QUT Health

Norfolk Island Food System Mapping Project

Final Report

Report prepared for:
**Regional Development Australia
Mid North Coast**

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Authors

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Associate Professor Helen Vidgen

Associate Professor Helen Vidgen PhD, APD, AFHEA is a public health leader with extensive experience in policy, practice, research, and education across government, civil society and higher education sectors. She is a global leader in the area of food literacy. Her definition and conceptualisation of the term is the most cited internationally and has advanced the concept in research, policy and practice across settings and sectors in low, middle and high income countries, including being adopted by the UN Food and Agriculture Organisation. Vidgen's other research interests include the social dimensions of food and eating, public health nutrition policy, translation and implementation including planning, evaluation, workforce and capacity. She was the chief investigator of Queensland's largest trial of a universal childhood obesity management program, wrote the evaluation framework for the State's largest chronic disease prevention program, and conducted Queensland's only published audits of the community and public health nutrition workforce. She enjoys the complexity of implementation. Helen's public health nutrition research is informed by her extensive practice and civil society experience.

Doctor Tina Gingell

Doctor Tina Gingell is an Accredited Practising Dietitian. After 20 years as a certified practicing accountant, in 2016 she decided to change career. She completed her Bachelor of Nutrition and Dietetics (Honours) in 2019 and her PhD in 2024. Her PhD project "Connecting with Cultural Foods" conducted food asset mapping of families with lived refugee experiences living in Australia. The project used a strength-based model to highlight the resilience of these communities to maintain their food security in complex environments. Tina loves to explore the cultural and spiritual role of foods. She is passionate about collaborating with communities to understand their complex needs and having community drive the research agenda and solutions.

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Background

Food security has been a persistent priority for Norfolk Island. Various projects have been undertaken with limited satisfaction from residents and stakeholders. Regional Development Australia Mid North Coast (RDAMNC) seek to systematically address food security on Norfolk Island by first understanding its food system to then facilitate the identification of priorities for action by its citizens.

RDAMNC contracted Queensland University of Technology (QUT) to provide an overview of available sustainable food system frameworks, and guidance on selecting an appropriate framework for Norfolk Island. This then informed the development of a map of the Norfolk Island food system. This was the first known attempt to document a ***holistic, evidence-based map*** of the current food system on Norfolk Island.

Mapping the food system can create numerous benefits:
- Identify the strengths and resilience of the food system to create strategies to safeguard these aspects.
- Identify vulnerabilities within the food system to allow risk mitigation strategies to be developed.
- Understand the productive capability of the environment. Sustainable food system strategies could be a valuable contribution to environmental management.
- Provide cost-effective foundational evidence to ground future investment and support in the food system on Norfolk Island
- Strengthen the agribusiness sector on Norfolk Island using evidence-based strategies.
- Strengthen the supply, production and preservation of capacity of Norfolk Island to de-risk the food system.
- Enhance the health, wellbeing and food literacy of Norfolk Island residents.
- Ensure food sustainability and supply for the tourism market.

A stable, ongoing, healthy, affordable, sustainable, and secure food supply for Norfolk Island will require evidence-informed decision tools. At a global scale, there is extensive research progress on methods to assess sustainability of food systems, with many frameworks available. Core domains typically assessed include social, economic and environmental considerations, while healthiness and affordability of foods, and issues such as governance and resilience are also often considered. Trade-offs often need to be considered in local decision making using local data.

This report will discuss the methods undertaken during the two stages of the project and outlines the deliverables (outputs) which occurred in each stage. The last two sections of the report will discuss the integration between the food system and health, and why this is critical to be considered. It also lists recommendations for RDAMNC's next steps for mapping for Norfolk Island food system.

Methods

The project was undertaken in two stages.
1. Identification of a food system frameworks for use on Norfolk Island
2. Application of this framework to initiate the mapping of the Norfolk Island food system

The first stage occurred between February and April 2024 and involved identifying food system frameworks that were available globally to determine suitable approaches for mapping the Norfolk Island food system. An extensive review was undertaken of academic and non-academic literature. The information collected from this literature was then collated into a visual food system framework which included the process of mapping a food system and the key features of a food system. This food system framework was then used to inform the second stage of the project.

Stage two occurred between May and June 2024 in collaboration with RDA. This stage involved carrying out initial food system mapping. QUT provided advice to support RDA whilst they identified key stakeholders that could provide high level advice to the project. RDA then travelled to Norfolk Island and met with stakeholders individually to determine the purpose of the Norfolk Island food system and identify aspects of the food system which would be important during a food system mapping exercise. Following this, QUT and RDA met to refine the purpose of the food system for Norfolk Island. QUT then assessed these purposes against the food system framework (stage 1 output) to identify gaps and priorities for action.

Stage 1: Identify food system frameworks

Selection of literature

Academic articles were identified by searching scientific literature databases, Web of Science (Clarivate, 2024), PubMed (National Library of Medicine, 2024), and Google Scholar (Google, 2024). This occurred using varying combinations of the search terms *food system*, *mapping*, *toolkit*, *framework* and *Island* or their synonyms. A large number of search results (>100) were initially reviewed against the inclusion and exclusion criteria (see Table 1) until the search results no longer presented relevant articles. This initial review occurred by reading the title and abstract of each article. An in-depth review then occurred by reading the full text of each article selected in the initial review. Backwards citation searching (articles cited in the papers identified) occurred using the reference lists (including references to webpages and toolkits) of selected articles from the full text review. Forwards citation searching (more recent articles that cited the papers identified) occurred by using the "cited by" functionality in Google Scholar of selected articles. Grey literature was then identified by using general internet search engines Google™ and Bing™. A combination of the search terms used for academic databases were entered into these search engines and the same process described for academic articles was followed.

Table 1 Inclusion and exclusion criteria for selecting articles

Inclusion criteria	
Source type	All (peer reviewed journal articles, websites, reports, toolkits or any other source types)
Subject	- Frameworks and methods for food system mapping - Frameworks and methods for food system assessments (i.e. for transformative change) - Case studies/examples of successful food system mapping - Information that is important to consider when mapping a food system - Local, community, regional/city, country wide food system mapping
Exclusion criteria	
Subject	- Subject is focused on one aspect of the food system (e.g. water use, soil regeneration, geographical land use, transportation, food miles, food waste) without consideration of other aspects of the food system - Subject is focused on a single food supply value chain (e.g. movement of beef in Nariobi). - Toolkits and websites that are not supported by evidence

Data extraction

Data were extracted from each article, including the author, year published, publication title, study aims or objectives, information about the methods or process undertaken, the aspects of the food system that were considered during the study, resources used by the study, figures containing graphical representations of food systems and frameworks, and information on previously identified key areas of the food system (resilience, food sovereignty, food security and its dimensions, environmental sustainability, governance mapping, significant or meaning of foods, and trade off analysis). Where possible, the same data were extracted for grey literature. Data were collated using Microsoft Excel.

Data analysis

Data analysis involved collating details of the food system models identified in the selected articles. From these components, one coherent model was built using an iterative process. Literature which contained figures of food systems or frameworks were initially collated to identify key features of the food system and mapping processes. A flowchart was created from the identified key features using Microsoft Visio software. All selected articles were read, and the flowchart was updated as new data were identified. This process occurred iteratively until all features of the food system and mapping processes were captured on the flowchart.

The comprehensive food system model was initially developed by one author (TG). The draft food system model was then reviewed and discussed among the full investigator team, which informed development of an updated model. This updated model was then presented to the RDA team and discussed. No new food system features were identified.

Stage 2: Initial steps of food system mapping

Mapping a food system should be completed in a systematic manner using systems thinking, to ensure desired outcomes can be achieved (Food and Agriculture Organization of the United Nations (FAO), 2023; Food System Transformative Integrated Policy (FS-TIP) initiative, 2023). This was undertaken by a project team that included the authors (QUT), Dianne Wall, Acting Chief Executive Officer, RDA, Madeleine Lawler, CEO/Director of Regional Development, RDA, and Karen Innes-Walker APD, Health and Wellbeing Coordinator, Norfolk Island Health and Residential Aged Care Services. Mrs. Innes-Walker is a resident of Norfolk Island and was recruited to provide expertise and perspectives about

the Norfolk Island operations and food system. Karen has extensive experience in nutrition and dietetics, and public health more broadly. Through her long association with the Island she has in-depth knowledge of most aspects of the food system from soil quality to prevalence of diet related disease and household food insecurity. She brought great local insights into the context of the food system, key stakeholders and feasibility and opportunities for food system change.

