22 February 2019).

73 Minister for Planning (2018) Protecting Melbourne's green wedges from skyscraper Guy. Media release, 4 November 2018.

3.2.2 Recommendations

1 Maintain Melbourne's Urban Growth Boundary

What Melbourne's current Urban Growth Boundary (UGB) should be maintained as a firm boundary that is not subject to reviews or expansion. Melbourne's metropolitan planning strategy, *Plan Melbourne 2017-2050*, has a policy (2.1.1.) to "maintain a permanent urban growth boundary around Melbourne to create a more consolidated, sustainable city". This is an important strategy to prevent further loss of farmland on the city fringe, and the following should be considered in its implementation:

- a **Clear and consistent signals should be provided by government about the future of Melbourne's UGB.** Reviews of the UGB send a signal to stakeholders that the boundary is 'soft' and subject to change. This fuels speculative investment in farmland close to the UGB, driving up land prices and undermining the viability of farming. Inconsistent signals also create uncertainty, undermining stakeholder confidence and willingness to invest in farms and infrastructure (e.g. infrastructure to deliver recycled water to farms). See Foodprint Melbourne *Food for Thought* report p29-30.
- b **Pressure on the UGB should be reduced** by lifting the proportion of development that takes place in existing urban areas and by increasing urban density. Melbourne's urban density target should be increased from 16-18 lots per net developable hectare⁷⁴ to 25 lots per hectare, with a view to increasing this target over time. Melbourne (like Australia's other capital cities) currently has a very low rate of urban density compared to other cities worldwide (e.g. the UK achieved an urban density rate of 45 lots per hectare in 2009).⁷⁵
- c Although Melbourne established a 'fixed' UGB in 2002, it has been operationalised in the past as a 'managed' boundary. That is, the boundary is re-negotiated and expanded in response to emerging concerns about housing affordability and land availability. These boundary expansions have been 'ad hoc' as no legislated process exists to manage reviews of the boundary, and expansions of the boundary have generally occurred into agricultural land. **If a fixed boundary cannot be maintained in future** in practice, and the boundary is subject to further review, **a legislated process must be introduced to manage the boundary.** The legislation should establish a minimum period for reviewing the UGB (e.g. once every 8-10 years), an independent body responsible for conducting reviews and recommending boundary amendments, clear criteria for assessing whether boundary extensions are required (e.g. the supply of developable land has fallen below 20 years supply), urban reserves that specify where future development will occur and mandatory urban density efficiency targets that must be met. The process should also ensure that agricultural land is not considered for inclusion in the boundary unless other (non-protected) types of land have first been exhausted.

Who State government

Why Melbourne's UGB is an important mechanism for preventing conversion of agricultural land for urban development and should be maintained over the long term to send clear and consistent signals to all stakeholders about the future of the agricultural areas that lie outside the boundary. See Foodprint Melbourne *Food for Thought* report p36-37.

74 Victorian Planning Authority (2019) *Six facts about greenfield communities*. Available: <https://vpa.vic.gov.au/greenfield/more-information/greenfield-6-fast-facts/> (accessed 18 March 2019).

75 Department for Communities and Local Government (2010) Land use change statistics (England) 2009 provisional estimates. Planning statistical release (May 2010).

2 Map agricultural land on Melbourne's fringe

What Identify areas of land on Melbourne's fringe that are suitable for agriculture in publicly available and widely accessible maps as a basis to strengthen protection for these areas. This important work is underway as part of Action 17 in the metropolitan planning strategy *Plan Melbourne 2017-2050*.⁷⁶ This mapping work should be based on the following principles:

-
- a **All land suitable for agriculture in peri-urban Melbourne outside the UGB should be mapped and protected.** Assessment of the suitability of land for agriculture should be based on land capability (including soil classification and climate), existing or potential water availability, parcel size, adjacent land uses and the availability of infrastructure (such as irrigation, processing, transportation) and labour.
 - b It is important that all land suitable for agricultural purposes is mapped and protected, **rather than a subset of land deemed to be of 'strategic' or 'high' value**, although land deemed to be of particular importance for agricultural purposes could be subject to additional restrictions (e.g. land suitable for horticultural production or land close to secure sources of recycled water from water treatment plants).
 - c **Judgements about the viability of agricultural land for farming uses should take into consideration the diversity of approaches to sustainable farming** in Melbourne's foodbowl **and consumer trends** that open up new models of farming and product distribution on Melbourne's fringe, such as growing demand for local, organic and quality foods, and direct marketing of foods to consumers, restaurants and other businesses. Parcels of land that may not be suitable for conventional large-scale farming operations that supply into traditional markets may be suitable for smaller-scale operations that provide source-identified and values-differentiated products direct to customers.
 - d Judgements about the value of agricultural land should also take into account **emerging developments in sustainable farming approaches** that may extend productive uses for some types of land in future. For example, regenerative farming approaches that use intercropping are opening up new opportunities for cropping land that was previously used only for grazing.⁷⁷

Who State government

Why Land suitable for agriculture on Melbourne's fringe should be mapped, because greater clarity is needed in the Victoria Planning Provisions about which land should be protected and where this land is (See Foodprint Melbourne *Food for Thought* report p16). It is important to take a *precautionary approach* to mapping and protecting all land suitable for agriculture, rather than a smaller subset of land deemed to be of particular or 'strategic' value, to provide sufficient flexibility in future to address the significant pressures facing the city's food supply from rapid population growth, declining supplies of the natural resources underpinning food production, climate change and water scarcity (see section 2). Increasing water scarcity in traditional foodbowl regions such as the Murray-Darling Basin (due to climate change) may make it necessary in future to shift some water-intensive food production to the fringes of cities to make use of urban wastewater, such as recycled water and stormwater (see section 2.4), but this will only be possible if sufficient farmland has been retained on the city fringe.

76 DELWP (2017) As above.

77 Massey, C (2017) *Call of the reed warbler: A new earth*. University of Queensland Press.

Mapping and protecting farmland in Portland

In 2007, Oregon Department of Agriculture mapped and assessed agricultural lands in the Portland metropolitan region at the request of the Metro government⁷⁸. The assessment took into account soil classification, climate, water availability, land parcel size and land use.⁷⁹ The analysis also took into account changing consumer trends, such as increasing demand for locally grown, sustainably produced food and growing interest in agritourism, as well as growing uncertainty about long term food supplies and increasing demand for bioenergy crops. The report emphasised that in light of these trends some land not previously regarded as 'viable' should be considered for protection:

"Lands not always considered to be important to the region's agricultural base may now merit greater or equal consideration. Areas considered impacted due to parcelization, parcel size and non-farm development may be suited to more intensive operations on a smaller parcel. Lands underutilised in the past but maintained as larger parcels may well be suited to the production of biofuel crops"⁸⁰

Following this mapping exercise, urban and rural reserves were created on Portland's fringe in 2010.⁸¹ The rural reserves protect areas important to farming and conservation on Portland's fringe for at least 50 years. Under Oregon state law, all agricultural lands must be protected within an Exclusive Farming Zone unless they fall within an urban growth boundary or are designated as forest lands. Agricultural lands are generally defined as land with class I, II, III and IV soils according to the USDA National Resources Conservation Service classification (and some land with class VI and VII soils in Eastern Oregon).⁸² Some agricultural lands are classed as 'high value' and given additional forms of protection. 'High value' lands are generally class I and II soils (the most versatile soils), and some class III and IV soils.⁸³ This includes important rangelands and land used primarily for grazing (lands with 70% or more desirable forage species, capable of producing 800 pounds per acre per year of forage).⁸⁴

78 Metro is the regional government for the Portland metropolitan area. It is a directly elected regional government.

79 Oregon Department of Agriculture (2007) *Identification and assessment of the long term viability of metro region agricultural lands*. January 2007. Oregon Department of Agriculture.

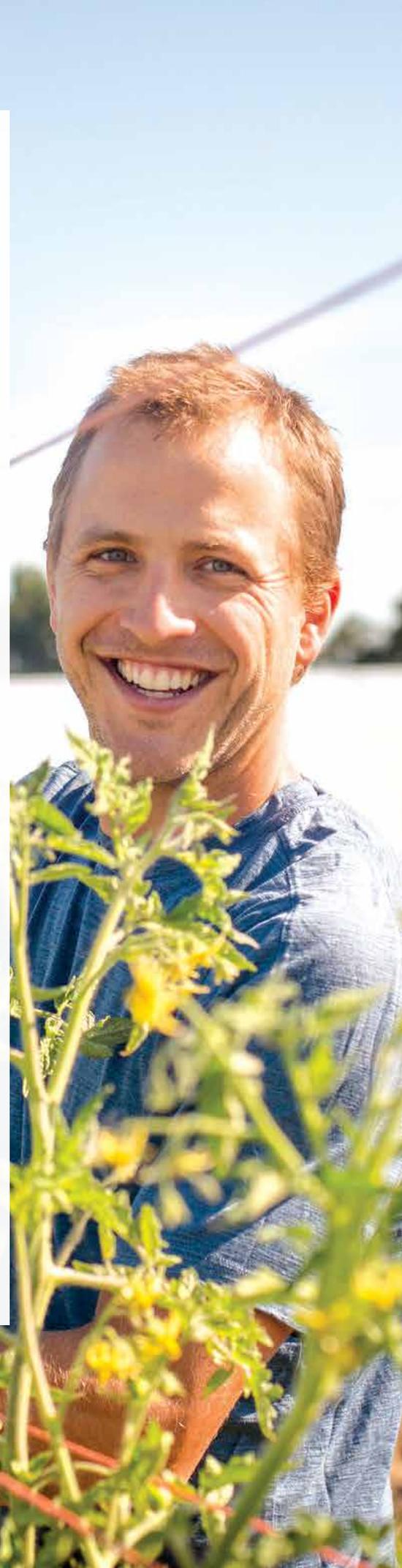
80 Oregon Department of Agriculture (2007) As above p64.

81 Metro (2018) *Urban and rural reserves*. Available: <https://www.oregonmetro.gov/urban-and-rural-reserves> (accessed 18 March 2019).

82 State of Oregon (2012) *Background brief on agricultural and forest lands*. Available: <https://www.oregonlegislature.gov/lpro/Publications/AgriculturalandForestLands.pdf> (accessed 18 March 2019).

83 State of Oregon (2012) As above.

84 Daniels, K and Johnson, J. *The NCRS soil survey and the Oregon land use planning program*. Protecting farm and forest lands. Oregon Department of Agriculture.



3 Introduce a new ‘food production zone’ to protect farmland on Melbourne’s fringe

What Protect all land on Melbourne’s fringe that is suitable for agriculture (see recommendation 2 above) by applying a new ‘food production zone’. Victorian Labor made a pre-election commitment in November 2018 to strengthen protection for agricultural land on Melbourne’s fringe by introducing a new ‘strategic agricultural land overlay’.⁸⁵ This is an important commitment and the following should be considered in its implementation:

- a **A new food production zone should be introduced rather than an overlay**, as an overlay is likely to be subject to the same issues that weaken current mechanisms aiming to protect agricultural land on Melbourne’s fringe. Introducing a zone would overcome these problems (see below).
- b **The zone should apply to all land outside the UGB in the green wedges and peri-urban Melbourne that is assessed as being suitable for agriculture** (see above).
- c **A minimum lot size should apply in the zone** to prevent land fragmentation which threatens the viability of farming.
- d Non-farming land uses should be restricted in the zone. However, appropriate farming-related uses should be allowed that support farm viability by enabling farmers to diversify and value-add to their produce (e.g. farmgate shops).
- e **Land uses likely to degrade productive soils** or prevent future use of the land for soil-based agriculture **should be prohibited** within the agricultural zone.
- f Large-scale greenhouses or large-scale intensive (shed-based) livestock production should be sited on areas of poorer quality soils that are less suited to soil-based agriculture.
- g **A buffer zone should be applied** between areas in an agricultural zone and areas of urban growth.
- h **The right to farm should be recognised** in all areas where the agricultural zone applies, with corresponding responsibilities (see section 3.3).

Who State government

Why Existing mechanisms in the Victoria Planning Provisions that aim to prevent loss of farmland on Melbourne’s fringe are open to interpretation, and they have not prevented ongoing loss and fragmentation of farmland. Stronger protection is required in the form of a new planning zone. A zone is needed rather than an overlay, because an overlay would be discretionary. It would be open to permits and appeals (e.g. at VCAT) and would be subject to the same issues of ambiguity and interpretation that weaken existing measures to protect farmland on Melbourne’s fringe. See *Foodprint Melbourne Food for Thought* report p21-22.

