

**Submission
No 52**

FOOD PRODUCTION AND SUPPLY IN NSW

Organisation: Arup

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Dear Mr. Greenwich,

Inquiry on Food Production and Supply in NSW

Arup is pleased to provide this submission to the NSW Legislative Assembly Committee on Environment and Planning.

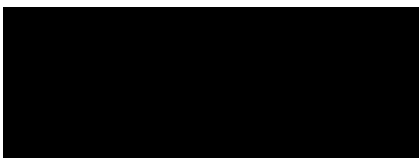
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This submission is responding in particular to two aspects of the Terms of Reference:

- Developing technologies to bring food production into cities.
- Preserving productive land and water resources.

Our experience and research in the region, and globally, have informed our response. We are open to further discussions on this important topic.

Yours sincerely,



Kaitlin Shilling

Associate Principal | Resilience

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Developing technologies to bring food production into cities.

Alongside developing the technologies themselves – we need to consider what the requirements are of these technologies to operate at scale in the urban environment

What are the issues?

1. Many of the new technologies for food production (CEA, alt meats) are highly energy intensive (which tends to involve carbon emissions), some may add pressure on already scarce water resources, although water can often be recycled
2. These food ‘factories’ require the same access to storage and distribution as traditional factories to reach scale, so siting them close to both energy and distribution infrastructure is an important factor
3. Biosecurity of the facilities is a key consideration to ensure that whole production areas are not wiped out if a pathogen is introduced.
4. While new technologies for food production require less land than conventional farming – they still require space that is affordable (relative to the crop being produced). The cost-benefit of producing in an urban environment needs to make sense, and often urban property is more expensive than equivalent land outside the city, which could also be used for high-tech food production.
5. It is important to identify opportunities for circularity – re-use of food waste for other products, for energy creation, etc. – to go alongside food production. Applying circular economy principles can help identify benefits for co-location, considering siting for food production and space availability to create an industrial ecosystem that supports urban food production.
6. To balance rural and urban production potential, it will be important to understand what foods are well-suited to urban food production, and how shifting that production to urban areas can create increased opportunities for regional areas to focus their food production, and to develop a holistic approach to creating a sustainable and resilient food supply.
7. Urban farming requires some specialised skilled, and while there high-tech farming requires a relatively small workforce, compared to conventional farming, the proximity to urban areas, represents a workforce development opportunity to ensure that urban farming can reach scale. Again, planning for urban farming ‘hubs’ would also help identify where training should occur, and how to integrate into existing transportation and economic development corridors.
8. Planning policies and regulations need to be aligned to support urban food production of different types. Rooftop gardens, community gardens, and other localised food growing may be inhibited by existing codes and regulations. To

support the growth of urban food production, these regulations should be reviewed.

Best Practice

Globally, there are a number of examples NSW could learn from to address some of these issues. In Singapore, they have established the Singapore Food Agency with the mandate to address Singapore's food security and reduce their reliance on food imports. They have set clear targets and are now in the process of developing a masterplan for "a 'grow-learn-play' agricultural powerhouse" in the city. This area will be the flagship model for urban agri-food production.

Milan has recently won the Earthshot Prize for their work on reducing food waste by enforcing a city-wide food waste policy encompassing public agencies, food banks, charities, NGOs, universities and private businesses. Theirs is a blueprint for how to introduce circularity principles into policy.

Policy can also be used to ensure appropriate use of water and energy, integrating renewable energy and efficiency strategies to ensure that the urban production is sustainable. Distilleries in the UK, like Macallan and InchDairnie, have decarbonised their production and processes, and many of the same approaches could be integrated into policy for urban food production.

Recommendations for Next Steps

- Goal-setting for urban food production (similar to what Singapore Food Agency has done) to guide planning and production goals
- Mapping of high-potential areas for urban food production clusters according to parameters including access to energy, logistics and workforce
- Potential concept plan for urban food production clusters
- Circular food planning – identify and prioritise opportunities for food waste reduction/re-use into other sectors and nutrient recovery
- Consideration of possible cities and locations (outside Sydney) to develop urban food production hubs to support local/remote food security
- Identify opportunities for community farming options and create framework to support

Preserving productive land and water resources.

Preserving productive land and water resources have many interlinked systems and conflicts. Developing a comprehensive understanding of the water system and land with agricultural potential is vital to managing, regenerative and preserving these assets.

Soil Health:

Preserving soil health is a vital part of preserving productive land and water. Land with degraded soil health but potential for agricultural development should be considered as an opportunity for regenerative farming practices.

What are the issues

The biggest challenges would be keeping the real kind of bacteria in the soil – the western practices struggle in Australia as they were not created for Australia. Macrobacteria and soil performance are complementary.