This project undertook the first three steps of mapping the food system on Norfolk Island. The full process commonly involved in a food system mapping is outlined in Figure 1.
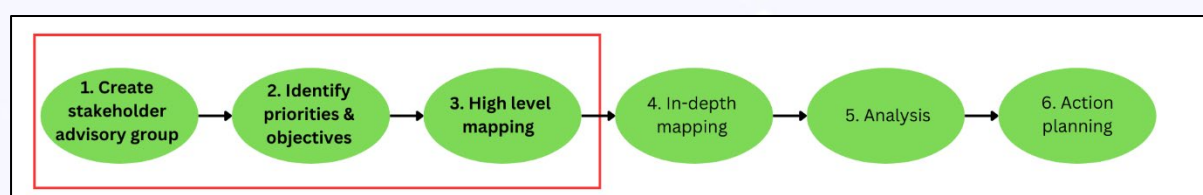
Note: Figure created by authors, adapted from data extracted from selected articles (Food and Agriculture Organization of the United Nations (FAO), 2023; Food System Transformative Integrated Policy (FS-TIP) initiative, 2023; Jacobi et al., 2019; Liddy et al., 2023; Milgroom et al., 2019; Posthumus et al., 2021)

Figure 1: Process of mapping a food system

The three steps undertaken in this project were creating an advisory board, identifying the priority and objectives of the food system map, and undertaking high level mapping (Food and Agriculture Organization of the United Nations (FAO), 2023; Milgroom et al., 2019; Posthumus et al., 2021).

Create a stakeholder advisory board

A stakeholder advisory group is important to ensure engagement, collaboration and local ownership of the food system map (Food and Agriculture Organization of the United Nations (FAO), 2023). The project sought to identify residents and government representatives and organisations on Norfolk Island that had overarching knowledge of the Norfolk Island food system and could act as allies and champions for the project. Potential stakeholders were identified, analysed and selected through iterative discussions between the project team of using an influence and interest matrix grid.

It was elucidated by the project team that in recent years there had been a large number of workshops run on Norfolk Island with mixed levels of satisfaction. Therefore, it was considered that some food system stakeholders may feel that additional workshops such as to inform mapping of the Norfolk Island Food system would not be perceived as helpful mechanisms for input or direction. Consequently, it was decided the RDAMNC representative would meet with a small number of individual stakeholders face-to-face initially, to discuss the project and elicit engagement. The outcomes from these meetings were then used to complete the second and third steps of the food system mapping process.

Identify priorities and objectives

The second step in food system mapping was to identify priorities and objectives of the Norfolk Island food system. This step is important to ensure data is collected that leads to strategies, policies and interventions that strengthen the food system (Food System Transformative Integrated Policy (FS-TIP) initiative, 2023). Without these objectives established at the commencement of the system mapping project, it may lead to the collection of meaningless or vague data that does not instigate transformative change (Food System Transformative Integrated Policy (FS-TIP) initiative, 2023).

Prior and during stakeholder meetings as described under step 1, stakeholders were encouraged to reflect on the Norfolk Island food system and discuss the following:

- *What are the purposes of the Norfolk Island food system?*

Responses were then collated, discussed, and refined by the project team and the overarching objectives and priorities of the food system were agreed upon.

High level mapping of the food system

The third (and final step in this project) was to conduct high level mapping. This step involves identifying the resources and assets which exist in the Norfolk Island food system when considering the priorities and objectives of the food system. This process allows the stakeholder to focus on the necessary aspects of the food system (Serrano-Cortés et al., 2023) and can then inform the development of a plan for in-depth mapping (the following step). This project categorised resources and assets into four key areas: (i) contextual, (ii) food supply value chain, (iii) food system outputs, and (iv) risks and resilience of the food system. The following questions were also posed during stakeholder meetings:

- *What features of the food system are a priority for Norfolk Island?*

- *Are there any features of the Norfolk Island food system that have not been identified so far?*

- *What are the levels of support required by RDA and your organisation for completing a comprehensive map of the Norfolk Island food system?*

RDAMNC provided the compiled list to QUT which was plotted against the food system framework (from stage 1). Areas which were not identified as relevant were then highlighted to determine if the priorities and objectives should be expanded.

Deliverables

Stage 1: Food system mapping framework

Fifty articles, toolkits and websites were selected for a full text review, of which 13 were deemed directly relevant to the Norfolk Island food system and selected for data analysis (refer Table 2). The selected articles, toolkits and websites were then used to draft a food system mapping approach for Norfolk Island, using the Methods described previously (refer Figure 1).

Table 2: Journal articles, toolkits and websites (n=13) selected during full text review

Authors	Type	Aims	Main focus
Béné et al. (2023)	Journal article	To provide an analytical framework aimed at assessing the resilience of food systems	Resilience of food systems (and trade off analysis), aspects of food supply value chain, model is underpinned by food security, governance is assessed as a contextual driver.
Blay-Palmer et al. (2018)	Journal article	To assess the FAO toolkit	Sustainability and policy
Jacobi et al. (2019)	Journal article	To provide an example of a codesigned food system mapping process in 2 regions, (Kenya and Bolivia)	Geographical scope of the food system, including the physical flow of goods and information.
Horton et al. (2016)	Journal article	To present a theoretical Map Analyse Visualise and Share framework	Sustainability of agriculture
Lawrence et al. (2015)	Journal article	To develop a policy formulation tool for strategically informing food and nutrition policy activities to promote healthy and sustainable diets	Policy and governance, including trade off analysis through assessment of synergies and orders of change.
Liddy et al. (2023)	Journal article	To identify what evidence has been generated from food mapping, approaches that have been used to map food systems, and propose possible routes to address existing data and knowledge gaps.	Contextual factors of the food supply value chain
Tecco et al. (2016)	Journal article	To assess the introduction of two innovative agronomic processes for raspberry farming.	Equity and ethics of the food system
Food and Agriculture Organization of the United Nations (FAO) (2023)	Toolkit	To provide a toolkit for Building Sustainable and resilient city region food systems	Resilience and sustainability and a city regional food system

Authors	Type	Aims	Main focus
Food System Transformative Integrated Policy (FS-TIP) initiative (2023)	Toolkit	To provide a toolkit to accelerate food systems transformations	Policy transformation for country wide food systems
Milgroom et al. (2019)	Toolkit	To provide a toolkit for food system change	Food sovereignty and agroecology
Posthumus et al. (2021)	Toolkit	To provide a toolkit for food system analysis	Systems thinking for community food systems
Serrano-Cortés et al. (2023)	Toolkit	To help community leaders and technical support professionals assess and build food system resilience in their regions	Asset mapping of capital (natural, cultural, human, political, social financial and built)
Cardinia Shire Council (2019)	Report	To create a food strategy and action plan	Community food system
Government of FiJi (2021)	Report	To describe Fiji's current food system.	Island food systems, priorities, and objectives
Government of Canada (2020)	Website	To create a food policy	Country food system

The main deliverable for stage 1 was a food system framework, informed by the articles, toolkits and websites selected from the global literature. The framework encompassed four key features which are described below.

The food system context

This is the environment in which the food system operates. This includes aspects such as infrastructure, economic and information systems, agricultural assets, social environment, ecological environment, and political environment. These aspects interact with other features of the food system and can have significant impacts on the way in which the food system value chain operates and therefore its outputs. For example, limited agricultural assets may restrict the yield of producers, or poor roads may affect the transport of foods between food system value chain operators. Furthermore, foods can be consumed by community members or visitors (e.g. tourists), and these types of consumers may have different food preferences. The food system context can also play a role in the resilience of the food system and can be impacted when a hazard to the food system occurs. For example, an extreme weather event may impact on the ecological environment (through environmental damage), infrastructure (disruption to roads or electricity grid), and social environment (creating collective stress), which may then lead to reduced capacity of the food system to respond to future hazards.

Food supply value chain

These are the functions of the food system involved in food supply. This includes enterprises such as producers (fisheries, livestock, and cultivation of foods), processors (to prepare food for consumption and includes packaging of foods), wholesalers, and food suppliers to the public (retail, restaurants, and farmers markets). Enterprises may also rely on the importation of foods from outside the community. Transport of supplies and foods between each of the value chain operators should also be considered (e.g. between producers, processors, wholesalers, and retail stores). It is also important to account for foods which are grown and produced by households (i.e. backyard gardens) as these contribute to community food supply.