Left: Image courtesy of US Department of Agriculture (CC BY 2.0)

85 Minister for Planning (2018) As above.

4 Promote Melbourne's green wedges to the general public

What Increase visits to and engagement with green wedge areas by promoting these regions to the general public (through campaigns and events) and by developing agri-tourism and leisure opportunities that encourage their use e.g. by introducing common signage for green wedge areas, developing walking and bicycle trails between farms in green wedge areas etc.

Who State government and civil society groups.

Why Public understanding of the value and importance of green wedge areas is important for their long term protection. Increasing visits to Melbourne's green wedge areas could help to raise public awareness of these areas and grow their local economies. See Foodprint Melbourne *Food for Thought* report p41-42.

5 Strengthen the effectiveness of green wedge management plans in protecting farmland and promoting agriculture

What Strengthen the effectiveness of green wedge management plans in protecting farmland and promoting agriculture by:

- a. **Giving green wedge management plans statutory force.** This could be done by including a legislative requirement in the Planning and Environment (Green Wedge Protection) Act 2003 for local governments to prepare and review green wedge management plans. All local governments in green wedge areas should also be funded to develop green wedge management plans.
 - b. **Including objectives to protect farmland in green wedge management plans**
– Local governments in green wedges areas should ensure that green wedge management plans contain strong statements about protecting farmland and promoting agriculture (see the example from the *Mornington Peninsula Green Wedge Management Plan*).
-

Who State government and local government

Why Green wedge management plans are important in specifying the values and resources in individual green wedge areas that should be protected, but they currently lack statutory force which limits their influence on planning decisions, such as disputes that come before VCAT. Green wedge management plans describe vision and objectives for individual green wedge areas and outline preferred land uses. Stating a clear vision for agriculture and proposing strategies that support agriculture can contribute to the protection of farmland in these areas. For an example, see the extract from the Mornington Peninsula Shire Green Wedge Management Plan.⁸⁶ Also see the Foodprint Melbourne *Food for Thought* report p28 and 40.

86 Mornington Peninsula Shire (2018) *Mornington Peninsula Green Wedge Management Plan*. Mornington Peninsula Shire.

Extract from the Mornington Peninsula Green Wedge Management Plan⁸⁶

Objective: Ensure Planning Scheme provisions support sustainable agricultural land use in the Green Wedge

... the provisions of the Planning Scheme are only one aspect of the Green Wedge Management Plan. However, by managing pressures for urban encroachment, land fragmentation and incompatible uses, the planning scheme does provide an essential component of a strategy to support agriculture on the Peninsula in the long term.

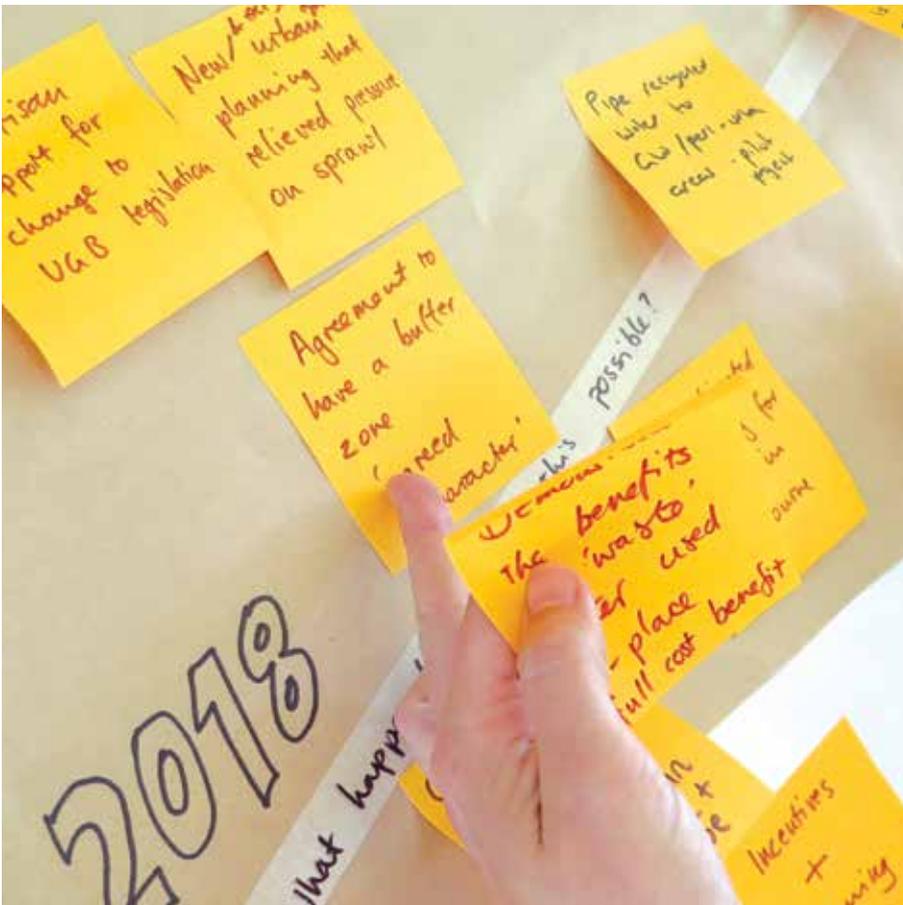
Ref.	Actions	Priority
3.1	Rigorously oppose any amendments to the Urban Growth Boundary that would result in any loss of Green Wedge land.	Ongoing
3.2	Rigorously oppose any amendments to the Green Wedge Zone which would reduce the minimum lot size requirements or introduce excision provisions.	Ongoing
3.3	Maintain the policy that re-alignment of lot boundaries or the re-subdivision of land (which does not increase the number of lots) should not be supported unless there is a good land management justification and should generally avoid any reduction in the area of the existing larger lot(s).	Ongoing
3.4	Advocate for a consistent set of rural planning provisions, particularly in regard to subdivision, excision and dwelling provisions, across all non-urban areas on the Peninsula including land in Farming Zone and the Special Use Zones, to the extent these are used for rural purposes.	Medium
3.5	Further Investigate the location and extent of multi-lot tenements in more detail and engage with owners to promote voluntary consolidation of land. Investigate mechanisms to retain these larger landholdings, to discourage their disposal as separate lots for the purpose of rural living, and to encourage their consolidation. ...	High
3.8	Investigate means to facilitate the sale of certified produce grown on the Peninsula through local outlets, including farm gate sales from other farms participating in the certification program, farmers markets or similar outlets within the Green Wedge.	High
3.9	Investigation the potential for directional signage as part of a food /farm shop trail.	High

6 Create multi-functional urban-rural buffer zones

What There is an opportunity to create buffer zones between farming and urban areas that have multiple functions in addition to providing a physical barrier between these different land uses e.g. providing bicycle or walking trails, community gardens, remediating stormwater to reduce the risk of flooding, creating biodiversity corridors, providing shade and cooling for the city (e.g. through tree canopies) and sequestering carbon.

Who State government

Why Creating buffer zones between farming and urban areas reduces friction between farming and non-farming neighbours and aids perception of a hard boundary. By designing buffer zones as multi-functional areas they can deliver additional social and environmental benefits.



3.2.3 Potential barriers and enablers to implementing the recommendations

Stakeholders identified a range of potential barriers and enablers to implementing these recommendations:

Enablers

- The metropolitan planning strategy Plan Melbourne 2017-2050 has a focus on supporting “strategic planning for agriculture” (action 17)⁸⁷, including identifying strategic areas of agricultural land that require additional protection.
- Victorian Labor made a pre-election commitment in November 2018 to “introduce a new strategic agricultural land overlay” to permanently protect areas of prime agricultural land⁸⁸, opening a “window of opportunity” for action to significantly strengthen protection for farmland on Melbourne’s fringe.
- Measures to strengthen protection for farmland can build on existing policy objectives in the Victoria Planning Provisions to protect farmland and existing legislation to protect the city’s green wedges.⁸⁹
- Ongoing drought in NSW⁹⁰ has raised awareness of the advantages of city fringe areas for food production, because of their access to sources of recycled wastewater from city water treatment plants.

Barriers

- There is a relatively low level of awareness among the general public about increasing pressures on the resilience and sustainability of the city’s food supply. It is therefore important to clearly articulate the long term public interest in protecting the city’s farmland.
- There is likely to be resistance to stronger protection for farmland from some individual land owners and parts of the property development industry.
- Farmland in some green wedge and peri-urban areas is already quite fragmented, which may undermine its viability for some types of farming.
- On-going speculative investment continues to drive up the price of farmland and undermine the viability of farming in city fringe areas.

87 DELWP (2017) As above.

88 Minister for Planning (2018) As above.

89 See Carey, R., Sheridan, J. and Larsen, K. (2018) p As above.

90 Murray-Darling Basin Authority (2019) *Basin environmental watering outlook for 2019-20*. Canberra: Australian Government.

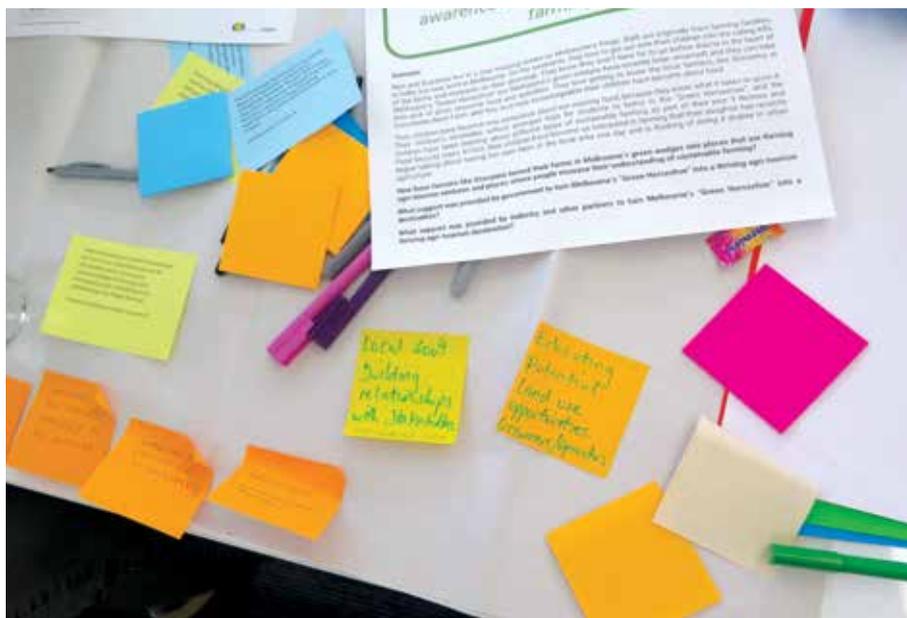
3.3 Farm viability

Promoting the viability of farming in Melbourne's foodbowl is as important to preserving the region as protecting farmland. The resilience and productive capacity of Melbourne's foodbowl relies on farmers actively farming the land. The international case studies conducted for this project emphasise the importance of implementing policy to actively promote the viability of farming in peri-urban regions. However, peri-urban farmers have often been overlooked in Victorian state government policy.⁹¹

Although farmers in peri-urban regions face challenges (see section 2.2), their proximity to markets also brings unique opportunities. Growing consumer interest in the provenance of food⁹² and reconnecting with where their food comes from offers opportunities for farmers to sell direct to consumers and local businesses, gaining more control over their supply chains and a greater share of the retail price for produce. Emerging trends in quality and values-based foods, and growing consumer interest in agritourism⁹³, also offer new models for the viability of farming at smaller scale in peri-urban areas. The key to enabling farmers in Melbourne's foodbowl to realise these opportunities lies in a combination of tailored extension services, infrastructure that supports local supply chains and direct sales, and promotion of agritourism and economic development in the region.



Help farmers thrive
by promoting the
regional economy



91 Carey, R, Sheridan, J and Larsen, K (2018) As above.

92 Ipsos (2016) *Food facts, fiction and fads: How Australia eats, thinks about and shops for food*. Sydney: Ipsos.

93 Tourism Australia (2013) *Gourmet tourism is growing*. Sydney: Tourism Australia; DAFF (2012) *FOODMap: an analysis of the Australian food supply chain*. Canberra: Department of Agriculture, Fisheries and Forestry; DAFF (2012a) *Australian food statistics 2010-11*. Canberra: Department of Agriculture, Fisheries and Forestry

Creating a thriving Melbourne foodbowl

Where city fringe farming supports a vibrant food city
and Melbourne supports its city fringe farms



research.unimelb.edu.au/foodprint-melbourne

What should policy aim to achieve?

