

ATTACHMENT BOOKLET

ORDINARY COUNCIL MEETING
29 MARCH 2023

LIVERPOOL
CITY
COUNCIL



FRANCIS GREENWAY CENTRE,
170 GEORGE STREET, LIVERPOOL

CONTENTS

PAGE

PLAN 01 DRAFT RURAL LANDS STRATEGY

<i>Attachment 1 Draft Liverpool Rural Lands Strategy.....</i>	<i>237</i>
<i>Attachment 2 Liverpool Rural Lands Study (2020)</i>	<i>290</i>

PLAN 02 LIVERPOOL LOCAL ENVIRONMENTAL PLAN 2008 AMENDMENT: 22 BOX ROAD, CASULA

<i>Attachment 1 Attachment 1: Council prepared Planning Proposal Report.....</i>	<i>455</i>
<i>Attachment 2 Attachment 2: Local Planning Panel Report 22 Box Road (Mimosa Park) ...</i>	<i>476</i>
<i>Attachment 3 Attachment 3: Local Planning Panel Minutes: 22 Box Road Casula (Mimosa Park)</i>	<i>481</i>
<i>Attachment 4 Attachment 4: Safety Design Report: 22 Box Road, Casula (Mimosa Park)</i>	<i>483</i>
<i>Attachment 5 Attachment 5: Soil Contamination Report: 22 Box Road (Mimosa Park).....</i>	<i>499</i>

OPER 01 CITY PRESENTATION PARKS REVIEW

<i>Attachment 1 Parks Review Final 13 March 2023.....</i>	<i>646</i>
---	------------

OPER 02 CLIMATE CHANGE POLICY AND LIVERPOOL CLIMATE ACTION PLAN

<i>Attachment 1 Climate Change Policy</i>	<i>749</i>
<i>Attachment 2 Climate Action Plan</i>	<i>753</i>

LIVERPOOL RURAL LANDS STRATEGY



LIVERPOOL

RURAL LANDS STRATEGYLIVERPOOL
CITY
COUNCIL**Table of Contents**

Table of Contents.....	2
Executive Summary	3
Introduction	5
Relationship to Key Policies.....	5
State Policies.....	5
Metropolitan Policies	7
Local Policies	16
Findings of Relevant Technical Studies	17
Rural Lands Snapshot.....	22
Economic and Agricultural context.....	22
Key Challenges and Opportunities	22
Rural Precincts.....	25
Denham Court.....	25
Rossmore.....	29
Kemps Creek.....	31
Dwyer Road.....	34
Western Rural Lands.....	37
Airport/Aerotropolis Core	40
Agribusiness.....	42
Guiding Criteria for Planning Proposals.....	44
Action and Delivery Plan	46

LIVERPOOL

RURAL LANDS STRATEGY

LIVERPOOL
CITY
COUNCIL

Executive Summary

Liverpool is growing rapidly with a population that requires more housing, businesses, jobs and social infrastructure. The Liverpool Local Government Area (LGA) is undergoing a profound transformation as the Liverpool City Centre continues to develop as a Metropolitan Cluster and the Western Sydney International (Nancy-Bird Walton) Airport brings with it the Western Sydney Aerotropolis. This surge in investment and population growth needs to be accommodated within the expanding urban footprint of the LGA. Furthermore, Liverpool's growing population is reliant on local markets for high-quality and locally accessible produce. This strategy aims to protect and enhance existing rural and scenic lands to meet the current and future demands of Liverpool in terms of the provision of alternative recreational activities, local produce and employment opportunities for the local population.

The Liverpool Rural Lands Strategy sits within a broader strategic framework at the State, Regional and Local level. These various plans and strategies have contributed to the formulation of this strategy by providing broader guiding principles that contextualise rural land within the Liverpool LGA. This strategy is informed directly by the data, insights and recommendations presented within the Rural Lands and Green Grid studies prepared for Council in 2020. These studies provide a robust technical basis for the vision, strategies and actions within this strategy.