Food system outputs

These describe what happens to the foods and its byproducts produced through the food system value chain such as food consumption and its effects on human health, food waste and export. Other aspects of the food system outputs include food security and nutrition. Food security can be impacted by limited foods available for purchase (supplied by the food system value chain), inaccessibility of foods due to physical or economic constraints of the household, and/or inability to utilise foods due to inadequate food literacy/skills or inadequate food preparation facilities (High Level Panel of Experts on Food Security and Nutrition (HLPE), 2020). For example, where nutritious foods are more expensive than low nutrient/energy dense foods, it can mean people with low incomes may not be able to afford to purchase nutrient rich foods. This can then lead to poor health and wellbeing for certain populations in the community and create vulnerabilities in the food system (Liddy et al., 2023). Furthermore, foods can be inequitably distributed across the community. The food system value chain also has non-food outputs, such as waste and environmental impacts that should be measured to ensure they can be minimised. Waste can include physical outputs from the food system value chain, such as packaging or by-products, and the mismanagement or inefficiencies of inputs, such as inefficient use of water or electricity (Horton et al., 2016). Additionally, environmental impacts (e.g. greenhouse gas emissions, water use and pollutants like microplastics) should also be measured and assessed as a risk of the food system (Food and Agriculture Organization of the United Nations (FAO), 2023; Posthumus et al., 2021).

Food system resilience and risks

These can be understood by assessing how hazards effect the food system. A hazard can include acute events, such as an extreme weather event or pandemic, and chronic events, such as the effects of climate change (Food and Agriculture Organization of the United Nations (FAO), 2023). When the food system is exposed to a hazard, two main mediating factors can be assessed to understand the potential impact of the hazard. This includes capabilities and vulnerabilities, which are mapped in the food system context. Capabilities include "physical, financial, natural, social, political, and psychological capitals and assets" which individuals within the food system can call upon to recover from a hazard (Béné et al., 2023). When individual capabilities are aggregated, system-level capabilities can emerge which are essential for understanding food system resilience (Béné et al., 2023). On the other hand, vulnerabilities are the factors which contribute to increased susceptibility to the effects of a hazard (Food and Agriculture Organization of the United Nations (FAO), 2023). This can include social, economic and environmental conditions (Food and Agriculture Organization of the United Nations (FAO), 2023), such as insufficient liquid assets or insurance cover to repair storm damage. When hazards are assessed against these mediating factors, the immediate, short term and long-term impacts of the hazard can be understood.

The purpose of assessing the risk and resilience of the food system is to identify aspects which should be safeguarded (capabilities) and improved (vulnerabilities) to reduce the impact of future hazards. It should be noted the effects of hazards on the food system may change the food system context and value chain. Although it may appear that the food system recovers from hazards, it may never return to the pre-hazard state. For example, storm damage repairs may deplete financial assets or increase insurance premiums, which can have a long-term effect on the financial status of the food system. Furthermore, identifying the food system resilience and risks allows trade off analysis to be conducted to avoid inadvertent and negative effects of food system initiatives on other aspects of the food system.

Figure 2 provides a simplified version of the framework developed, a detailed version is provided in Appendix 1.
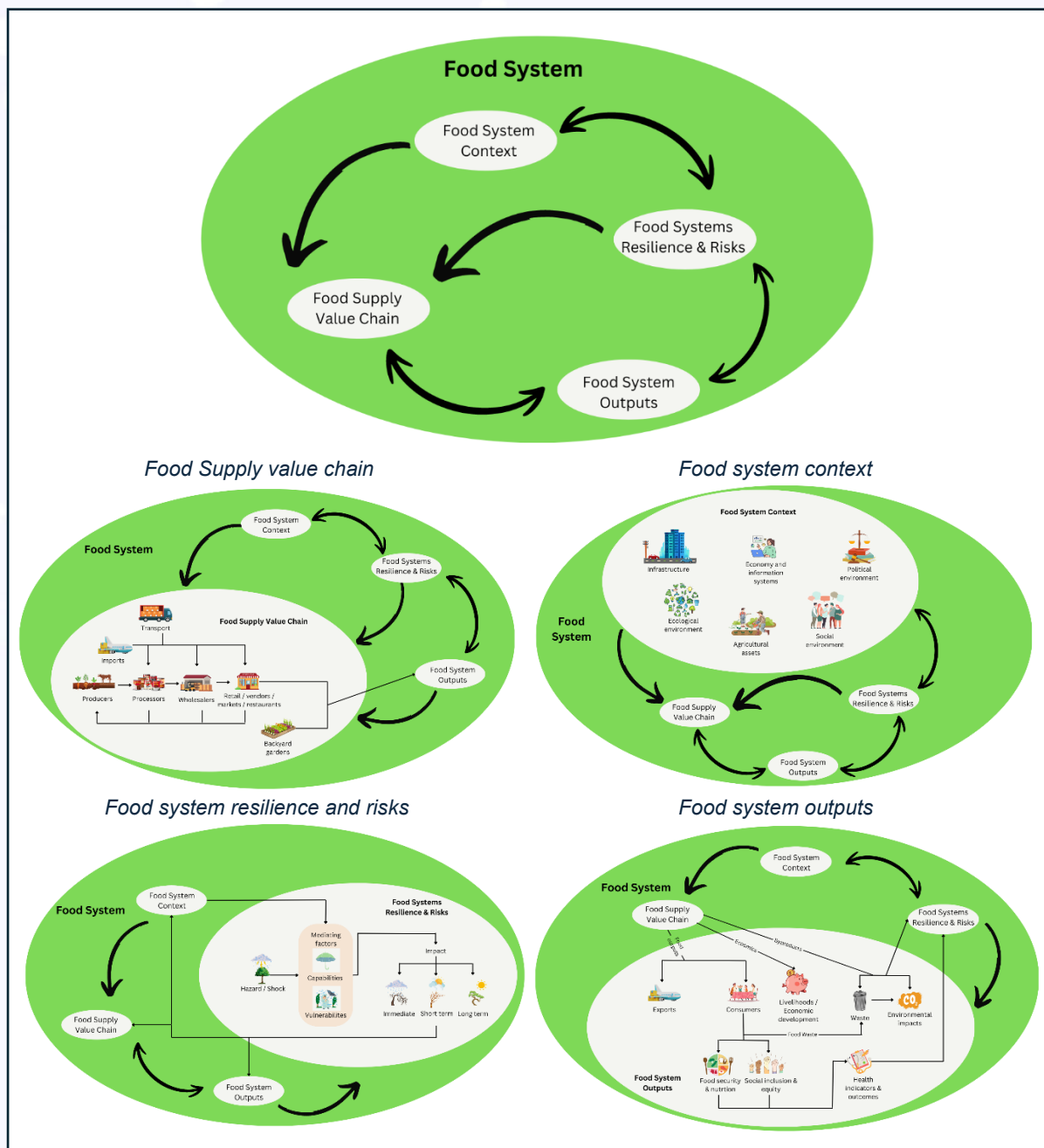

Figure 2: Simplified food system mapping framework deliverable.

Stage 2: Objectives and priorities

Stakeholder advisory group

Four stakeholder groups were invited for stakeholder discussions with the RDAMNC representative. The mission statement of each stakeholder group is provided in Box 1. In addition, local resident Rebekah Gupte, Fellow at Churchill Fellowship and member of the Sustainability Hub, was invited for stakeholder discussions. Gupte has conducted research investigating the viability of establishing a community owned (not for profit) Norfolk Island food processing facility. The research was underpinned by the core goal of "[r]educing our food waste and increasing the food security on the island" (Gupte, 2022,p 6.).

Box 1: Mission statements of key stakeholder advisory group members

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Deputy General Manager, Norfolk Island Regional Council
> *"The Norfolk Island Regional Council will provide local civic leadership and governance through good decision-making, accountability, and transparency. We will protect and enhance our unique culture, heritage, traditions, and environment for the Norfolk Island people. We will promote a healthy and sustainable lifestyle, look after our community assets, and foster a prosperous economy" (Norfolk Island Regional Council, 2024)*

Administrator, Dept of Infrastructure
> *"The Administrator of Norfolk Island is appointed by the Governor-General of Australia.*
> *The Administrator represents the Australian Government on Norfolk Island.*
> *The Administrator is responsible for assisting the implementation of the Australian Government's agenda on Norfolk Island and for engaging with, and advocating on behalf of, the Norfolk Island community. The role also has a range of statutory powers and functions relating to the delivery of government services on the Island." (Department of Infrastructure, Transport, Regional Development, Communications and the Arts, 2024)*

The Food and Farming Alliance
> *"The Food and Farming Alliance is a network of people interested in the growing or marketing of food and in improving the food security of the Island. The group was formed on 5 September 2022, through active facilitation by the Growers' Cooperative and is community-driven" (The Food and Farming Alliance, n.d.)*

Stakeholder consultation resources

QUT developed three resources to support the Norfolk Island stakeholder meetings held by RDAMNC. Two briefing documents were created to enhance stakeholders' understanding of the food system in different formats (written and visual). These documents contained information about the process of mapping food systems and the benefits of this process, examples of real-world successful food system mapping projects, and an overview of the key features and sub-features of food systems (a simplified version of the food system mapping framework developed in stage 1). The two resources were provided to stakeholders between one and two weeks prior to the meetings. The visual document was uploaded to the QUT media hub and made publicly available. Copies of these documents can be found in

appendices 2 and 3. The third resource was a template for RDA to capture the questions posed in the stakeholder meetings, for ease of collation. This document can be found in Appendix 4.