This narrative describes the outcomes that policy should aim to achieve by 2040:

In 2040, Melbourne's foodbowl is thriving. The region's food sector has grown considerably over the last two decades, and many new jobs have been created as farmers moved into the region. Schemes have also been established to help new and young farmers to access farmland in the region. The region now comprises a diverse range of thriving farms, with a focus on sustainable farming approaches. New value-adding food businesses have also moved into the region. Farmland is more accessible and farming more viable because of the stronger planning measures that were introduced to protect agricultural land and because recycled water was made more widely available and affordable. There is a highly supportive policy environment that helps farmers to capitalise on the unique opportunities of farming close to the city. A team of extension officers has been established to support farmers in Melbourne's foodbowl, and all local governments now have significant farm discounts on rates. The level of well-being among farmers in Melbourne's foodbowl is high, and farmers feel valued by local consumers and rewarded for their efforts.

Melbourne's foodbowl is such a vibrant region that there is broad public and political support for protecting it permanently from urban development. Melbournians have a close connection to the region, visiting often to buy fresh food direct from the farm and to use farmgate cycle and walking trails. Melbourne's chefs have become renowned for their use of seasonal, local food from the region, and local food is widely available throughout the city and easily recognisable. State and local governments also introduced policies that enable them to give preference to produce from Victorian farmers when they buy food for services in aged care centres, childcare centres, prisons and hospitals, and this has helped to grow the market for food from Melbourne's foodbowl.

3.3.1 Recommendations

1 Invest in infrastructure that enables small-medium scale farmers to gain greater control of supply chains and to sell direct to consumers and businesses

What Establish grant programs to fund the development of supply chain infrastructure (such as micro-abattoirs, farmer-owned processing co-operatives and community kitchen incubators) that enables small to medium-scale farmers on Melbourne's fringe to diversify, value-add and capture a greater share of the food dollar by selling direct.

Who State and local governments

Why Farmers on Melbourne's fringe have the benefit of being close to markets, but often lack access to the infrastructure that enables them to take advantage of opportunities to value-add and sell direct (e.g. access to food processing, packing and storage facilities, marketing expertise, micro-abattoirs etc). This particularly affects small to medium-scale farmers who may not produce at a scale that enables access to conventional supply chains. Grant funding could be made available for appropriate infrastructure, and regulations could also be developed that encourage small-medium scale farmers to diversify and develop new value-added products (i.e. cottage industry laws). See the Foodprint Melbourne *Food for Thought* report p82-84.

Right: Image courtesy of Stanley Zimny (CC BY-NC 2.0)

Vermont Farm to Plate Network

The *Vermont Farm to Plate Network*⁹⁴ aims to drive systematic food system change in the state, including improving the viability of local farms. The Network was created in 2011 in response to state legislation, and a 10-year *Farm to Plate Strategic Plan* was developed, with the following priority areas:

- 1 Meet food system employment needs in positive work environments
- 2 Improve viability of farms and food businesses
- 3 Increase local food availability and affordability in all market channels
- 4 Increase consumer engagement and demand for local food
- 5 Protect and expand affordable and environmentally sustainable farmland in agricultural production⁹⁵

The Network brings stakeholders together into working groups and taskforces to work on specific initiatives:

Working groups	Taskforces
Aggregation and distribution	Farm to Institution
	Independent Grocers
Consumer education and marketing	Agritourism
	Communications and marketing community of practice
	Rooted in Vermont (a grassroots movement to increase demand for local food)
Education and workforce development	Career pathways & image
	Business-Education partnerships
Farmland access and stewardship	Farmland access
Production and processing	Farm viability indicators

Cross-sector teams of stakeholders also work on issues related to energy, finance, food access, nutrient cycling, health and research. This networked, strategic approach has been very effective. Local food purchasing in Vermont has increased by \$176 million and is now around 13% of total food sales. Over 6550 new jobs and 740 new businesses have been created, and the percentage of food insecure households in the state has dropped from 13.2% to 9.8%.⁹⁶

94 Vermont Farm to Plate Network (2019) The farm to plate network. Available: <https://www.vtfarmtoplate.com/network> (accessed 18 March 2019).

95 Vermont Sustainable Jobs Fund (2015) *Farm to plate: Strengthening Vermont's food system*. A 10-year strategic plan for Vermont's food system. Vermont Sustainable Jobs Fund.

96 *Vermont Farm to Plate Annual Report 2018*, <https://www.vtfarmtoplate.com/resources/2018-farm-to-plate-annual-report>



2 Ensure that producers and support agencies in peri-urban Melbourne are eligible to access relevant funding streams

What Ensure that producers, local governments and catchment management authorities in peri-urban Melbourne are eligible to apply for relevant agricultural funding initiatives in Victoria. This could be achieved by removing the eligibility requirement that applicants must be in 'regional' areas of Victoria, as defined in the Regional Development Victoria Act (2002) or by developing specific funding initiatives aimed at farmers and support agencies in the region.

Who Federal government and state government (particularly Agriculture Victoria and Regional Development Victoria)

Why Victorian state government programs and funding initiatives aimed at farms and food businesses (e.g. the Regional Jobs and Infrastructure Fund) generally exclude businesses in metropolitan Melbourne, because they are not considered 'regional' under the Regional Development Victoria Act (2002). As a result, farms and value-adding businesses in Melbourne's foodbowl have access to little support, although they face significant challenges and often higher costs of farming. This should be addressed so that farmers in metropolitan Melbourne are not disadvantaged by lack of access to the funding streams available to farmers in other areas of Victoria. See Foodprint Melbourne *Food for Thought* report p67-69.

3 Apply differential 'farm rates' to actively farmed land in all areas of Melbourne's foodbowl

What Apply a differential 'farm rate' to actively farmed land in all areas of Melbourne's foodbowl to reduce the impact of high land costs (and rates) on farm viability. Variable rates could be used to encourage more productive use of farmland, with a higher discount for farmers who make more productive use of land. Differential rates could also be used to promote sustainable farming practices (see section 3.6).

Who Local governments. State government could also play a role in encouraging local governments in Melbourne's foodbowl to apply a consistent farm rate.

Why The high cost of land on Melbourne's fringe leads to disproportionately high local government rates for many farmers in Melbourne's foodbowl, where the land value far exceeds the productive value. Some local councils apply a 'differential farm rate' to reduce the rate burden for farmers and to encourage more productive use of farmland, but the discount applied varies across local governments, and not all local governments offer a farm rate. The Victorian Farmers Federation has argued that a differential rate should be applied to all farmland and that the Local Government Act (1989) should be amended to require local governments to apply a differential rate.⁹⁷ In view of the very high land prices on Melbourne's fringe, there is an opportunity for local governments to make a significant difference to the viability of farms in their regions through the application of substantial differential rates. See Foodprint Melbourne *Food for Thought* report p73. Differential farm rates also present an opportunity to incentivise farming practices that actively regenerate land, soils and waterways (see section 3.6).

97 Victorian Farmers Federation (2017) *Rural rates – fight for fair*. Available: https://www.vff.org.au/vff/Policy/Rural_rates/vff/Policy__Submissions/Rural_Rates_Community_Movement.aspx?hkey=d1b83000-27b9-4fb6-919f-429f82aa090a (accessed 18 March 2019).

4 Provide economic development officers with agribusiness skills throughout Melbourne's foodbowl

What Provide dedicated agribusiness officers (or economic development officers who are skilled in agribusiness) to support farmers in all areas of Melbourne's foodbowl. This could be achieved in a number of ways. Officers could be based within individual councils (as currently happens in the City of Whittlesea and Mornington Peninsula Shire), groups of councils could pool resources to employ agricultural officers to work across multiple local government areas (e.g. across the Interface Councils or Peri-Urban Group of Rural Councils), state government could establish a team of agribusiness officers dedicated to supporting farmers in the region, or industry bodies could provide specialist support.

Who State government, local councils or groups of councils, industry

Why The specialised agribusiness officers who provide support to farmers in the City of Whittlesea and Mornington Peninsula Shire are widely perceived to provide excellent support and advice in those areas by acting as an advocate to council, providing advice on council regulations affecting farmers, providing education programs and developing new programs that boost economic development (such as regional provenance marketing or farmgate trails). However, only two local government areas in Melbourne's foodbowl currently provide these specialist agribusiness support services, and there is a strong argument for extending similar support to all farmers in Melbourne's foodbowl. See Foodprint Melbourne *Food for Thought* report p86.

5 Support new farmers to access land in Melbourne's foodbowl and retiring farmers to transition out

What Develop programs that make it easier for new farmers to access land in Melbourne's foodbowl and to receive mentoring support to begin farming in the region. These programs should also assist farmers aiming to retire to transition out of farming by matching them up with new entrants to farming (who are outside their own family networks).

Who Civil society groups, local and state government (Agriculture Victoria)

Why It is difficult for new farmers to begin farming in Melbourne's foodbowl due to high land prices, a lack of experience and training, and a lack of on-going mentoring and support. It is particularly difficult for new farmers from non-farming families, who don't have a family connection to land. It can also be difficult for retiring farmers to put succession plans in place, particularly if there is no family member to take over the farm. New approaches are needed to keep farmland in Melbourne's foodbowl productive. These could include:

-
- Farmer incubator programs that provide new farmers with access to land, training and support to trial new farm businesses e.g. Intervale in Vermont (USA) and The Kindling Trust's FarmStart program in Manchester (UK).
 - A farmland matchmaking service that aims to connect new farmers with landowners who are willing to lease land and helps to negotiate secure, long term leases e.g. the Young Agrarians B.C. Land Matching program funded by the Ministry of Agriculture in British Columbia (Canada).
 - Extension officers who support mid-career farmers with succession planning.

- Development of mechanisms to support transitional land arrangements such as leasing, share farming, lease-to-phase, 'call' options in leases or low or no-interest loans.
- Increasing the stamp duty exemption for young (under 35) or new farmers buying their first farm in metropolitan Melbourne. A full exemption is currently available for properties valued up to \$600,000 and a concession for properties valued up to \$750,000⁹⁸, but the very high land prices on Melbourne's fringe warrant greater concessions for new or young farmers who wish to buy farms in the region.

6 Strengthen government food procurement standards to give preference to Victorian produce and to pay farmers a fair price

What Introduce purchasing requirements for government food procurement that requires government-funded institutions (such as prisons, hospitals, childcare centres and meals-on-wheels services) to preference food from Victorian farmers in purchasing decisions e.g. if a bid from a local producer falls within a specific % of the lowest priced bid.

Who State and local governments

Why State and local governments have purchasing guidelines for government contracts (e.g. the Local Jobs First Policy⁹⁹ that applies to Victorian government departments) and for how food is purchased for government-funded services. These guidelines could be strengthened to give preference to food grown or processed in Victoria (as well as specifying that healthy and sustainable food should be purchased). This is a powerful mechanism to support Victorian farmers, to stimulate the market for local, sustainably produced food and to lead by example. At least 37 states in the US have procurement guidelines that give preference to food grown and processed within the state.¹⁰⁰

7 Develop an agricultural prospectus for the Melbourne metropolitan region

What Develop an agricultural prospectus for the Melbourne metropolitan region that recognises its unique strengths and challenges, and that outlines how federal, state, and local government policies and programs can best support it.

Who Agriculture Victoria in collaboration with local governments and other stakeholders

Why Victoria's agricultural policy, the *Agriculture Victoria Strategy (2017)* has little focus on the challenges facing city fringe farmers or on horticulture, the most important agricultural sector in Melbourne's foodbowl. Agricultural prospectuses are being developed for each region of Victoria, describing their unique challenges and opportunities and how Victorian government programs support each region. It is unclear whether the Victorian government intends to develop an agricultural prospectus for the Melbourne metropolitan region. However, this is a key opportunity to address the particular challenges and opportunities of farming in Melbourne's foodbowl, and it is important that a prospectus is developed for the region. See Foodprint Melbourne *Food for Thought* report p67-68 for more information.

98 State Revenue Office (2018) Young farmer duty exemption or concession. Available: <https://www.sro.vic.gov.au/young-farmer-duty-exemption-or-concession> (accessed 18 March 2019).

99 Victorian Government (2018) *Local jobs first policy*. Available: https://localjobsfirst.vic.gov.au/__data/assets/pdf_file/0019/25273/Local-Jobs-First-Policy-October-2018.pdf (accessed 18 March 2019).

100 Public Health Law and Policy (2012) *Local food for local government: Considerations in giving preference to locally grown food*. Public Health Law and Policy.