Australian soils are older and more weathered and more nutrient deficient – Australia is particularly vulnerable to water quality and water management – this explains our need for indigenous knowledge and regenerative farming processes as these are particularly well suited to those conditions.

Our critical breaking issue is root and soil ecology and their ability to cycle carbon – for every extra gram of carbon in our soil, there's an extra 8 grams of water – this fosters the ability of soil absorb and store water and backs the need to foster regenerative farming in Australia.

Best Practice

There are many land management measures which can be used to maintain soil health. The principal factors involved include preventing soil erosion, maintaining a sustainable nutrient supply, and managing the soil moisture status. There are a wide range techniques to maintain soil health including regenerative land management which are selected based on type of farming being performed and local environmental conditions. At a governmental guidance level, recommended techniques should focus on soil health which improves drought and flood resistance, improves biodiversity as well as minimise the carbon footprint and environmental impact of the farming.

Recommendations for Next Steps

- Soil health and land use assessment
 - A roadmap, land use map, soil quality plan to understand current conditions
 - Identify opportunities to increase soil health and increase carbon in the soil.
- Strategic Environmental Assessment
 - This should identify policies for review or additional opportunities and constraints. This could be completed through multiple lenses – i.e. indigenous and socio economic.

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- Assessment of indigenous farming practices
 - Through consultation of the traditional owners, identify opportunities to maintain and develop that knowledge further, including into mainstream farming.

Managing Waste to Preserve Productive Land and Yields:

Food waste can provide organics and nutrient matter benefits to productive land, but there is a risk of contamination of microplastics in this space. This contamination would lead to reduced yield, land degradation, and contaminated food.

What are the issues

PFAS¹ and Microplastics in Organic Waste and compost results in a loss of yield, degrades agricultural land and allows microplastics to re-enter the food chain. The process of using sync macerators to pulp food waste is prone to human error and results in PFAS and microplastics being located within the output before being injected into land.

Best Practice

Re-cology in San Francisco is a framework the city government has set up. The Government now runs an organics processing facility which takes organics from the city, this includes commercial food waste which is often excluded due to collection difficulties. This allows the collection and sorting of waste to be centralised and efficient which minimising PFAS and Microplastic contamination.

San Francisco City has a mandatory legislation for composting called 'Mandatory Recycling and Composting Ordinance', introduced in 2009. This legislation makes it compulsory for everyone to properly recycle and compost their waste, including both businesses and residents.

This waste is separated into recyclables, compostable and landfill waste. These separated streams will then be collected by the City's waste contractor, Recology, for recovery of recyclables and composting of organics. Recology hold the exclusive refuse collection licence for San Francisco, administered by the San Francisco Department of Public Health"

Recommendations for Next Steps

- The Australian Standard for compost material needs to be reviewed and updated to deal with the potential risks associated with this and prevent the risk of contaminants getting back into the food chain. This should prevent Microplastics and PFAS from re-entering the food system through compost.

¹ Perfluoroalkyl and polyfluoroalkyl substances (PFAS) are man-made chemicals, not found naturally in the environment.

- Once the standards are updated, a potential next step would be to consider co-location of infrastructure and intensive food production. The co-location of infrastructure and intensive food production areas would minimize transportation as it only needs to be moved once.

Regional Agricultural Hubs and Economic Development:

For effective regional agricultural hubs to be established and flourish, a range of supporting infrastructure and governance is required. This will benefit yields and productive land preservation.

What are the issues

Regional agricultural hubs have not been fully developed; the question is how we help regional NSW Flourish. Water supply in these regions is a large issue due to lacking infrastructure and climate change. This is similar to the Cape York region where soil quality is high, but the supporting infrastructure is not adequate.

Water needs to be priced appropriately and there needs to be more appropriate and equitable allocation of water in these rural areas. Water supply for regions is a constraint. Rural land use has competing interests with Solar farms often using land prime for agriculture.

Best Practice

There are many examples of best practice in this space including the water trading established in the Murray darling basin. The Cape York and Torres Opportunities Plan is another example which looked at opportunities and constraints for the region. The region has poor food supply resilience, so a process was undertaken to identify land suitable in remote towns for food hubs.

Enel, an Italian multinational manufacturer and distributor of electricity and gas, provides an example of how agriculture can be integrated into their solar plants. Through research they demonstrated that, in the right context, farming between the solar panels can be productive and even beneficial to the solar performance.

The City Water Resilience Approach has been developed to help cities grow their capacity to both anticipate and mitigate water-related shocks and stresses. The approach helps cities grow their capacity to provide high quality water resources for all residents and connects them through water-based transportation networks. This approach has been applied to various types of cities including Cape Town, Miami, Mexico City, Greater Manchester and Rotterdam.