Results of key stakeholder consultation

In collaboration with the stakeholder advisory group, the identified main objectives of mapping the Norfolk Island food system are:

1. *To improve the capacity of the Norfolk Island food system to sustainably feed Norfolk Island residents and visitors.*

2. *To reduced reliance on the importation of food to feed Norfolk Island residents and visitors*

The stakeholder group identified priority areas of the Norfolk Island food system, which should be considered to ensure these objectives are met. The stakeholder advisory group also identified other areas, which, although were not priority areas, were also considered important. These priority and other important areas of the Norfolk Island food system span across all key features of the food system framework. Table 3 provides a list of the priorities and other areas of the Norfolk Island food system identified by stakeholders and how they align to the food system framework developed in this project.

Table 3 Stakeholder identified priorities and other important areas of the Norfolk Island food system and their alignment to the developed food system framework.

Description of area	Framework feature area	Framework feature sub-area
Priority areas		
Infrastructure	Context	Infrastructure
Cattle (dairy and beef)	Context	Agricultural assets
Varieties and size of produce	Context	Agricultural assets
Freight costs	Context	Economy and information systems
Availability of labour	Context	Economy and information systems
Supply chain costs	Context	Economy and information systems
Biosecurity	Context	Political environment Ecological environment
Storage and on island processing	Food supply value chain	Processors and wholesalers
Efficiencies	Outputs	Waste
Viable business opportunities	Outputs	Livelihoods and economic development
Other important areas		
Freight	Food supply value chain	Transport
Age of producers	Context	Agricultural assets
Succession planning	Resilience and risks	Mediating factors
Sustainability	Resilience and risks	Mediating factors
Access to land / development	Context	Agricultural assets
Waste management	Outputs	Waste
Contamination of land	Context Outputs Resilience and risks	Ecological environment Waste Hazard

Other findings

As a result of the project, stakeholders and RDAMNC determined that it was counter-productive to collect quantitative data on the Norfolk Island food system at this stage of the project. It was determined that data will be collected following the finalisation of this report. This report will be used as a tool to facilitate the collection of qualitative and quantitative data (where available and appropriate), which can then be used by stakeholders during strategic planning and decision-making processes regarding the food system on Norfolk Island.

Through the course of this project, it was identified that some data already existed e.g. availability of agriculture land, however, relevant reports were not held in a central repository and relied on local historical knowledge that they existed.

The impact of the food system on climate change was not identified as priority by the stakeholders however, international evidence indicates this is critical objective and priority for food system transformation. For example, the United Nations emphasises the urgency to shift food systems globally towards reduced greenhouse gas emissions and promotion of healthy and sustainable diets (United Nations Food Systems Coordination Hub, 2023). Water security, which underpins the ecological domain of food systems, has also not been flagged by stakeholders. These factors should be included as priorities of the Norfolk Island food system.

The 2023 Health Needs Assessment Summary report identified high prevalence of nutrition related health needs for Norfolk Island residents and indicated the priority to implement a food security strategy on Norfolk Island (Primary Health Network (PHN) Brisbane North, 2023). In the current project, there were no identified priority areas which aligned to consumers, their food security, social inclusion and equity, or the health outcomes of residents within food system outputs.

There were also no priority areas which aligned to the social environment of the food system context, which is often closely tied to these missed consumer-based food system output features. For example, providing a variety of foods is essential for the food security and nutrition of residents and the cost of food is instrumental when addressing social inclusion and equity among community groups. When stakeholder priorities and other important areas (Table 3) were mapped to the food system framework graphically (see Figure 3), it becomes clear that these areas were mainly clustered within the food system context and food supply value chain.
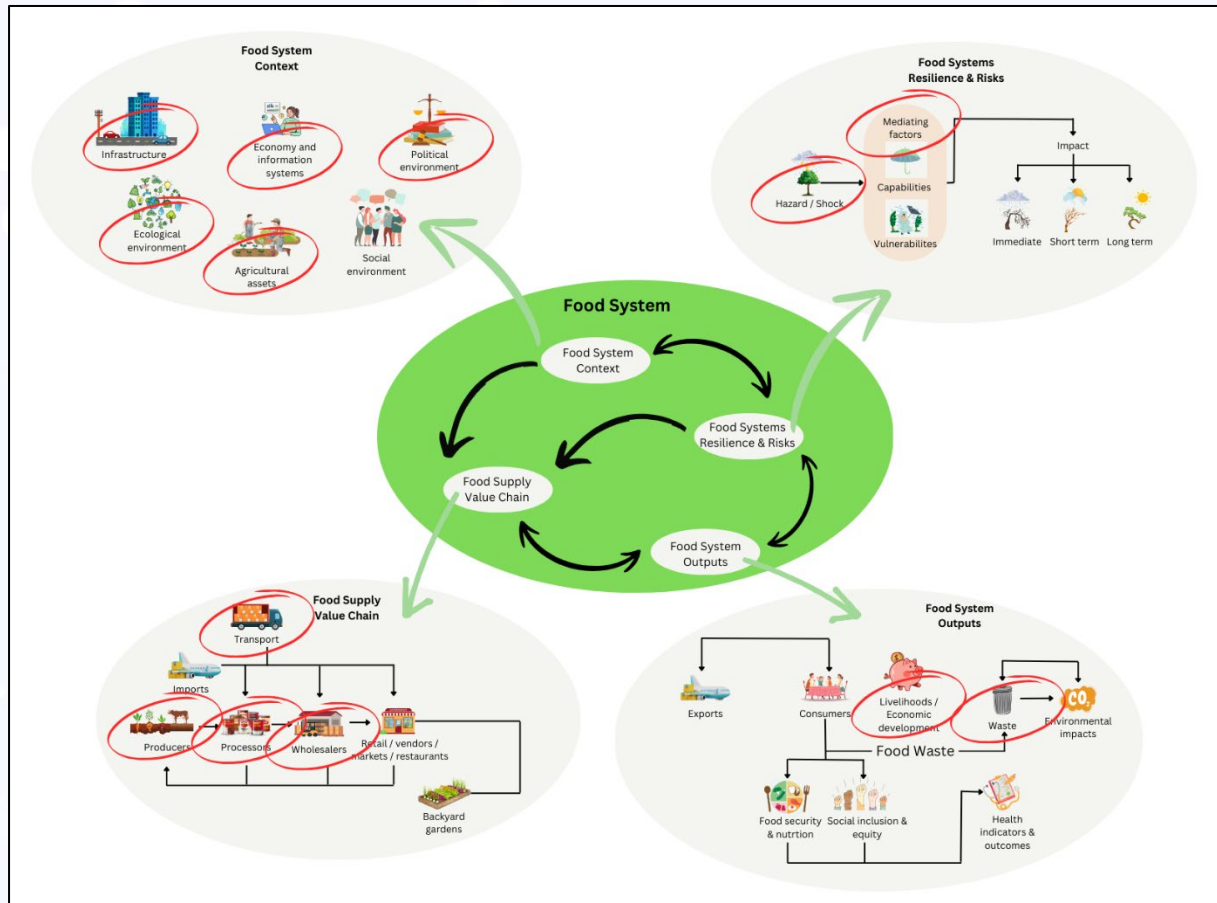
Figure 3: Priority areas and perceived missed areas

Recommendations

1. Continue to act on the Norfolk Island food system in a strategic, evidence-informed way.
   1.1. Use the framework developed by this project (Figure 3) to consider the whole food system and its purposes when taking action.
   1.2. Ensure available evidence on the Norfolk Island food system is centrally available to facilitate decision making by key stakeholders and agencies. This could be through a publicly accessible clearing house style dashboard administered by RDAMNC.
   1.3. Report results of food system activity on the central dashboard for real time evaluation.

2. Involve local citizens in decision making, in particular, the feasibility of actions.
   2.1. Use the priorities identified by stakeholders in this project (Table 3) and perceived missed areas to guide work.
   2.2. Build the capacity and empowerment of local citizens to take action on their food system.
   2.3. Increase community understanding of and engagement in, health and climate change priorities.

3. Map the governance of the food system on Norfolk Island in order to identify key stakeholders and enablers for change.
   3.1. Identify funding sources for key infrastructure required for food system change.
   3.2. Identify community allies and champions for food system change.
   3.3. Use the literature identified in this project to review and connect to exemplars of local food system change.