8 Protect the rights of farmers in Melbourne's foodbowl

What Strengthen the right to farm in areas that are zoned for agriculture, so that farmers in farming areas are protected when carrying out normal (and sustainable) farm practices. In strengthening the rights of farmers, it is important that these rights are balanced against broader environmental, health and safety concerns and laws. This intent should be stated clearly in any policy or legislation implemented. It is also important that any arbitration body established to mediate in disputes has broad representation from the community and from farmers (large and small scale) who practice a diverse range of sustainable farming approaches.

Who State government, with support from local governments

Why Urban encroachment into farming areas can lead to conflict between farmers and non-farming neighbours, who may object to the odours and noises of farm practices. Right to farm policies and legislation protect the right of farmers to carry out normal and lawful farm practices. See Foodprint Melbourne *Food for Thought* report p85.

9 Promote agritourism initiatives in Melbourne's foodbowl and support farmers to develop agritourism initiatives

What Support farmers who want to increase the viability of their farms by incorporating agritourism initiatives, and develop a strategy to encourage people to visit farming areas in Melbourne's green wedges for recreational and tourism experiences. This could include introducing common branding and signage for the green wedges, developing walking and cycling trails and promoting seasonal food experiences.

Who State Government or a partnership of local governments and regional economic development agencies

Why Encouraging Melbournians to visit farming areas in the city's green wedges for leisure and tourism experiences could have multiple benefits. It could boost farm viability by enabling farmers to diversify their income streams, grow local economies, reconnect Melbournians with farmers and raise public awareness of the value of protecting Melbourne's green wedges. Infrastructure to support agritourism exists in some areas of the green wedges, such as the Mornington Peninsula and the Yarra Valley, but a coherent strategy is needed to promote agritourism across the green wedges.

10 Promote farmer wellbeing in peri-urban farming areas

What Strengthen rural financial counselling and support services (including peer-to-peer networks) for farmers in peri-urban areas.

Who Financial and social counselling services, rural health agencies, state government

Why Farmers in peri-urban areas face many of the same pressures as farmers elsewhere in Victoria, but also face challenges specific to farming close to the city (including the high cost of land and potential conflicts with non-farming neighbours). Rural financial counselling services tend to focus primarily on regional areas and there is a need for greater support in peri-urban areas.

San Francisco Bay Area's Greenbelt Alliance

"We envision a Bay Area where the natural and agricultural lands that provide so much to our region are protected and where everyone can live in a thriving neighborhood that they are proud to call home."

Greenbelt Alliance¹⁰¹

The area of food production in San Francisco's Bay Area faces similar challenges to Melbourne's foodbowl. In response, the Greenbelt Alliance formed to advocate for, and provide expertise on, policy and planning to conserve open space and limit sprawl.¹⁰²

The Alliance runs a range of events in the Bay Area to connect residents with the region's areas of food production. These include group bike tours of farming areas (particularly areas at risk of urban development), and hikes through farming and conservation areas. These activities support the Alliance's mission to build public support for preserving agricultural lands and increasing the viability of farms in the region.

The Greenbelt Alliance also runs an annual 'Farms & Ranches Forever Fest' which brings producers from the peri-urban area into the centre of the city to celebrate the region's agriculture, connect city residents to nearby farms, and raise funds to support continued advocacy.¹⁰³ The event ties in to the group's ongoing Farms & Ranches Forever program of work, which includes research into the importance of local agriculture, and the barriers and challenges facing local farmers. The Alliance has also developed a number of resources and public campaigns to address these issues.

101 Greenbelt Alliance (2019) *Mission*. Available: <https://www.greenbelt.org/mission/> (accessed 18 March 2019).

102 Greenbelt Alliance (2019) As above

103 Greenbelt Alliance (2019a) Farms ranches forever fest. Available: <https://www.greenbelt.org/farms-ranches-forever-fest/>



3.3.2 Potential barriers and enablers to implementing the recommendations

Stakeholders identified a range of potential barriers and enablers to implementing these recommendations:

Barriers

- Rate capping has limited the capacity of some local governments to offer differential rates to farmers and limited the resources available for programs to promote farm viability.
- Some people may have the perception that farms in the peri-urban region cannot be viable because they are too small or mostly 'hobby' farms.
- Selling their farms for urban development is part of the retirement plan for some farmers in Melbourne's foodbowl, because of the challenges they have faced in the past (and the lack of certainty about the future of the region). These farmers may not have another succession plan or retirement plan in place.
- Farmers may be uncertain about how to best incorporate new strategies to increase farm viability into their existing operations e.g. how to start an agritourism initiative.
- Consumers have a poor understanding of the challenges of farming and there is a high demand for cheap food.
- Planning controls can sometimes create barriers to the introduction of new income streams on farm.

Enablers

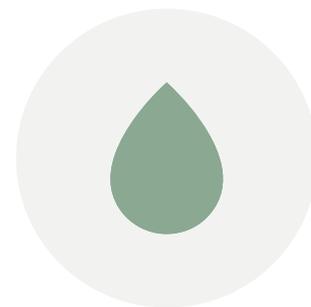
- There is increasing public demand for local food and agritourism experiences.
- Successful examples exist of some of the proposed initiatives in some local government areas e.g. agribusiness officers in Mornington Peninsula Shire and City of Whittlesea and differential farm rates offered by some local governments.
- Industry bodies already have extension programs that could be adapted to better meet the needs of peri-urban farmers.
- Some Victorian Government funding streams are already open to peri-urban farmers e.g. the Artisanal Sector Program.
- The Victorian Government Local Jobs First Policy already mandates a level of local procurement on major projects.
- There is an opportunity to identify and leverage existing best practice in Melbourne's foodbowl in initiatives to promote farm viability and to apply this best practice consistently across all areas of Melbourne's foodbowl.

3.4 Water access

3.4.1 Introduction

Water scarcity is one of the main constraints on food production in Melbourne's foodbowl and elsewhere in Victoria.¹⁰⁴ There is increasing pressure on the availability of water for food production from population growth, the need to restore environmental flows in major river systems (such as the Murray Darling Basin) and from climate change, which is likely to reduce rainfall in southeast Australia and lead to more frequent and severe periods of drought.¹⁰⁵

Melbourne's foodbowl has the potential to increase the resilience of the city's food system to water scarcity by making greater use of sources of urban wastewater for food production, such as recycled water from the city's water treatment plants and stormwater runoff.¹⁰⁶ New approaches to designing and delivering water infrastructure will be needed to achieve this. The Victorian Government has introduced an integrated water management framework¹⁰⁷, which encourages new ways of thinking about water. This approach has the potential to increase the focus in government and in other agencies on planning for water to produce food in a drying climate, using fit-for-purpose water from multiple sources. Certainty is needed about the long term future of Melbourne's foodbowl as a springboard for new investment (and new forms of investment) to deliver more 'fit-for-purpose' water to Melbourne's foodbowl.



Increase water reuse from urban sources in a warming climate



104 Outer Suburban Interface Services and Development Committee (OSISDC) (2010) *Inquiry into sustainable development of agribusiness in outer suburban Melbourne*. Final report. May 2010.

105 DELWP (2016) *Managing extreme water shortage in Victoria: Lessons from the millennium drought*. Melbourne: Department of Environment, Land, Water and Planning.

106 Carey, R, Sheridan, J and Larsen, K (2018) *Food for thought: Challenges and opportunities for farming in Melbourne's foodbowl*. University of Melbourne.

107 DELWP (2017) *Integrated water management framework for Victoria: An IWM approach to urban water planning and shared decision making throughout Victoria*. Melbourne: Department of Environment, Land, Water and Planning.

What should policy aim to achieve?

This narrative describes the outcomes that policy should aim to achieve by 2040:

In 2040, despite large parts of Victoria being in drought, farmers in Melbourne's foodbowl are able to continue producing fresh foods for the city using recycled water and treated stormwater. Schemes supplying recycled water at the city's main water treatment plants have been extended, and new schemes have been introduced at all the water treatment plants around Melbourne, so many more farmers have secure access to water. There is increased investment by state government and water authorities in infrastructure to supply farms with recycled water and stormwater, and new forms of investment. As a result, farmers are offered recycled water at an affordable price. Cost-effective means of storing and treating stormwater have also been developed to enable regular use on farm.

Water is seen as one resource, and fit-for-purpose water is matched to its best use. The focus is on maintaining a healthy water catchment that supports food production as one of many community benefits. Areas of farmland with access to irrigation from water treatment plants now have the highest levels of protection in recognition of their value as relatively 'drought resilient' areas of food production. The high level of water security for farming on Melbourne's fringe, combined with stronger legislation to protect farmland and the right to farm in the region, is attracting more farmers to farm on the city fringe.

3.4.2 Recommendations

1 Implement a holistic approach to managing water assets in farming areas using an integrated water management framework

What Use an integrated water management framework to consider how more ‘fit for purpose’ water could be delivered to farmers in Melbourne’s peri-urban area and how water management and land management can be considered together in a more holistic way in the context of climate change e.g. to recognise the strategic significance of farmland which has access to secure water sources (such as recycled water) in a warming climate, or to recognise the potential to improve the productivity of farmland by providing access to irrigation water. Local governments are important participants in Integrated Water Management forums and have an opportunity to advocate for delivery of ‘fit for purpose’ water for agriculture in their region.

Who State government, local government, water corporations, catchment management authorities

Why The Victorian Government introduced an integrated water management framework in 2017 as part of its *Water for Victoria* policy which provides an opportunity to consider water for agriculture and the relationship between land management and water management in a more integrated way. See Foodprint Melbourne *Food for Thought* report p59.

Victorian Integrated Water Management Framework

“Integrated Water Management is a collaborative approach to water planning and management that brings together organisations with an interest in all aspects of the water cycle. It has the potential to provide greater value to our communities by identifying and leveraging opportunities to optimise outcomes.”¹⁰⁸

The Victorian Government introduced a statewide Integrated Water Management Framework in 2017, with a commitment to work across government and with water corporations to apply the framework to water cycle planning.¹⁰⁹ The framework was followed by a number of Integrated Water Management Forums that brought together a broad range of organisations and government agencies (including local government) to create Strategic Direction Statements for catchments (at a smaller geographic scale than Catchment Management Authority boundaries).

The core aim of these initiatives is to place outcomes that benefit community at the centre of an integrated approach to water management. This approach brings together previously siloed management of different parts of the water cycle and integrates consideration of a variety of drivers, including climate change and land use change.

A key feature of the Integrated Water Management approach is to focus on water use that is ‘fit-for-purpose’. In the case of food systems, this might mean considering uses for Class A or Class C water according to how they would function in a particular setting, such as irrigation, rather than the use being determined by the source of the water.

108 DELWP (2018) *Strategic Direction Statements (multiple)*. Melbourne: Department of Environment, Land, Water and Planning.

109 DELWP (2017) *Integrated water management framework for Victoria: An IWM approach to urban water planning and shared decision making throughout Victoria*. Melbourne: Department of Environment, Land, Water and Planning.

2 Develop integrated assessment frameworks for costing the delivery and benefits of recycled water for agriculture

What Use an integrated water management framework to rethink the approach to assessing the cost of recycled water to users and to more fully account for the multiple social, economic and environmental benefits of water reuse. Share the costs of investment in recycled water infrastructure for agriculture among all beneficiaries (not just the water users) in light of the broad public benefits, rather than asking farmers to meet the full costs.

Who Federal government, state government, water retailers

Why Current costing models for delivery of recycled water for agriculture are based on full cost recovery from farmers (for both delivery of the water and building the infrastructure), which can make the cost of recycled water prohibitive for some farmers. However, there are broad social and environmental benefits of reusing wastewater for agriculture, including the economic contribution of these industries, their contribution to public health (e.g. to maintaining fresh fruit and vegetable supplies during drought) and the environmental benefits of diverting the disposal of wastewater from waterways. The focus should be on the use that delivers the greatest community value rather than the lowest community cost. See Foodprint Melbourne *Food for Thought* report p59.

3 Investigate options for greater re-use of stormwater in and around Melbourne

What Investigate the potential of stormwater harvesting for agriculture, particularly agro-forestry, including options for treating the water to an appropriate standard, storing it until it is required and delivering it to farmers. This could include using stormwater to irrigate urban-rural buffer zones that fulfil multiple purposes, such as carbon sequestration and sustainable timber production from agro-forestry (see Farmland Protection, Recommendation 9).