Broad Vision

This strategy forms the basis for a review of planning provisions that apply to the rural precincts in Liverpool. It provides a review of the current planning and policy context applying to Liverpool's rural and scenic lands. Findings derived from the Rural Lands and Green Grid studies are applied through this strategy to inform the management and improvement of rural lands. A strategic vision has been described for each rural precinct, supported by actions. Strategies and an implementation plan guide the application of this strategy into planning policy.

Actions

Action 1: Review existing Liverpool Local Environmental Plan (LEP) and Development Control Plan (DCP) provisions for rural land

Action 2: Encourage economic use of rural land

Action 3: Review environmental health provisions for rural land

Action 4: Ensure green and blue grid networks are supported

Action 5: Investigate appropriate land-uses in Cecil Park, including addressing transition of development controls from Liverpool LGA to Penrith LGA

Action 6: Protect rural heritage

LIVERPOOL

RURAL LANDS STRATEGYLIVERPOOL
CITY
COUNCIL

Action 7: Identify the RU1 zone and Metropolitan Rural Area as 'prime' agricultural land

Action 8: Manage transition to urban land

Action 9: Increase resources dedicated to handling compliance matters in the rural areas

Action 10: Investigate placemaking opportunities in Wallacia and Luddenham, including addressing transition of development controls from Liverpool LGA to Penrith LGA and Camden LGA

LIVERPOOL

RURAL LANDS STRATEGY

LIVERPOOL
CITY
COUNCIL

Introduction

This Liverpool Rural Lands Strategy (the strategy) guides the retention, improvement, rezoning and development of rural lands in the Liverpool Local Government Area over the next 20 years. The strategy considers a variety of metropolitan and local level policy and incorporates the findings of the *Liverpool Rural Lands Study* (2020) and the *Liverpool Green Grid Implementation Study* (2020).

The way in which land and buildings are used and developed in rural precincts is steadily changing in response to several key drivers, both domestically and internationally. These drivers include globalisation and impacts of global competition, population growth and increased construction activity. There has also been significant investment in major infrastructure projects and land releases in Greater Sydney, including the Western Sydney Aerotropolis and the South West Growth Area. These investment projects will contribute to the changing fabric of rural lands in the Liverpool LGA.

The strategy aims to ensure that agricultural lands are recognised for their economic value, as well as their intrinsic and landscape values. The actions are tailored to consider highest and best land uses in rural zones, the objectives of the Metropolitan Rural Area and any other plans/zoning across adjoining Council boundaries.

A significant amount of Liverpool's rural lands is earmarked for future urban development, therefore it is important that remaining rural and scenic lands are protected from urban development and that there are clear boundaries between urban, non-urban and scenic lands.

Relationship to Key Policies

The Liverpool Rural Lands Strategy sits within the broader strategic framework at the State, Metropolitan and Local level. These various plans and strategies have contributed to the formulation of this strategy by providing broader guiding principles that contextualise the management of rural land within the Liverpool Local Government Area (LGA).

State Policies

Right to Farm Act and Policy

The concept of 'right to farm' has multiple facets, but the common interpretation – and the one used in this strategy – relates to a desire by farmers to undertake lawful agricultural practices without conflict or interference arising from complaints from

LIVERPOOL

RURAL LANDS STRATEGY**LIVERPOOL
CITY
COUNCIL**

neighbours and other land users. Therefore, the NSW Government has developed a comprehensive, state-wide approach to deal with the issue of right to farm. The Right to Farm policy brings together a collection of actions including:

- reinforcing rights and responsibilities;
- establishing a baseline and ongoing monitoring and evaluation of land use conflicts;
- strengthening land use planning;
- ensuring ongoing reviews of relevant environmental planning instruments include consideration of options to ensure best land use outcomes and to minimise conflicts;
- improving education and awareness on management of land use conflicts; and
- considering potential future legislative options, should additional Government intervention be required.

Particularly in the Liverpool LGA, land use conflict arises due to the relationship between existing rural lands/industries and oncoming urban initiatives for the LGA's growth areas. This may exert additional pressure on agricultural practitioners to relocate, leave, or at the very least diversify their industry.

Part of this strategy will be to establish a baseline and ongoing monitoring and evaluation by fostering increased cooperation with the State and Local Governments, and other stakeholders for the monitoring of nuisance complaints related to farming. This also entails identifying any additional measures required to assist in best practice land use planning to address conflict.