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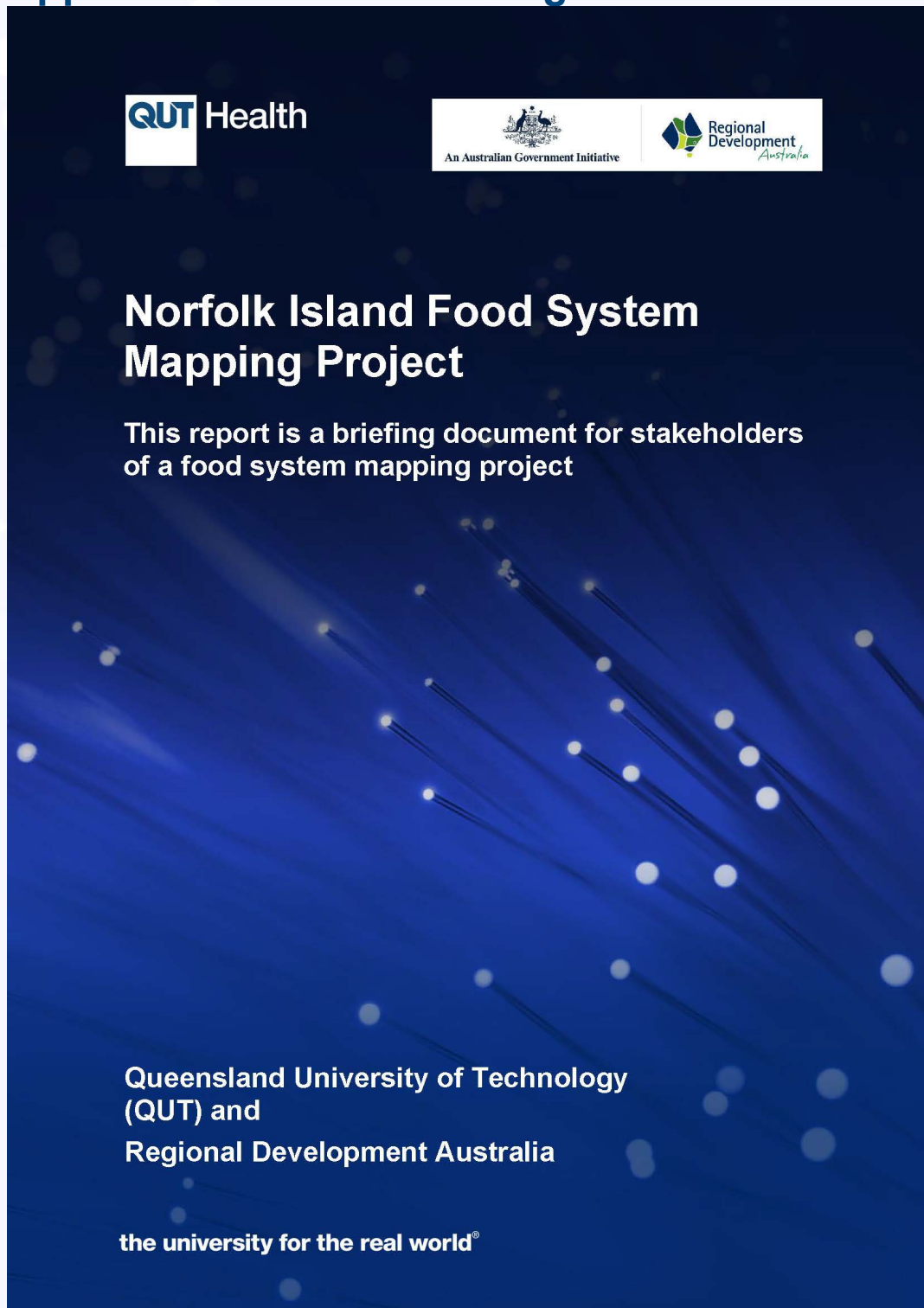
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Appendix 1: Food system model
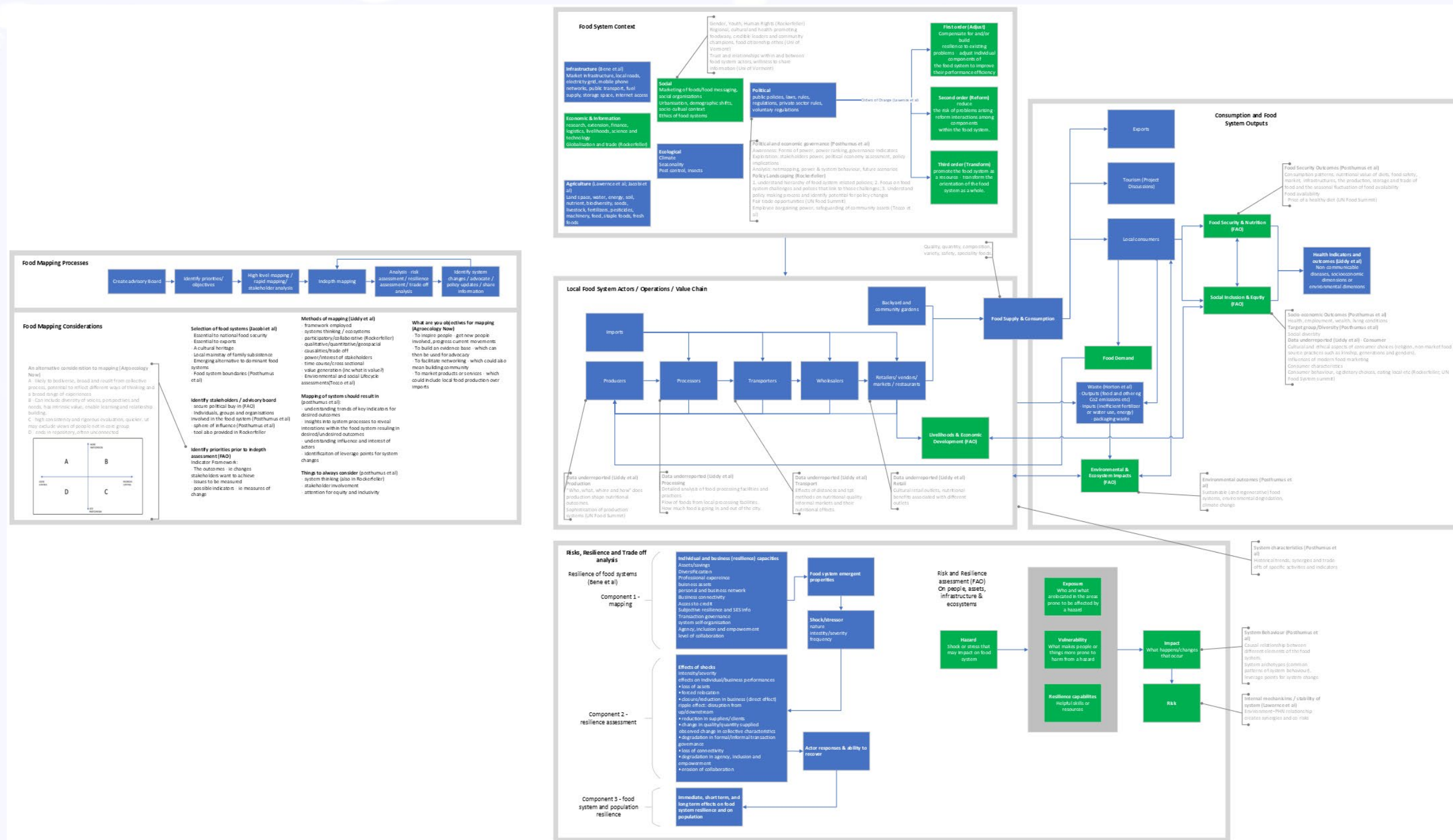
Appendix 2: Written Briefing Document.

QUT Health

An Australian Government Initiative   Regional Development Australia

Norfolk Island Food System Mapping Project

This report is a briefing document for stakeholders of a food system mapping project

Queensland University of Technology (QUT) and

Regional Development Australia

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Table of Contents

Introduction

Regional Development Australia (RDA) has contracted Queensland University of Technology (QUT) to provide an overview of available sustainable food system frameworks and guidance on selecting a framework appropriate for Norfolk Island. This work will then inform the development of a map of the Norfolk Island food system. This is the first known attempt to document a **holistic, evidence-based map** of the current food system on Norfolk Island. Mapping the food system can create numerous benefits:

- Identify the strengths and resilience of the food system and create strategies to safeguard these aspects.
- Strengthen the Agribusiness sector on Norfolk Island using evidence-based strategies.
- Identify vulnerabilities within the food system to allow risk mitigation strategies to be developed.
- Strengthen the supply, production and preservation of capacity of Norfolk Island to de-risk the food system.
- Provide cost-effective foundational evidence to ground future investment and support in the food system on Norfolk Island.
- Enhance the health, wellbeing and food literacy of Norfolk Island residents.
- Ensure food sustainability and supply for the tourism market.
- Understand the productive capability of the environment. Sustainable food system strategies could be a valuable contribution to environmental management.