Who State government, Melbourne Water

Why There will be an increase in stormwater runoff as Melbourne grows that could lead to a greater risk of flooding, and solutions need to be found to safely dispose of this water. Stormwater harvesting could have multiple benefits for agriculture and multi-functional buffer zones in a warming climate, but it is currently unclear how this water should be treated to remove pollutants and stored until it is needed. Research and pilot studies are needed in approaches to treating and storing stormwater. See Foodprint Melbourne *Food for Thought* report p58.

4 Set targets for water reuse and stormwater use

What Set targets for water reuse in the *statement of obligations* that sets the obligations and priorities for Victorian water corporations.

Who State government

Why A target for water reuse in the *statement of obligations* would make it easier for water corporations to demonstrate prudence and efficiency in spending on infrastructure projects to deliver recycled water and stormwater for agriculture. It could become a service that corporations are mandated to provide for customers alongside current requirements to provide drinking water and sewerage, and would provide greater clarity about the purpose of stormwater management and the responsibility for it. See Foodprint Melbourne *Food for Thought* report p53.

5 Strengthen protection for Melbourne's green wedges and peri-urban farming areas

What See recommendations 1-3 in the 'Farmland Protection' section.

Who State government

Why Investments in infrastructure to deliver recycled water for agriculture are long-term (50 year plus) investments, and uncertainty about the future of agriculture in Melbourne's green wedges and peri-urban areas undermines stakeholder confidence in making these investments. Certainty about the long-term future of farmland on Melbourne's fringe is needed to give all stakeholders the confidence to invest in the necessary infrastructure.

6 Undertake water infrastructure planning for water to support food production in and around Melbourne in a warming climate

What Engage in long term planning to develop strategies for harnessing significantly larger volumes of urban wastewater (such as recycled water and stormwater) to support fresh food production on Melbourne's fringe in a warming climate. Raise awareness among all stakeholders of the need to act to ensure the availability of 'fit for purpose' water for agriculture in Melbourne's foodbowl in a warming climate.

Who State government, local government, water retailers, catchment management authorities

Why Global temperature rise is expected to reach at least 1.5 degrees before 2040 and may continue rising (see section 2.3). Victoria is situated in a water-scarce region of the world that is likely to experience more frequent and more severe periods of drought and extreme heat as a result of global warming, and the Murray-Darling Basin (Australia's major foodbowl) is likely to be particularly affected (see section 2.3). Government and water retailers need to plan now to make more secure sources of water available to support food production on Melbourne's fringe.

7 Increase investment in fit-for-purpose water projects for agriculture

What Increase investment in the infrastructure needed to treat and deliver more fit-for-purpose water to more farmers in Melbourne's peri-urban area. Fit-for-purpose water includes recycled water, stormwater and other water sources. The infrastructure needed includes facilities to store the water so that it can be made available in the growing season and to pipe it to more farms. New partnerships also need to be established to fund infrastructure development e.g. to enable local government to collaborate with private funders to drive investment in new water infrastructure.

Who State government, federal government, local government, irrigation districts, private operators and water retailers

Why Significant quantities of unused treated wastewater are currently discharged at sea (only around 10% is reused), and as Melbourne's population grows, greater quantities of wastewater will become available. More wastewater will be generated in growth areas on Melbourne's fringe than can be reused in these areas (see section 2.4). Recycled water is one of the most secure sources of water for food production during drought, but more investment is needed to deliver this water to farmers on Melbourne's fringe. See Foodprint Melbourne *Food for Thought* report p55.

8 Invest in opening up new areas of Melbourne's foodbowl for irrigated agriculture using recycled water

What Invest in infrastructure to open up new areas of Melbourne's foodbowl for irrigated agriculture. Increase the amount of water available for use in irrigation by identifying which land is the best fit for Class A-C water and make available irrigation water that meets those needs from multiple sources, such as recycled water. This should include investigation of opportunities to extend the use of recycled water from existing treatment plants into new areas, as well as creating recycled water schemes from new water treatment plants as they are built.

Who State government, local government, water retailers

Why There are opportunities to grow the regional economy and to derive greater value from existing water resources (only around 10% of existing wastewater is reused) (see section 2.4). A number of proposals have been developed to open up or extend irrigated agriculture into new areas, such as Balliang and the Bunyip Food Belt. See Foodprint Melbourne *Food for Thought* report p51.

9 Local governments should collaborate to drive investment in infrastructure that delivers fit-for-purpose water to farmers

What Local governments should collaborate with each other, with private investors, water retailers and with other levels of government to increase investment in infrastructure that delivers more fit-for-purpose water to farmers e.g. as new infrastructure for recycled water treatment and delivery is established. Local governments should collaborate with other parties to carry out feasibility studies that demonstrate the case for investment.

Who Local government

Why Local government does not have primary responsibility for the infrastructure that delivers recycled water to farmers. However, there are other ways for local governments to drive investment in recycled water infrastructure for farmers in their region. These include advocating to state government, federal government and water retailers for greater investment in infrastructure and finding ways to work with private or community-driven funders and investors to deliver more recycled water to more farmers in their region. See Foodprint Melbourne *Food for Thought* report p48 and 51.

10 Educate water customers to build understanding of the role of water re-use for agriculture

What Promote greater understanding among water customers of the role of recycled water in agriculture.

Who Water retailers, with advocacy from local government

Why Water retailers survey customers to assess their support for investment in projects to deliver recycled water to farmers in the local area. Evidence of customer support for water reuse for agriculture provides a way to demonstrate prudence and efficiency to justify investments in the infrastructure to deliver recycled water to farmers. For customers to demonstrate their support, there is a need to educate customers about the benefits of water reuse for agriculture. See Foodprint Melbourne *Food for Thought* report p 54.

11 Investigate options for better matching the quality of water needed for different types of agriculture and crops as part of a 'fit-for-purpose' water framework

What Investigate approaches to increase the quality of recycled water for agriculture, including reducing the salt content. Research and promote new agricultural practices that are adapted to suit recycled water.

Who State government, water corporations

Why Some farmers have experienced issues with the quality of recycled water affecting the quality of their produce, particularly due to high salinity content. There are opportunities to better match available water to agricultural needs, and to adopt new agricultural practices that suit water conditions, as well as improving the quality of the water delivered.

12 Support greater uptake of water-efficient crops

What Investigate and promote new agricultural practices that are more water efficient. Increase the uptake of water-efficient crops through education and availability.

Who Extension services including industry groups, farmer groups and state government officers

Why Although research into water efficient crops is taking place, farmers need rapid access to new techniques and information in order to transition to more water-efficient crops in a drying climate.

13 Explore with Indigenous Australians the potential for research into water-efficient indigenous food crops

What Explore with indigenous Australians the potential for research into growing and marketing commercial quantities of indigenous food crops that are water-efficient and well suited to a drying Victorian climate, ensuring that indigenous Australians are able to exert control over the research and are the primary beneficiaries of the research.

Who Universities, Indigenous groups

Why Indigenous food crops that are well adapted to the Victorian climate could have a more important role in future food supply in the context of climate change and water scarcity, but little is currently known about their nutritional properties, their potential for commercial-scale agriculture or successful marketing approaches.

3.4.3 Potential barriers and enablers to implementing the recommendations

Stakeholders identified a range of potential barriers and enablers to implementing these recommendations:

Enablers

- There is growing understanding of the challenges of increasing water scarcity and drought and recognition from key agencies and partners of the intensity of warming and drying due to climate change, and a corresponding appetite for change in peri-urban farming communities.
- Integrated Water Management processes (such as forums) have increased collaboration between stakeholders and have helped to create a new culture of working towards 'best community outcomes'.
- Water corporations are becoming more innovative in funding partnerships, finance models and business approaches, which creates an enabling environment for new infrastructure, research and development.
- Potential co-benefits in delivery of water for agriculture can be realised through other schemes. For example, by introducing new firefighting infrastructure, some regions have also been able to improve irrigation infrastructure.
- Existing facilities demonstrate what is possible and there is potential to make better use of these.

Barriers

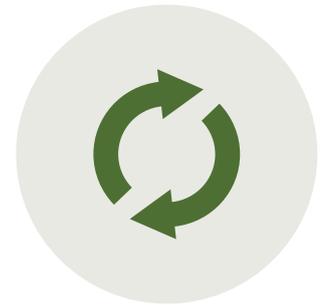
- Current frameworks for costing delivery of water and infrastructure have little flexibility and no mechanism for assessing non-monetary benefits, which makes public benefit outcomes difficult to justify. The definitions of 'return on investment' also make it difficult to justify public good outcomes, and there is no set structure for how to equitably attribute cost across various sectors or parties.
- While public understanding of the link between drought and agriculture has increased, there is less understanding of the impact of drought on food supply and little proactive planning to alleviate the impacts.
- Short term political cycles and thinking can undermine the longer-term planning required to progress some proposals.
- There are gaps in the regulations and responsibilities for various water sources, e.g. it is unclear which agency would have the remit to manage a stormwater harvesting scheme, as stormwater is currently managed differently to other sources of water.
- The cost of storing water (e.g. stormwater and recycled water) until it is needed may be a barrier, particularly in comparison to the current perceived value of water.

3.5 Nutrient recycling

3.5.1 Introduction

Over 600 kg of organic waste is generated in Australia per person per year, around a third of which is food waste. This is a waste of precious natural resources and generates methane (a powerful greenhouse gas) when disposed of in landfill.¹¹⁰ The first priority in addressing this waste is to avoid the generation of waste. The second priority is to reuse the waste to extract valuable nutrients, biomaterials and energy. Initiatives are underway at all levels of government to reduce food waste in order to meet Australia's national target to halve food waste by 2030¹¹¹, which mirrors a similar target in the Sustainable Development Goals.¹¹² The focus of this report is the opportunity to reuse valuable nutrients in organic waste (which are essential to food production) on farms in Melbourne's foodbowl (see section 3.5). There is also an opportunity to convert organic waste to energy. However, this use of organic waste is lower on the waste hierarchy¹¹³ and is not a focus of this report.

Farms close to cities have the advantage of ready access to large amounts of organic waste generated by urban populations. This waste is a source of important nutrients (such as nitrogen and phosphorous) that can be processed into biofertilisers, including composts, and added to soils on farm to counter declining supplies of the natural resources (particularly fossil fuels and phosphate rock) that underpin synthetic fertilisers (see section 2.5). The proximity of farms in Melbourne's foodbowl to the city reduces the need to transport these (often bulky) materials long distances, reducing their cost. Use of inputs like compost on farm can build the health and function of soils, increasing their organic matter, moisture, permeability and carbon storage.¹¹⁴ Replacing synthetic fertilisers with organic alternatives can also reduce the negative impacts of synthetic fertilisers on ecosystems.¹¹⁵



**Reuse urban
organic waste to
build soils on farm**

110 Pickin, J and Randall, P (2017) *Australian national waste report 2016*. Department of the Environment and Energy/Blue Environment Pty Ltd.

111 Australian Government (2017) *National food waste strategy: Halving Australia's food waste by 2030*. Canberra: Australian Government.

112 See target 12.3 to "halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses". Available: <https://www.un.org/sustainabledevelopment/sustainable-consumption-production/> (accessed 16 March 2019).

113 Senate Environment and Communications References Committee (2018) *Never waste a crisis: the waste and recycling industry in Australia*. Commonwealth of Australia.

114 Sustainability Victoria (2015), *Victorian Organics Resource Recovery Strategy*. Melbourne: Sustainability Victoria.

115 Bradford, J. (2019), *The Future is Rural: Food System Adaptations to the Great Simplification*, Post Carbon Institute, postcarbon.org/future-is-rural

Organic materials are already used to build soils on farms in Melbourne's foodbowl and elsewhere in Victoria. However, there is potential for much greater use. Only around half of non-hazardous organic waste in Australia is currently recovered¹¹⁶, and most of the organic compost products that are produced in Victoria are used in the residential landscaping industry rather than on farm.¹¹⁷ A number of obstacles hinder uptake of biofertilisers and compost by Victorian farmers, including a lack of tailored, reliable products for different agricultural industries, a lack of independent and up-to-date advice about how to make effective use of available products and source-contamination of the organic material, particularly with glass and plastic.¹¹⁸ Contamination of organic material at source is one of the most significant problems and requires increased investment in community behaviour change programs and decontamination systems.¹¹⁹ However, if these hurdles can be overcome, the potential benefits are significant. Nutrient recycling could contribute to building a circular food economy within Melbourne's city region food system¹²⁰, where scarce resources are used efficiently and where increased use of biofertilisers reduces the negative impacts of conventional fertilisers and regenerates natural ecosystems.

What should policy aim to achieve?