Recommendations for Next Steps

- State level food production review or opportunities and conservation plan.

- This should identify how all of the agricultural precincts, land, resources and infrastructure connect. It can investigate land that should be retained for agricultural production and introduce policy to ensure it is protected and or if appropriate, integrated with new land uses.
- This could include the creation of a regional masterplan or opportunities plan for all of NSW. This may identify the areas that need protection at all costs and their opportunities.
- Regional towns may need to adapt their economies to value add in the food production cycle and move to a logistics offering to maintain their economies. They could also explore a move to energy / materials.

Urban Growth, Planning Schemes and Legislation:

Protecting land and water through planning schemes and legislation is mandatory to preserve these NSW Assets. If these assets are identified but have ineffective governance and legislation to preserve, enhance and regenerate them, then the efforts are for nil.

What are the issues

Cities are dense and are resulting in urban sprawl as well as migration to regional areas. Land with rich soil which is prime for agriculture is being developed due to many farmers facing a great financial gain from selling to developers. Legislation currently permits development of these areas with rich soils, most master planned areas which retain some agricultural land uses are usually still a net loss of productive land.

Sprawl not only impacts agricultural land but puts water catchments and basins at risk. There is a blanket state approach to policy guidelines, this means agriculture is not adequately protected, and complimentary land uses are not supported.

Best Practice

The Serian district of Malaysia is looking at a range of factors to manage urban sprawl and support productive land. A Land Suitability Analysis formed the baseline of the economic opportunities and spatial and infrastructure plans. Given the existing contribution from agriculture to the economy and society, as well as the potential for greater value to come from downstream processing, agriculture land was prioritised in the land suitability analysis, and the spatial plans.

The analysis of the green and blue corridors and the opportunity to create a stronger connected network formed a founding strategy to the spatial plans. Green and blue corridors were used to frame key development centres, to support compact urban development and limit urban sprawl.

Recommendations for Next Steps

- State level legislation identify key agricultural land areas that may need to be protected through environmental protection legislation and by state planning policy. This will prevent conflicting land uses and minimize valuable land being sold for non-agricultural purposes.
- Undertake a mapping of the food production system in order to identify what land is needed for agricultural purposes, and where co-location of supporting infrastructure should be sited. This would promote secondary food processing and increase the value of agricultural land which dissuades owners from selling it to developers. This will allow local planning schemes to be updated to enable more agricultural related land uses and protect the land from residential development.

Climate Change, Water security and Agricultural Impacts:

Shifting climates and resulting impacts are already resulting in various impacts to water security and agricultural land. A plan to build climate change resilience into NSW's land and water resources is necessary to preserve these assets.

What are the issues

The changing climate is undermining growing cycles farmers are used to, suitability of crops and therefore impacting crop yield. Climate change leads to various issues including a reduction in available water, flooding, bushfires and other extreme weather events which impact soil quality and the environment. With such reliance on dryland agriculture, the risk from changing flooding and drying cycles has already seen significant impact. NSW is going to have more "heat" days and more rainy days.

The water quality impact and degradation of water ecosystems because of climate change, will change the fundamental ways that soil and water work for us. Sea level rise and salination will have an impact on the availability of fresh water for irrigation on farming land – this requires new thinking on what land should be prioritised/ protected.

Best Practice

Australia, NSW and Sydney have undertaken a range of projects to understand and deliver on water security and quality. For instance: Sydney Water has developed comprehensive water security plans; research has been undertaken to assess the merits of recycled water versus desalination; various water studies have been undertaken around Broken Hills; and the Gold Coast has deployed Water Sensitive Design approaches.

Dong Tan is another example where climate change and sea level constraints were present. Dong Tan is an ecological hub for food production, this island is affected by sea level rise and they are located at the mouth of the river so salt water and fresh water mixes in the area. This is a sensitive area because as sea level rise occurs, salinity will be moved

upstream and onto productive land due to the ocean pushing the fresh water further inland.

The Riverina Eastern Regional Organisation of Councils has completed a piece of work which analyses the impact of climate change on the region. This piece of work identifies and maps water security impacts due to climate change, water dependent industries, and prepares a range of plans and policies to response to these findings.

Recommendations for Next Steps

- Climate change resilience assessment to identify areas of productive land and water which will be impacted by climate change. This would allow you to create strategies to adapt the landscape, agricultural land or water, to suit the new climate.
- A review of innovative solutions and technological advancements that could provide new angles for preserving productive land and water resources not previously identified.
- An assessment of innovative micro-scale actions that could help preserve water quality and assets or regenerate and protect agricultural land against climate change.