Some examples of the outcomes and strategies identified in other food mapping initiatives can be found here, and Appendix One provides an infographic on Cardinia Shire's Liveability Plan 2017−29 Framework:

- https://agriculture.canada.ca/en/department/initiatives/food-policy/food-policy-canada
- https://www.unfoodsystemshub.org/docs/unfoodsystemslibraries/national-pathways/fiji/2021-09-15-en-2021-national-pathway_fiji-synopsis_unofficial-draft_subject-to-approval_150921.pdf?sfvrsn=f3def03f_1
- https://www.cardinia.vic.gov.au/info/20031/liveability_health_and_wellbeing/597/community_food_strategy#section-1-about-the-strategy

This report provides a summary of food system conceptual frameworks and is intended as a briefing document for people and organisations on Norfolk Island. The framework presented in this report has been developed after extensive review of current international literature on food system mapping and evaluation.

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The report firstly details the initial scoping currently being conducted by RDA, including where it fits within the food system mapping process and the aims and objectives of this activity. The report then provides an overview of how food systems are commonly conceptualised and details aspects which should be considered for mapping, such as the context, value chain, outputs and risk and resilience of the food system. Finally, the report poses questions for reflection and consideration by stakeholders of the Norfolk Island food system.

Initial scoping activity

Research indicates there are specific steps involved in mapping a food system to identify areas for improvement,[1, 2] as shown in Figure 1. This initial scoping activity represents the second and third steps: identify the priorities and objectives for mapping the food system; and conduct high level mapping.
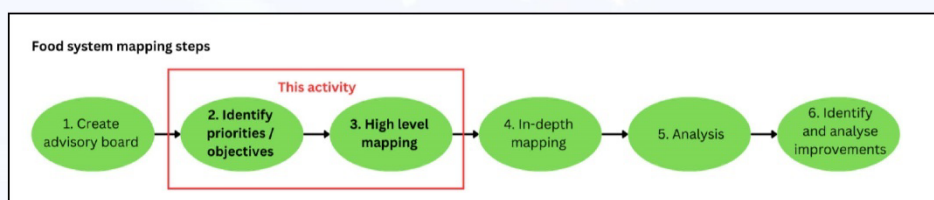
Figure 1: Overview of the food system mapping process.

Aim:

The aim of this activity is to identify the priorities for mapping the food system and to identify key areas of the food system to be mapped.

Objectives:

1. To establish agreed purpose of the food system on Norfolk Island.
   1.1 Present a range of existing food system purposes used in other settings.
   1.2 Establish consensus on the main purposes of the Norfolk Island food system.

   OUTPUT: agreed purpose of the Norfolk Island food system that will guide future mapping and strategy development.

2. To agree on aspects of the food system that data (information) needs to be collected on to inform the achievements of this project.
   2.1 Present conceptualisation of food system maps.

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2.2 Determine which parts of those maps are most relevant.

OUTPUT: agreement on key areas of the Norfolk Island food system to be mapped

Overview of the food system conceptual framework

Review of the literature indicates that the food system contains four key features that should be considered during the mapping process (Figure 2). This includes the context of the food system, the value chain involved in food supply, the outputs (e.g. food) of the food system and what happens to these outputs, and the risk and resilience of the food system. The food system is fluid and continually changing as each of the features interact and affect each other.
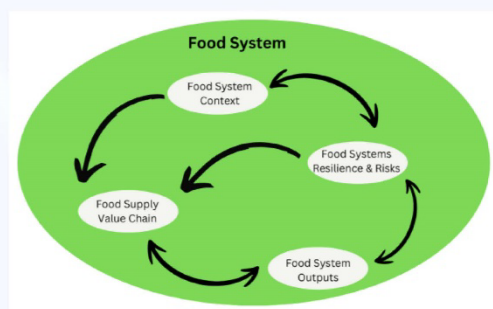
Figure 2: Key features of the food system conceptual framework

The next four subsections of the report will detail the components of each feature of the food system. Each subsection includes a figure that provides more details of that feature. For ease of reading, enlarged copies these figures (Figures 3 to 5) can be found in Appendix Two.

Food system context

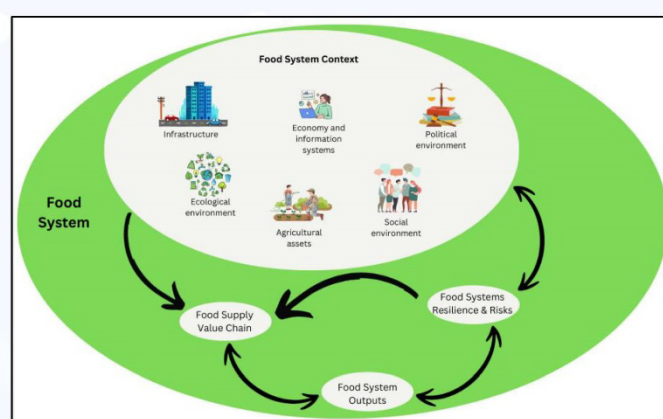The food system context is the environment in which the food system operates (Figure 3).

Figure 3: Key features of the food system, highlighting the food system context

Key aspects of the food system context include, but may not be limited to:

- **Infrastructure** - local roads, electricity grid, telecommunication and internet networks, public transport, fuel supply, storage space[3]
- **Economic and information systems** – globalisation and trade, information systems, livelihoods and financial assets, science and technology, research and development[4]
- **Agriculture assets** – land space, water, energy, soil, nutrients, biodiversity, seeds, livestock, fertilizers, pesticides, machinery, feed, staple foods, fresh foods[5,6]
- **Social environment** – marketing practices and food messaging, social organisations, urbanisation, demographics and socio-cultural context, ethics of food systems[2,4]
- **Ecological environment** – climate, seasonality, insects, pest control
- **Political environment** – public policies, laws, rules, regulations, private sector rules, voluntary regulations[6]

The food system context interacts with other features of the food system. The food system context can have significant impacts on the way in which the food system value chain operates and therefore its outputs. For example, limited agricultural assets may restrict the yield of producers, or poor roads may affect the transport of foods between food system value chain operators. Furthermore, foods can be consumed by community members or visitors (e.g. tourists), and these types of consumers may have different food preferences. For example, a tourist may consume more convenience foods or foods prepared by restaurants, whereas longer-term community members with access to kitchen facilities may prefer to prepare their own meals. These food habits drive demand for certain foods and food types, which then inform the food system value chain to supply those foods.

The food system context can also play a role in the resilience of the food system and can be impacted when a hazard to the food system occurs. For example, an extreme weather event may

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impact on the ecological environment (through environmental damage), infrastructure (disruption to roads or electricity grid), and social environment (creating collective stress), which may then lead to reduced capacity of the food system to respond to future hazards.

Food supply value chain

The food system value chain are the functions of the food system involved in food supply (Figure 4). This includes enterprises such as producers (fisheries, livestock, and cultivation of foods), processors (to prepare food for consumption and includes packaging of foods), wholesalers, and food suppliers to the public (retail, restaurants, and farmers markets). Enterprises may also rely on the importation of foods from outside the community. Transport of supplies and foods between each of the value chain operators should also be considered (e.g. between producers, processors, wholesalers, and retail stores). It is also important to account for foods which are grown and produced by households (i.e. backyard gardens) as these contribute to community food supply.
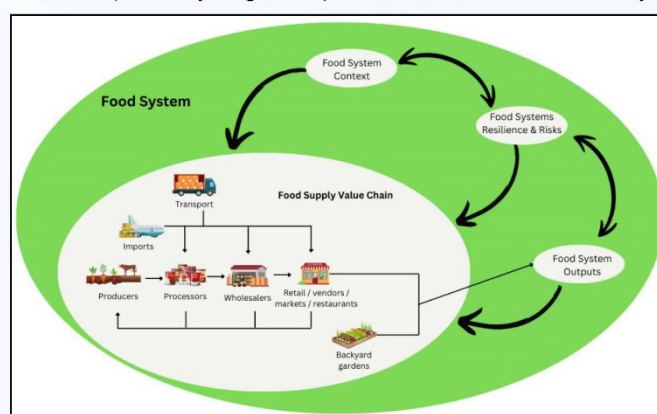

Figure 4: Key features of the food system, highlighting the food supply value chain