This narrative describes the outcomes that policy should aim to achieve by 2040:

In 2040, Melbourne's food system operates on the principle of 'no waste'. Food waste has been reduced by 90% since 2019 through a major shift in how people think about waste. Governments encouraged all sectors of the food system to work together to capture valuable resources from the city's organic waste, food waste, wastewater and biosolids. In a world where nutrients – like nitrogen and phosphorous - are scarce and expensive, this access to nutrients from urban waste streams creates significant advantages to farming on the city fringe. Wastes throughout the food supply chain are re-used, from animal manure to by-products from animal and other food processing.

Farmers are able to build soils using high-quality liquid fertilisers and compost that are free of contamination. They also have access to highly concentrated nutrient solutions, developed from waste streams, for use in hydroponic and controlled-environment greenhouses. Some organic materials are also used in bioenergy production, where this is their highest value use. Nutrient cycling happens at many scales – in households and communities, through to major regional processing centres that are co-located with intensive agricultural precincts in Melbourne's foodbowl. Behaviour change in waste management and investment in decontamination technologies has increased the availability and reliability of recycled nutrient products for farms and led to rapid uptake by farmers.

116 Pickin, J and Randall, P (2017) As above.

117 Sustainability Victoria (2013) Recycled organics market analysis. Melbourne: Sustainability Victoria.

118 Sustainability Victoria (2013) As above.

119 Pickin, J and Randall, P (2017) As above; Senate Environment and Communications References Committee (2018) As above.

120 Ellen MacArthur Foundation (2019) *Cities and circular economy for food*. Cowes: Ellen MacArthur Foundation.

3.5.2 Recommendations

1 Develop approaches to prevent and manage contamination of organic resource streams

What Develop and implement educational and technical approaches to overcome contamination of organic waste streams and enable better use of these valuable resources. This could include:

- a Targeted and well-resourced behavioural change campaigns to stop contamination at the source (i.e. when people put organic waste into their bin).
- b Investment in public-private partnerships to overcome the ‘first-mover’ risk of investing in decontamination technologies.

Who State government and the recycled organics industry

Why Organic materials can become contaminated during collection and processing by a range of contaminants, including glass, plastics and chemicals, such as heavy metals and herbicides. Contamination affects the processing technologies that can be used, increases the costs of processing and raises concerns among potential users about the risks of using organic composts. Actions to avoid contamination can occur throughout the supply chain. Much contamination can be avoided through behaviour change i.e. by educating consumers not to contaminate the resource stream with glass and plastics. There are also technologies available to remove common contaminants, but they are expensive. There is currently a ‘Catch 22’. Farmers are reluctant to use recycled nutrient products because they lack confidence that the products are free of contaminants, and companies are reluctant to invest in decontamination technologies until there is strong demand for the products. Public-private partnerships that share the investment risk could help to overcome this gap.

2 Collaborate with farmers to develop fit-for-purpose compost products that meet industry needs

What Work with farmers to develop new compost products from recycled organic waste that meet the needs of different agricultural industries. This could include development of a ‘Top 10’ set of products with profiles that meet the needs of farmers in Melbourne’s foodbowl and the development of technologies that enable ‘custom’ orders i.e. products with specific nutrient profiles to address a farmer’s specific needs (as happens within the conventional fertiliser industry).

Who Farmers, the recycled organics industry

Why Compost use is relatively low in agricultural industries in Victoria. One of the reasons is that the compost products available aren’t always suitable for some industries. If compost use on farm in Melbourne’s foodbowl is to be increased, there is a need to develop compost products that meet farmers’ needs (and Australian standards for these products). Guidelines for using these products effectively should also be developed.

3 Establish a Melbourne Nutrient Recycling Network to help match known sources of nutrients in and around Melbourne with demand for these nutrients

What Establish a network of key stakeholders to foster connections between organisations that manage nutrient resources and organisations with nutrient needs. The network could involve stakeholders from the organics waste recycling industry, farming industries, water retailers, government and researchers. Activities could include:

- a Developing a framework for measuring and communicating nutrient profiles and other key attributes of recycled organic products (and investigating technologies that can be used to assess nutrient density).
- b Developing a framework to understand how nutrients flow and can be recycled effectively within a city region food system (which comprises an urban area and its hinterland, including its farms). The framework should identify typical sources of nutrients within urban and peri-urban areas, typical areas of demand for the nutrients within agriculture and recommend the highest use for recycling as farm inputs.
- c Extend existing waste mapping and models (such as the Victorian Biomass Residue Generation Estimates dashboard and the Victorian Waste Projection model) by adding a nutrient cycling element.
- d Pilot exchange mechanisms to identify suitable nutrient sources and to match them with their highest value reuse before additional processing.
- e Review and recommend consistent application of technologies for reading / measuring nutrient densities.

Who Metropolitan Waste and Resource Recovery Group (MWRRG), Sustainability Victoria, state government, Australian Organics Recycling Association (AORA),

Why There are many sources of potential nutrients in urban and farm waste but there is a need to foster the types of relationships and partnerships that will lead to new opportunities for recycling these nutrients on farms in Melbourne's foodbowl. It is unclear which sources of nutrients are available in a typical city region food system and how they can best be used. It would be useful to develop a simple framework to identify types of waste streams, the uses they might be put to and treatment processes available to turn them into suitable products. A process is also needed to identify the sources, location and volumes of nutrients and to match them up with areas of likely demand. To do this, it is necessary to agree how nutrient profiles and other key product attributes should be consistently communicated. Transporting organic waste and compost etc is expensive and energy-intensive, so identifying demand for recycled nutrients close to the source of nutrients should be a priority.

4 Support practice change to enable farmers to effectively use recycled organic products

What Establish a program to train farmers in the skills required to effectively use recycled organics.

Who Farmers, farming groups, MWRRG, water authorities, state and local government, AORA

Why Recycled organic products are often bulky and require different skills, machinery and equipment to apply than synthetic inputs. The transition from synthetic fertilisers to compost can be challenging and expensive, and farmers require support.

Right: Image courtesy of Local Compost

'Local compost' – a demonstration project to close the loop on food waste

Local Compost™ is a demonstration project in Melbourne trialling a model for effectively and profitably diverting food and other organic waste from landfill into high value compost products that improve soil health.

The project brings together a network of existing service providers such as waste collectors, waste processors, composters, farmers, agronomists, local government decision makers and food industry leaders to build a scalable model to convert food waste into healthy productive soils.

Demonstration projects are currently active in the Melbourne Cities of Hume and Wyndham, where local food and green waste derived compost products are being used to re-invigorate trees in public spaces. Trials are also underway with several major restaurant chains to divert their food waste into compost, which is then used on farm to grow food for the restaurants.

With global and local calls for urgent action to reduce food waste and re-capture nutrients, project leader Steve Morriss believes that treating food waste as anything but a valuable resource is no longer acceptable. For more information about the Local Compost project see www.localcompost.com.¹²¹

121 To connect with the Local Compost project, contact Steve Morriss at steve@circularfood.com.



5 Develop a scheme to accredit agricultural consultants who advise farmers on recycled organic products

What Establish an accreditation program for agricultural consultants who specialise in advising farmers on the use of recycled organic products.

Who Agricultural consultants, MWRRG, water authorities, state and local government

Why Knowledge about recycled organic fertilisers is evolving rapidly, and farmers require advice to understand which products to use in different contexts and how to use them. There is a need for independently certified agricultural consultants and advisors who can provide relevant and up-to-date advice to farmers.

6 Develop recycled nutrient products for use in controlled-environment agriculture

What Develop products that recycle nutrients from urban and food waste streams for controlled-environment agricultural systems, such as intensive greenhouse-based systems.

Who Researchers in collaboration with waste industries and farmers

Why Controlled-environment agricultural systems that are non-soil based (e.g. hydroponic systems) typically obtain nutrients from synthetic liquid fertilisers that are tailored to deliver precise amounts of the nutrients that plants need. To make more efficient use of nutrients and the natural resources that they are derived from, it is important that controlled-environment agricultural systems draw on nutrients that are recycled from urban and food waste streams.

7 Conduct field trials to demonstrate the productivity and environmental benefits of using organic composts for agricultural industries

What Conduct Victorian field trials using organic composts in a variety of agricultural industries and on a range of crops to demonstrate their benefits to farmers.

Who The recycled organics industry in collaboration with universities, state government, Landcare and catchment management authorities

Why To increase the use of organic composts in agriculture it is important that field trials are conducted for various crops under Victorian conditions to demonstrate their effectiveness and impact on soils. The outcomes of trials should be shared with farmers through government programs and supports, and through existing education networks such as Landcare and catchment management authorities.

Right: Image courtesy of normanack (CC BY 2.0)



ASPIRE – Advisory System for Processing, Innovation & Resource Exchange

ASPIRE is an online marketplace which aims to intelligently match businesses with potential purchasers or recyclers of waste by-products. By doing so, it aims to offer businesses a chance to save on disposal costs, while cutting the amount of waste going to landfill.

ASPIRE was developed by CSIRO in partnership with City of Kingston Council, Hume City Council, Knox City Council, and City of Greater Dandenong. After the initial proof of concept stage, a pilot ran from 2017 to 2018 with additional partners including the Barwon South West Waste & Resource Recovery Group.

While organic waste streams were not a strong focus of the pilots, the ASPIRE system is set-up to support matching of organic waste streams such as: animal waste, biosolids, compost, food, garden mulch, organic, sawdust, soil and woodchips. With further work to respond to challenges specific to recycled organics (see the recommendations), ASPIRE could be a valuable tool in increasing the connection of Melbourne's urban waste streams to farmers in Melbourne's foodbowl.

The ASPIRE system is currently onboarding new networks and businesses in 2019.¹²² The ASPIRE platform is in a transition from CSIRO to a private operator.

¹²² For further information about joining the ASPIRE Network, contact Cameron McKenzie – 0417 212 240.

8 Stimulate the development of new agricultural markets for recycled organics

What Establish a program to stimulate the development of new markets for using recycled organic products in agriculture. This could occur through an extension of the Victorian Government's 'Recycled organics market development program' that focuses specifically on agricultural markets and that has a particular focus on markets in Melbourne's foodbowl.

Who State government

Why The main market for compost products from recycled organic waste in Victoria is currently in the landscaping and residential sector. There is potential for much greater use of compost in agriculture, but there is a need to develop suitable products and to address barriers, including inconsistency in product quality, contamination of the resource stream and a lack of knowledge among farmers about how to use biofertilisers effectively.

3.5.3 Potential barriers and enablers to implementing the recommendations

Stakeholders identified a range of potential barriers and enablers to implementing these recommendations:

Barriers

- Australia's current recycling crisis is diverting attention and financial resources away from other areas of waste management, such as organics recycling.
- There is insufficient focus in the recycled organics industry on developing tailored products that meet the specific needs of different agricultural industries.
- To improve the quality of compost products there is a need for open-air finishing, but this requires space and buffer areas that are challenging in a peri-urban context.
- New start-ups that are motivated to develop high-quality agricultural products have insufficient access to capital to invest in the technology needed for decontamination and product treatment.
- There are initial hurdles for farmers in transitioning to biofertilisers, including changes in practice, investment in new equipment and the challenge of handling bulky (rather than refined liquid) products.

Enablers

- The Victorian Organics Resource Recovery Strategy (2015) provides a policy framework for increasing use of recycled organics.
- There is increasing awareness of the impacts of synthetic fertilisers on soil, including the ability to build and maintain soil carbon.
- The National Food Waste Strategy (2017)¹²³ includes a focus on research and development into higher value products from retrieved food waste, development of alternative markets and source-separated organic waste.
- There is growing awareness among stakeholders (including within government) about 'Circular Economy' frameworks.
- Landfill levies are rising, which could focus more attention on diverting organic waste.
- More anaerobic digestion facilities are being established to process organic waste.

123 Australian Government (2017) As above.

3.6 Sustainable farming

3.6.1 Introduction

There is now an international consensus that agriculture needs to shift to more sustainable approaches that strengthen rather than degrade natural ecosystems and that operate within planetary boundaries (including boundaries related to climate change).¹²⁴ This consensus is reflected in the Sustainable Development Goals, which recognise that sustainable agriculture underpins food security.¹²⁵ Although broad principles have been developed for sustainable agriculture¹²⁶, there are different views about which approaches should be used to realise it. These approaches include sustainable intensification, organic farming, conservation agriculture, regenerative agriculture, agroecology and controlled-environment agriculture.¹²⁷

Different approaches to sustainable farming offer different potential benefits. For example, regenerative agriculture focuses particularly on building soils and regenerating natural ecosystems through mixed farming (animals, cropping and trees)¹²⁸, while protected agriculture focuses on resilience to climate extremes and efficient use of natural resources through a high degree of control (e.g. in controlled-environment glasshouses).¹²⁹ A diverse range of approaches to sustainable farming should be promoted in Melbourne's foodbowl, rather than one 'best' approach, as a diversity of approaches is likely to increase the overall resilience of the city's food system. Promoting a diverse range of approaches also has the potential to facilitate the transfer of promising tools and techniques between different approaches. The approaches supported should include regenerative, organic and agroecological farming systems, as well as sustainable intensification and protected agriculture systems.

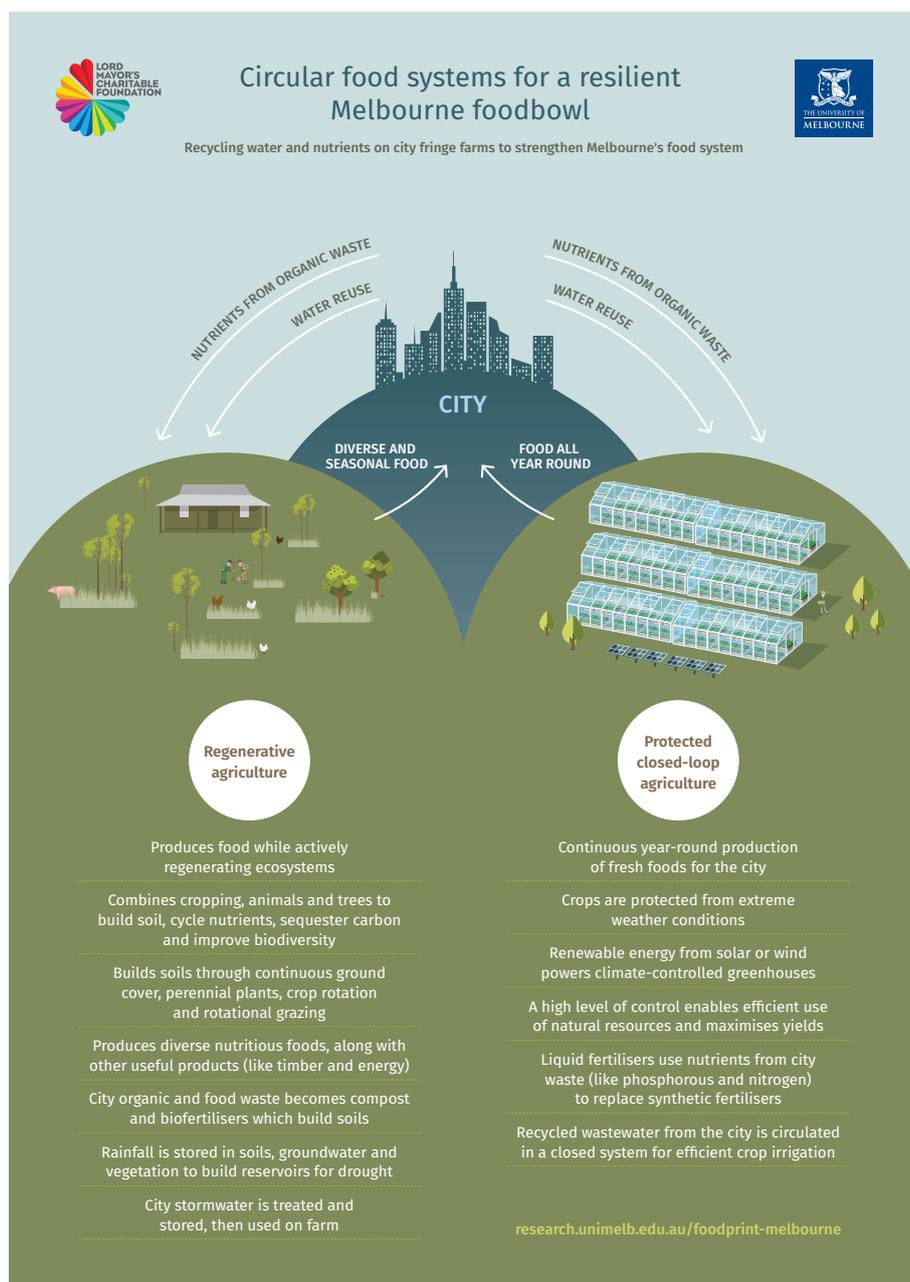
An important aspect of sustainable farming approaches is resilience to climate-related shocks and stresses, such as droughts, heatwaves, storms and floods.¹³⁰ Farming close to cities can draw on city waste streams (particularly water and organic waste) to increase its resilience to water scarcity in a warming climate (see section 3.4) and to declining supplies of the natural resources that underpin synthetic fertilisers (see section 3.5). The sustainable farming approaches promoted in Melbourne's foodbowl should focus particularly on recycling city waste streams on farm for efficient use of valuable resources (see section 3.5).



Incentivise diverse approaches to sustainable farming

- 124 See Springmann, M et al. (2018) As above.; Poore, J and Nemecek, T (2018) Reducing food's environmental impact through producers and consumers. *Science* 360: 978-992.
- 125 See target 2.4 of goal 2 (Zero Hunger) - "By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality". Available <http://www.fao.org/sustainable-development-goals/indicators/241/en/> (accessed 16 March 2019).
- 126 For example, see the UN FAO's five principles of sustainable agriculture in FAO (2018b) *Transforming food and agriculture to achieve the SDGs*. Rome: Food and Agriculture Organization of the United Nations.
- 127 Altieri, M, Nicholls, C and Montalba, R (2017) Technological approaches to sustainable agriculture at a crossroads. *Sustainability* 9: 349 doi:10.3390/su9030349; Shamshiri, R, Kalantari, F, Ting, K, Thorp, R, Hameed, I, Weltzien, C, et al. Advances in greenhouse automation and controlled environment agriculture: A transition to plant factories and urban agriculture. *International Journal of Agricultural & Biological Engineering* 2018; 11(1): 1-22.
- 128 Massey, C (2017) *Call of the reed warbler: A new earth*. University of Queensland Press.
- 129 McCartney, L and Lefsrud, N (2018) Protected agriculture in extreme environments: A review of controlled environment agriculture in tropical, arid, polar and urban locations. *Applied Engineering in Agriculture* 34 (2): 455-473.
- 130 FAO (2018b) As above.

One important aspect of promoting sustainable agriculture is to create an enabling policy environment.¹³¹ Policy actions should focus on farmer education and extension (including peer to peer learning networks), research and development, incentivising sustainable farming practices and rewarding farmers for the public benefits provided through sustainable land management.



131 FAO (2018b) As above.

What should policy aim to achieve?

This narrative describes the outcomes that policy should aim to achieve by 2040:

In 2040, farms in Melbourne's foodbowl showcase sustainable agricultural practices and are designed for resilience to the impacts of climate change. City fringe food production has an important role in 'drought resilient' food production, and farmers reuse valuable city waste streams, including recycled water, stormwater, nutrients and biogas. Sustainable farming takes many forms and there is resilience in this diversity. These farms include enclosed cropping systems (such as large-scale glasshouses) that continue producing food through extreme weather, making efficient use of recycled nutrients and powered by renewable energy. They also include regenerative farms that use extensive tree cover and crop diversity to produce a wide range of foods (meat and dairy products, grains, fruit and nuts) as well delivering other benefits for the city. These benefits include biodiversity, green space, diffusing the heat island effect and sequestering carbon in vegetation and soils to reverse climate change.

People have increased their consumption of plant-based foods and consume smaller quantities of meat in line with sustainable, healthy dietary guidelines. Livestock are raised as an integral part of regenerative farming approaches (at levels that natural ecosystems can support), with high levels of animal welfare. Traditional Owners have increased their management and ownership of land and there has been a rise in the availability of indigenous foods. The social licence for agricultural practices that degrade land and waterways has diminished. Local councils, catchment management authorities, farmers, research and community groups work together to drive sustainable land management and carbon sequestration. Governments incentivise sustainable farming practices and reward farmers for land stewardship that drives a shift to sustainable practices.

3.6.2 Recommendations

1 Incentivise sustainable farming practices through local government rate rebates and direct payments

What Introduce a system of local government rate rebates to incentivise best practice sustainable land management and farming approaches. These payments should reflect the public benefits of the landscape services provided by farmers.

Who Local governments in collaboration with catchment management authorities and farming industry groups.

Why High local government rates for farmland in Melbourne's foodbowl (based on high land prices) undermine the viability of farming in the region. Some local governments offer differential 'farm rates' on actively farmed land. There are opportunities to take rate discounts and rebates further as a lever for sustainable land management. For example, City of Whittlesea supplements the differential farm rate with an additional rate rebate if farmers adopt particular sustainable practices on farm (see case study).¹³² The use of rate rebates to incentivise sustainable farming practices could be extended to provide rebates consistently across the state for best practice sustainable farm management and land use. This mechanism could be particularly effective in peri-urban areas where rates are disproportionately high. Next steps could include:

- Developing evidence-based guidelines for assessing 'best practice' sustainable land management across a range of land uses and farming systems.
 - Building on the City of Whittlesea guidelines by investigating other existing accreditation systems that could be leveraged to agree practices eligible for rebates.
 - Pooling funds through networks of local governments, agencies (e.g. catchment management authorities) and Landcare to begin this work. A first step could be to convene a small group of interested parties (from local governments and elsewhere) to develop a coherent approach.
 - Developing effective approaches to assessment and enforcement (in Whittlesea, each property is visited by a council officer). There are opportunities to significantly reduce the costs of assessment and enforcement through use of satellite imagery, including through emerging systems like the Regen Network.¹³³
-

¹³² For further information, see <https://www.whittlesea.vic.gov.au/community-support/grants-awards-and-competitions/sustainable-land-management-grants-and-incentives/> (accessed 16 March 2019).

¹³³ Regen Network is a global community and platform focused on regenerating natural ecosystems. For further information, see <https://www.regen.network/> (accessed 16 March 2019).

Whittlesea sustainable land management rebate scheme

Whittlesea is a peri-urban local government area in the north of Melbourne around 20km from the CBD (that includes parts of the Kinglake National Park). As well as the highly urbanised southern part of the region, it contains a strong and diverse agriculture sector that includes grazing livestock, fruit and vegetables and mushrooms.

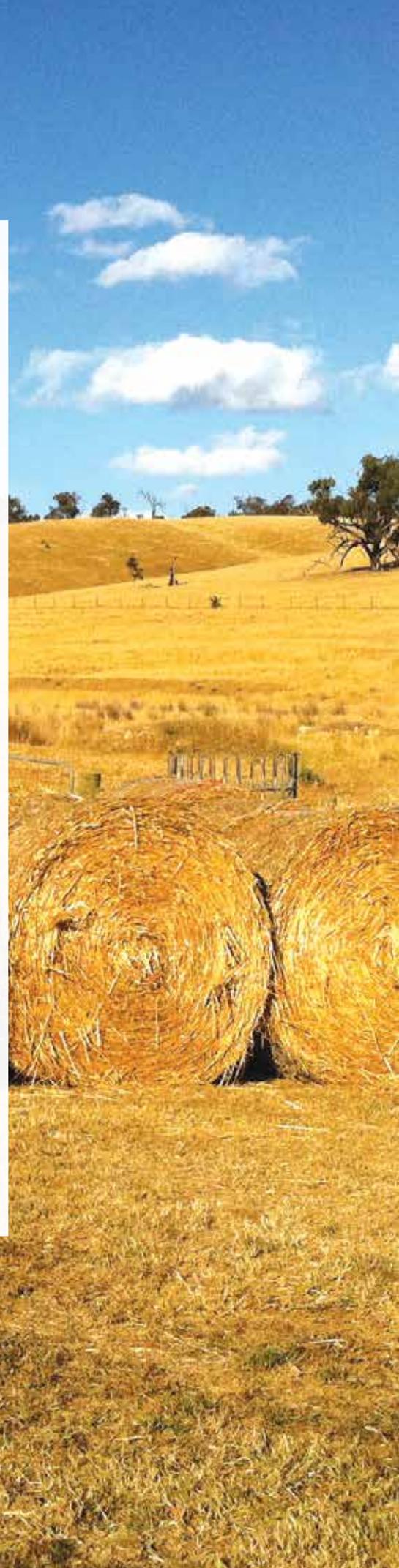
Whittlesea has a significant differential rate for farmland that is actively farmed, providing a 40% discount on the general rate. They do this because “rising property values in a ‘growing’ municipality do not always equate to increased income producing capability for farmers”.¹³⁴ Whittlesea also actively incentivises sustainable land management practices through their Sustainable Land Management Rebate Scheme. This Scheme offers a 30% additional rate rebate (on top of the 40% farm rate reduction) for farms that are 50 hectares or larger, and 20% for those that are 8 hectares or larger. In order to qualify for this additional rate rebate, land managers commit to undertaking a minimum of two actions to address high priority land degradation issues. There are allowed and non-allowed approaches under each activity area. Areas of allowed activity are:¹³⁵

- Noxious and environmental weed control
- Integrated pest animal control
- Soil erosion and/or salinity
- Protection and/or enhancement of remnant native vegetation
- Protection and/or enhancement of waterways/wetlands

The Scheme includes reference to particular agricultural practices and there is potential to extend this.