Food system outputs

The food system outputs describe what happens to the foods and its byproducts produced through the food system value chain such as food consumption and its effects on human health, food waste and exports (Figure 5).
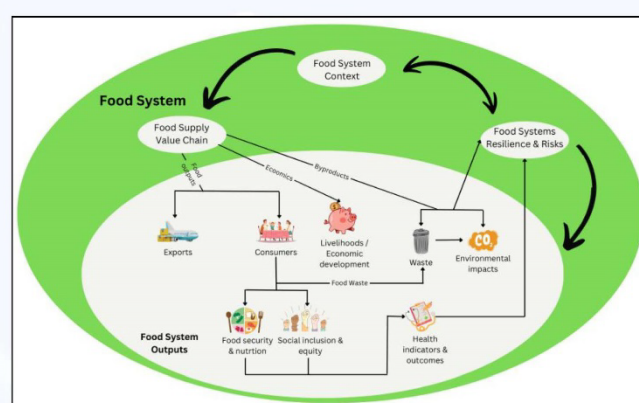
8

Figure 5: Key features of the food system, highlighting food system outputs

Another aspect to consider is food security and nutrition.[7, 8] Food security can be impacted by limited foods available for purchase (supplied by the food system value chain), inaccessibility of foods due to physical or economic constraints of the household, and/or inability to utilise foods due to inadequate food literacy/skills or inadequate food preparation facilities.[9] Furthermore, foods can be inequitably distributed across the community. For example, where nutritious foods are more expensive than low nutrient/energy dense foods, it can mean people with low incomes may not be able to afford to purchase nutrient rich foods. This can then lead to poor health and wellbeing for certain populations in the community and create vulnerabilities in the food system.[10]

In addition to food supply, the value chain may also provide livelihoods for community members involved in any of these activities and economic development for the broader community. It is important to model the effects of any proposed food system changes prior to implementation to ensure livelihoods and community economic development are not endangered, which could worsen food security and nutrition in the community.[1]

The food system value chain also has non-food outputs, such as waste and environmental impacts that should be measured to ensure they can be minimised. Waste can include physical outputs from the food system value chain, such as packaging or by-products, and the mismanagement or inefficiencies of inputs, such as inefficient use of water or electricity.[11] Additionally, environmental impacts (e.g. greenhouse gas emissions and pollutants like microplastics) should also be measured and assessed as a risk of the food system.[1, 8]

Food system resilience and risks

One of the main aims of mapping the food system is to understand the resilience and risks inherent in the food system, to identify areas for improvement. Risk and resilience can be understood by assessing how hazards effect the food system (Figure 6).
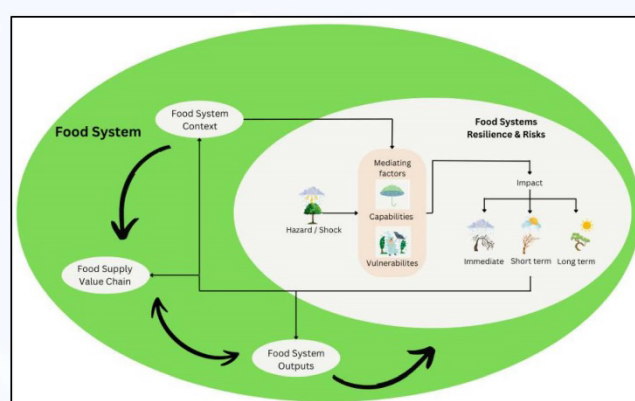
9

Figure 6: Key features of the food system, highlighting the food system resilience & risks

A hazard can include acute events, such as an extreme weather event or pandemic, and chronic events, such as the effects of climate change.[1] When the food system is exposed to a hazard, two main mediating factors can be assessed to understand the potential impact of the hazard. This includes capabilities and vulnerabilities, which are mapped in the food system context. Capabilities include "physical, financial, natural, social, political, and psychological capitals and assets" which individuals within the food system can call upon to recover from a hazard (Bene et al). When individual capabilities are aggregated, system-level capabilities can emerge which are essential for understanding food system resilience.[3] On the other hand, vulnerabilities are the factors which contribute to increased susceptibility to the effects of a hazard.[1] This can include social, economic and environmental conditions,[1] such as insufficient liquid assets or insurance cover to repair storm damage. When hazards are assessed against these mediating factors, the immediate, short term and long-term impacts of the hazard can be understood.

The purpose of assessing the risk and resilience of the food system is to identify aspects which should be safeguarded (capabilities) and improved (vulnerabilities) to reduce the impact of future hazards. It should be noted the effects of hazards on the food system may change the food system context and value chain. As demonstrated in Figure 6, although it may appear that the food system recovers from hazards, it may never return to the pre-hazard state. For example, storm damage repairs may deplete financial assets or increase insurance premiums, which can have a long-term effect on the financial status of the food system. Furthermore, identifying the food system resilience and risks allows trade off analysis to be conducted to avoid inadvertent and negative effects of food system initiatives on other aspects of the food system.

Next steps

RDA will organise a meeting with the stakeholders to discuss the following questions:

1. What are the purposes of the Norfolk Island food system?

2. What features of the food system are a priority for Norfolk Island?
3. Are there any features of the Norfolk Island food system that have not been identified in this report?
4. What are the levels of support required by RDA and your organisation for completing a comprehensive map of the Norfolk Island food system?

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3. Béné C, Frankenberger TR, Nelson S, Constas MA, Collins G, Langworthy M, et al. Food system resilience measurement: principles, framework and caveats. *Food security* 2023 **15**(6), 1437-58.

4. Food System Transformative Integrated Policy (FS-TIP) initiative. Food Systems Analysis Toolkit: A Tool to Accelerate Food Systems Transformation. 2023.

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9. High Level Panel of Experts on Food Security and Nutrition (HLPE). Food security and nutrition: building a global narrative towards 2030. PDF file. Rome; 2020.

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https://www.cardinia.vic.gov.au/download/downloads/id/2105/cardinia_shire_community_food_strategy_and_action_plan_2018_%E2%80%93_26.pdf

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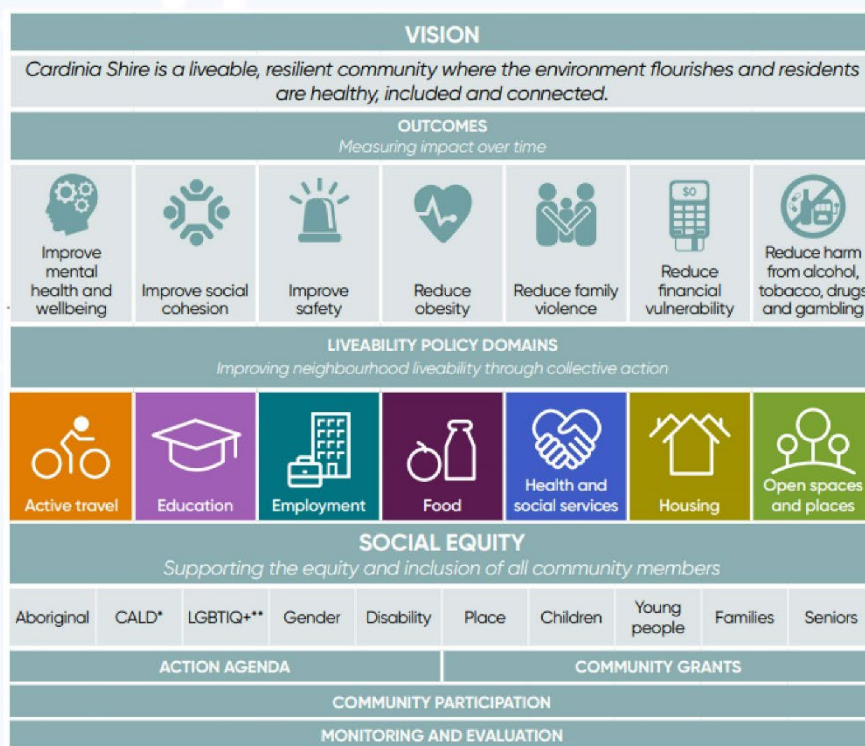## Appendix One – Cardinia Shire's Liveability Plan 2017-29 Framework.

Figure 7: Cardinia Shire's Liveability Plan 2017-29 Framework.

Reproduced from Cardinia Shire Council.[12]

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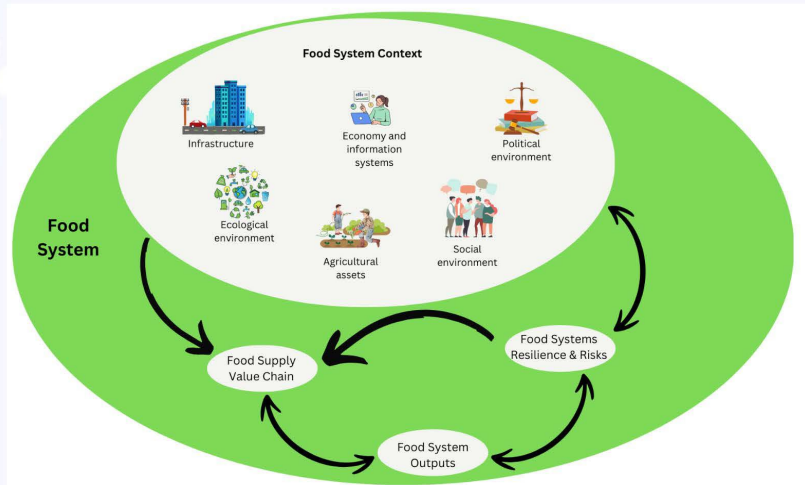## Appendix Two – Enlarged version of document figures.

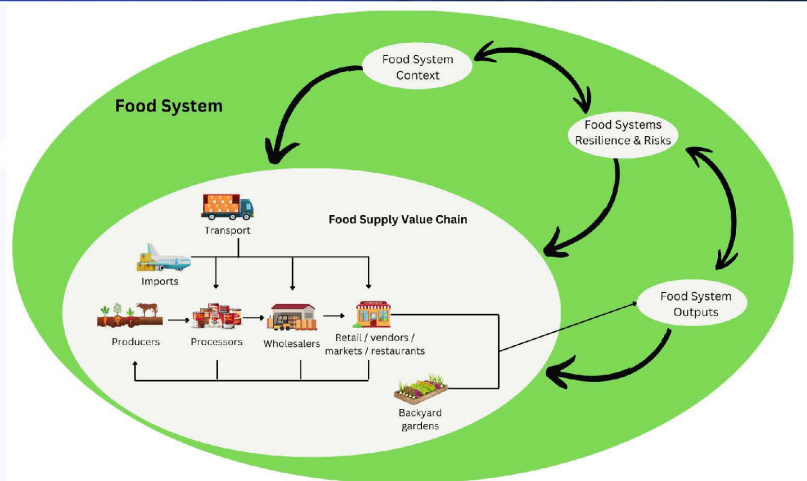*Figure 2: Key features of the food system, highlighting the food system context*

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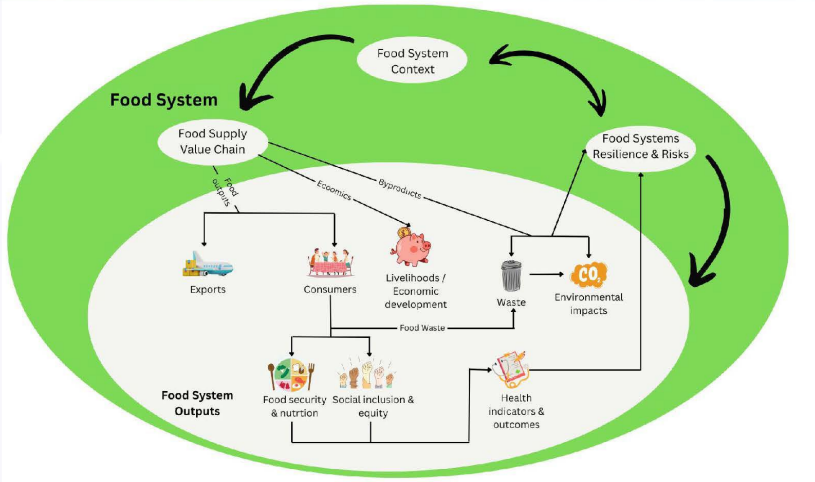Figure 3: Key features of the food system, highlighting the food system value chain

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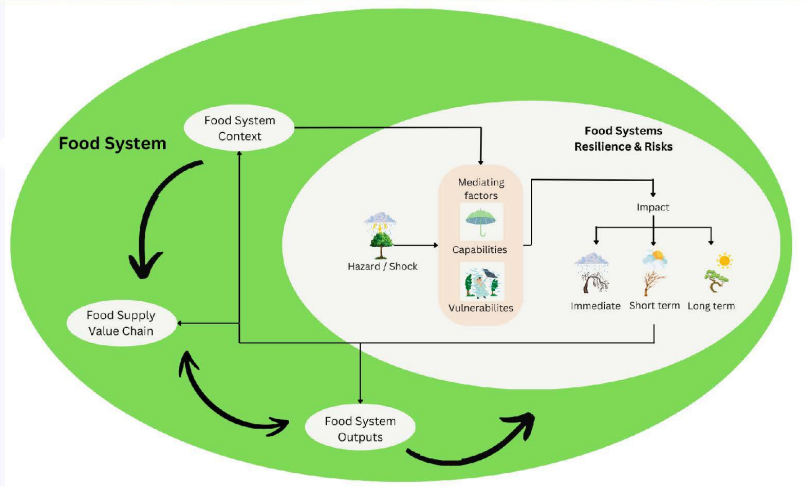*Figure 4: Key features of the food system, highlighting food system outputs*

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Figure 5: Key features of the food system, highlighting the food system resilience & risks

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Appendix 3: Visual Briefing Document.

Access the video here: https://mediahub.qut.edu.au/media/t/0_os2fndbf

Appendix 4: Answer Template.

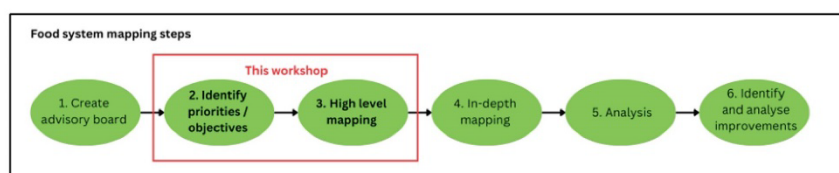School of Nutrition and Exercise Sciences
Faculty of Health

Template for capturing participant answers.

Prepared by: Tina Gingell, Queensland University of Technology

Version: V1.0

Created: 11/04/2024

Workshop details

Aim:

The aim of this workshop is to identify the priorities for mapping the food system and to identify key area of the food system to be mapped.

Objectives:

1.   To establish agreed purpose of the food system on Norfolk Island.

2.   To agree on aspects of the food system that data (information) needs to be collected on to inform the achievement of this purpose.

Participant Input

This document is a shared document, designed to help you reflect on the Norfolk Island food system. We encourage you to read through other people's responses, and add in more detail as you see fit. There are three questions posed. Some brief information is provided for each question, and tables are there to capture answers. Please feel free to add in additional rows as needed or add in comments to other people's responses (select a word and right click to add a comment).

What features of the food system are a priority for Norfolk Island?
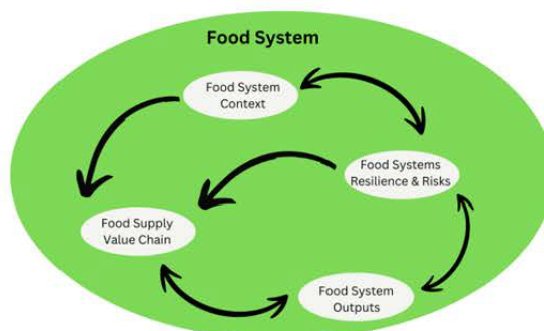
Please let us know, in terms of the purpose of the food system that you provided above, are there specific features of the food system which need to be addressed as a priority?

Name / organisation (optional)	Priority feature area	Priority feature aspect
Joe Blogs, ABC Ltd	*Food system output*	*Waste: inefficient use of resources, packaging and reducing food system byproducts*

Are there any features of the Norfolk Island food system that have not been identified in this report?

Please let us know any features of the Norfolk Island food system which are unique and have not been captured in the pre-reading information.

Name / organisation (optional)	Missing features	Why are they important?
Joe Blogs, ABC Ltd	*Aquaculture*	*Economic development project is currently underway to establish farming of fish*

What are the purposes of the Norfolk Island food system?

Some ideas may include: environmental sustainability, health and nutrition, food security, resilience to climate change, supporting local communities, optimise children's health, ensure equity/equality, economic growth, induce policy overhaul, technological innovation, optimise land utilisation, increase food literacy.

You can also review some examples of purposes identified in other food mapping initiatives:

- https://agriculture.canada.ca/en/department/initiatives/food-policy/food-policy-canada
- https://www.unfoodsystemshub.org/docs/unfoodsystemslibraries/national-pathways/fiji/2021-09-15-en-2021-national-pathway_fiji-synopsis_unofficial-draft_subject-to-approval_150921.pdf?sfvrsn=f3def03f_1
- https://www.cardinia.vic.gov.au/downloads/download/1097/cardinia_community_food_strategy_and_action_plan_2018_%E2%80%93_26

Please add your thoughts into the table below. Please note, you can remain anonymous if you choose:

Name / organisation (optional)	Purpose of Norfolk Island food system	Why is this important?
E.g. Jo Blogs, ABC Ltd	*Environmental sustainability through waste reduction*	*We have limited ways of dealing with waste from the food system, and therefore we need to ensure waste is kept to a minimum*

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