134 City of Whittlesea (2018), *2018/19 Rating Strategy*, <https://www.whittlesea.vic.gov.au/media/4080/20180614-rating-strategy-2018-19-and-waste-services-charge-fact-sheet.pdf> (accessed 18 March 2019) p12.

135 City of Whittlesea (2019), *Sustainable Land Management Rebate Scheme Application Guidelines*, https://www.whittlesea.vic.gov.au/media/1542/c-users-guh-desktop-sustainable_land_management_rebate_scheme_application_guidelines_pdf.pdf (accessed 18 March 2019).



2 Promote a diverse range of approaches to sustainable farming in Melbourne's foodbowl

What Promote a diverse range of approaches to sustainable farming in Melbourne's foodbowl that includes agro-ecological approaches, as well as protected or controlled-environment cropping and sustainable intensification. Develop a set of principles that underpin sustainable approaches to farming in Melbourne's foodbowl (e.g. reduce greenhouse gas emissions, adapted to the impacts of climate change, based on nutrient and water recycling) through a collaborative process that involves a wide range of stakeholders.

Who State government, local government, farming industry groups and civil society groups.

Why There are many different approaches to sustainable farming but stakeholders sometimes have polarised views about what constitutes the 'right' approach, promoting one 'best' way forward e.g. sustainable intensification or agro-ecological approaches. Different approaches have different benefits for the city's food system, so we argue here that a diverse range of approaches is needed rather than betting on one 'right' way, and that a diversity of approaches will increase the resilience of the overall system. It would be useful to develop a shared understanding among stakeholders of the principles that underpin sustainable approaches to farming in Melbourne's foodbowl as a basis for promoting these approaches and incentivising sustainable farming practices.

Right: Image courtesy of Moffits Farm

Moffitts Farm – sustainable farming in Melbourne’s foodbowl

Moffitts Farm is a 50-hectare farm near the town of Romsey, 60km north of Melbourne. Over 33 years, it has been transformed from a degraded small farm to a leading example of what can be achieved environmentally and productively. Moffitts Farm is not aligned to any one school of farming. Instead, they aim to demonstrate a pathway to sustainable farming for all farmers through their commitment to evidence-informed decisions, and to ensuring that their farming practices improve ecosystem services, animal performance and welfare.

Moffitts Farm’s main food product is sheep and lamb meat. They have a self-replacing flock of Wiltipoll sheep that sheds its wool each spring so there is no requirement for shearing or crutching. The breed also produces high quality meat which is sold through an ‘ethically focused’ butcher in Fitzroy. Their strong focus on animal welfare includes low-stress mustering and handling, optimal nutrition all year round and protection of new-born lambs from extreme cold weather.

They summarise their farming methods as ‘comfortable farming’ – that is, good for soil health and biodiversity, for the animals and for themselves. Practices include species diversity in pasture (including 100% year-round groundcover), height of grasses (to protect ewes and lambs) and return of native perennial grasses. Long rest periods between grazing mean that the diverse grassland maintains soils with high soil organic carbon levels (by south east Australia standards). The grasslands also provide healthy habitat for microbial and insect communities, while supporting ground-dwelling birds, mice, frogs and reptiles. These animals have attracted native birds of prey back onto the property. This approach, along with the planting of more than 10,000 trees and shrubs on the property (including five hectares of habitat corridors along the creek and fence lines) has led to significant species diversity on the property. They maintain a website and blog¹³⁶ and run a range of tours on the farm with interested individuals and groups, connecting with the community and sharing knowledge of their approach to holistic farming in the peri-urban area.

136 See <http://www.moffittsfarm.com.au/our-farm/> (accessed 19 March 2019).

3 Provide extension services in sustainable farming to peri-urban producers

What Provide farmers in Melbourne's foodbowl with access to evidence-based information about best practice in sustainable and resilient land management and farming, particularly building soils. This includes part-time farmers, who may have an interest in innovating, but poor access to support and information. This could be done through more state government extension officers, or improved resourcing and support of private services, ensuring that advisors are up-to-date with the latest in sustainable farm management approaches. It could also include support from agribusiness officers in local governments and land management partners such as catchment management authorities. Also encourage dissemination of best-practice local knowledge through peer-to-peer support programs, an important strategy in transitioning to more sustainable practices.¹³⁷

Who State government, local governments, Landcare, catchment management authorities, industry representative groups

Why Lack of access to clear and trustworthy information appropriate to particular farm contexts is a barrier to farmers adopting more sustainable farming practices. There are also gaps in state and federal government support for peri-urban farming and in extension and advisory support at local level.

4 Establish a Cooperative Research Centre or Rural Research and Development Corporation for sustainable peri-urban farming

What Establish a Cooperative Research Centre (CRC) or a Rural Research and Development Corporation (RDC) focused on research, development and extension of sustainable farming approaches in the peri-urban areas of Australia's cities. First steps could include co-ordinating a summit of key stakeholders, scoping research priorities and securing industry co-funding.

Who Industry partners together with universities

Why There is a need for more research into sustainable and resilient approaches to farming that take advantage of the benefits of peri-urban areas to cities (e.g. access to water and nutrient streams) and also research into the challenges of farming in peri-urban areas (e.g. minimising tensions with urban neighbours and opportunities for multi-functional buffer zones). A broad-based research, development and extension centre could lead research into the opportunities and challenges of sustainable farming on the fringes of Australia's cities and could drive take-up of best practice.

137 Garbach, K and Morgan, G (2017) Grower networks support adoption of innovations in pollination management: The roles of social learning, technical learning and personal experience. *Journal of Environmental Management* 204: 39-49; Kroma, M (2006) Organic farmer networks: facilitating learning and innovation for sustainable agriculture. *Journal of sustainable agriculture* 28 (4): 5-28.

5 Assess how existing financial supports to farmers affect environmental outcomes

What Undertake a review of how financial support payments to farmers (e.g. drought relief, fuel tax credits, primary producer tax concessions) affect environmental outcomes, with a view to altering or removing subsidies that lead to poor outcomes (e.g. that support farming systems and practices that are not well adapted to climate change) and instead incentivising a transition to sustainable, climate resilient land use and farming practices.

Who State government, universities

Why There are many ways in which governments may subsidise land use and agricultural practices that are not sustainable or suited to a rapidly changing climate. To drive change towards sustainable and resilient food production in Melbourne's foodbowl, incentives should be aligned with farming practices that contribute to positive environmental outcomes e.g. redirecting financial supports to better pasture plans for drought-proofing.

3.6.3 Potential barriers and enablers to implementing the recommendations

Stakeholders identified a range of potential barriers and enablers to implementing these recommendations:

Barriers

- Agriculture policy at federal and state level tends to focus on objectives related to increasing exports and productivity, with less emphasis on the need to drive a transition to sustainable agriculture.
- Farmers' need to ensure a return on investment (in the context of high land costs and rates) may drive them to production methods with negative environmental impacts.
- When environmental stresses affect production (e.g. climate-related events), pushing up prices for prolonged periods, food manufacturers and retailers may replace local products with cheaper imports, and it can be difficult for farmers to re-establish previous supply arrangements with buyers.
- There is a lack of infrastructure to promote 'closed-loop' systems for water and nutrient recycling (see sections 3.4 and 3.5).

Enablers

- Many farmers see farming and ecology as mutually beneficial, including young farmers and new generations of farmers that bring new thinking and worldviews.
- Cities need green space, recreational areas and the cooling benefits of natural ecosystems. Farmers that can provide these services while producing food may be welcome neighbours to urban populations.
- New technologies and practices to support sustainable farming are already available and affordable and can make a difference when applied.
- Consumers (including younger consumers) are showing increased interest in where their food comes from and its environmental impacts.
- The media can be a powerful enabler, amplifying stories of sustainable farmers and farming and increasing awareness of Melbourne's foodbowl and the people who farm there.





SECTION 4

Evidence gaps and future
research

This research has identified a number of evidence gaps in promoting a sustainable and resilient city foodbowl for Melbourne. Many of these gaps relate to the research base needed to promote sustainable agriculture in Melbourne's foodbowl:

Indicators for a sustainable and resilient Melbourne foodbowl – the Foodprint Melbourne project has articulated a framework and roadmap for a sustainable and resilient foodbowl for Melbourne. To achieve this vision, it is important to have indicators to quantify and measure success. There is a need to develop indicators and an assessment and monitoring framework for a resilient and sustainable city foodbowl (and more broadly, for the city's food system) in order to track progress.¹³⁸

Promoting sustainable agriculture in Melbourne's foodbowl – agriculture in Melbourne's foodbowl will need to adapt to a warming climate and scarcity of natural resources (indeed, it is already adapting), and will need to adopt approaches that enhance rather than degrade natural ecosystems. There are diverse possibilities for sustainable agriculture in Melbourne's foodbowl, ranging from regenerative approaches to protected closed-loop agriculture (see section 3.5). There is a need for further research into the effectiveness of approaches to sustainable agriculture currently practised in Melbourne's foodbowl, and what can be learned from best practice international approaches adopted in the peri-urban regions of other cities. There is a particular need for research into agro-ecological and regenerative approaches to sustainable farming, which have been overlooked in research agendas and funding. Research is also needed into the policy barriers and opportunities for sustainable agriculture in Melbourne's foodbowl (and more broadly at a state and national level).

Indicators for sustainable agriculture – if local and state governments are to reward and incentivise sustainable approaches to agriculture and land management (e.g. through tax incentives or rebates on local government rates – see section 3.6), they require an understanding of the features of 'best practice' sustainable approaches to agriculture in a peri-urban context, and also a set of indicators that can be used to identify and assess sustainable approaches to agriculture. There is a need for research to develop a monitoring framework and set of indicators.

Recycling nutrients in city region food systems – food production close to cities offers unique opportunities for recycling valuable nutrients essential to food production (such as nitrogen and phosphorous) back on to farm. There an opportunity to identify and map potential sources of nutrients in waste streams in and around Melbourne and to increase understanding of their highest potential uses (and the technologies and practice change required to use them on farm). The development of standard systems to compare nutrient profiles in resource streams and products would also assist with matching nutrients to effective on-farm use.

138 For an example of an indicator framework, see Carey, J. & Dubbeling, M. (2018), City Region Food System Indicator Framework, RUAF City Food Tools Project / FAO Food for the Cities Programme, <https://www.ruaf.org/sites/default/files/19255e-CRFS-Indicator-Framework.pdf>

Development of protected closed-loop agricultural systems – protected and controlled-environment agricultural systems (e.g. glasshouse-based) are likely to become a more significant feature of farming in Melbourne’s foodbowl as farmers adapt to climate extremes. Research is needed to develop controlled environment systems that make efficient use of resources by ‘closing the loop’ on city waste streams and using renewable energy. While some controlled environment systems already draw on recycled wastewater, there is a particular need to develop systems that can also draw on recycled nutrients from organic waste (see section 3.5).

Decoupling agriculture from fossil fuels – agriculture, like other areas of the economy, needs to transition rapidly from fossil fuels to renewable sources of energy and to sources of nutrients that are not dependent on fossil fuels (see section 2.5). Agriculture may also have a role to play in the generation of renewable energy, both for use on farm and for the broader economy. There is a need for research into strategies for decoupling agriculture from fossil fuels and into the opportunities for doing this in a peri-urban context.

Farmer well-being in Melbourne’s foodbowl – farmers in Melbourne’s foodbowl may experience particular stresses related to farming in close proximity to the city. These issues are poorly understood and there is a need for research to understand how farmer well-being can be promoted in the region.

Public perceptions of Melbourne’s foodbowl – if Melbourne’s foodbowl is to be protected for the long term, there is a need for public awareness of its importance to the city’s food security and support for protecting the region from urban development. There is a need for research to understand public perceptions of Melbourne’s foodbowl to underpin public campaigns and future monitoring of changes in public opinion.