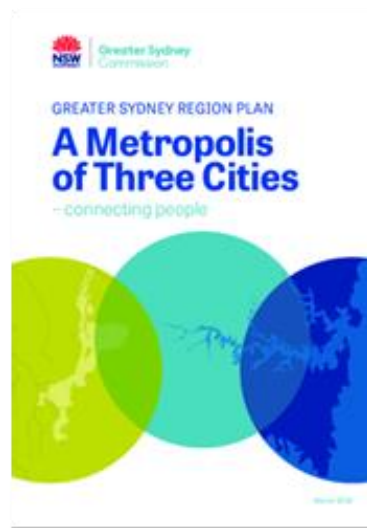
LIVERPOOL

RURAL LANDS STRATEGY

Metropolitan Policies

Greater Sydney Region Plan: A Metropolis of Three Cities (GSRP)

The Greater Sydney Region Plan was developed by the former Greater Sydney Commission (GSC) and sets a 40-year vision (to 2056) to align land use, transport and infrastructure planning and delivery across Greater Sydney. The vision is structured around a metropolis of three cities: The Western Parkland City, Central River City and Eastern Harbour City. Liverpool is identified in the plan as part of the Metropolitan City Cluster of the Western Parkland City. The Western Parkland City will be structured on a poly-centric city model, in which economic growth will be underpinned by the existing centres of Liverpool, Campbelltown-Macarthur, Greater Penrith and the future Western Sydney Airport-Badgerys Creek Aerotropolis.



The Plan discusses the importance of rural land to the Greater Sydney economy. It specifies that management of rural land across Greater Sydney will need to reflect local context and provide for a wide range of land uses which are vital to Sydney's overall productivity and the protection of scenic lands.

The Liverpool Rural Lands Strategy responds to the following directions and objectives of the GSRP:

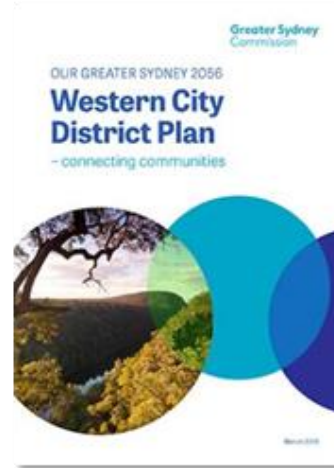
Table 1 – Relevant GSRP directions and objectives

Direction	Objective
Direction 7 - Jobs and skills for the city	Objective 20 - Western Sydney Airport and Badgerys Creek Aerotropolis are economic catalysts for Western Parkland City
	Objective 24 - Economic sectors are targeted for success
Direction 8 - A city in its landscape	Objective 26 - A cool and green parkland city in the South Creek corridor
	Objective 27 - Biodiversity is protected, urban bushland and remnant vegetation is enhanced
	Objective 28 - Scenic and cultural landscapes are protected
	Objective 29 - Environmental, social and economic values in rural areas are protected and enhanced
	Objective 32 - The Green Grid links parks, open spaces, bushland and walking and cycling paths

LIVERPOOL

RURAL LANDS STRATEGY**LIVERPOOL
CITY
COUNCIL*****Western City District Plan (WCDP)***

The Western City District Plan provides a link between metropolitan strategy and local planning. The District Plan articulates how the objectives of the Greater Sydney Region Plan are to be achieved through a series of objectives and actions under four themes: infrastructure, liveability, productivity and sustainability. The LGAs that make up the Western City District are the Blue Mountains, Camden, Campbelltown, Fairfield, Hawkesbury, Liverpool, Penrith and Wollondilly. The size of the district has been driven by the proposed Western Sydney Airport and the future Western Sydney Aerotropolis.



The Plan identifies the Metropolitan Rural Area (MRA) which lies on the fringe of the Western Parkland City. The MRA refers to the non-urban areas at the periphery of the Greater Sydney Region and typically includes agricultural activities such as egg production, poultry, cut flowers, turf, mushroom farms and agritourism. The far-western portions of the Liverpool LGA are included in the MRA.

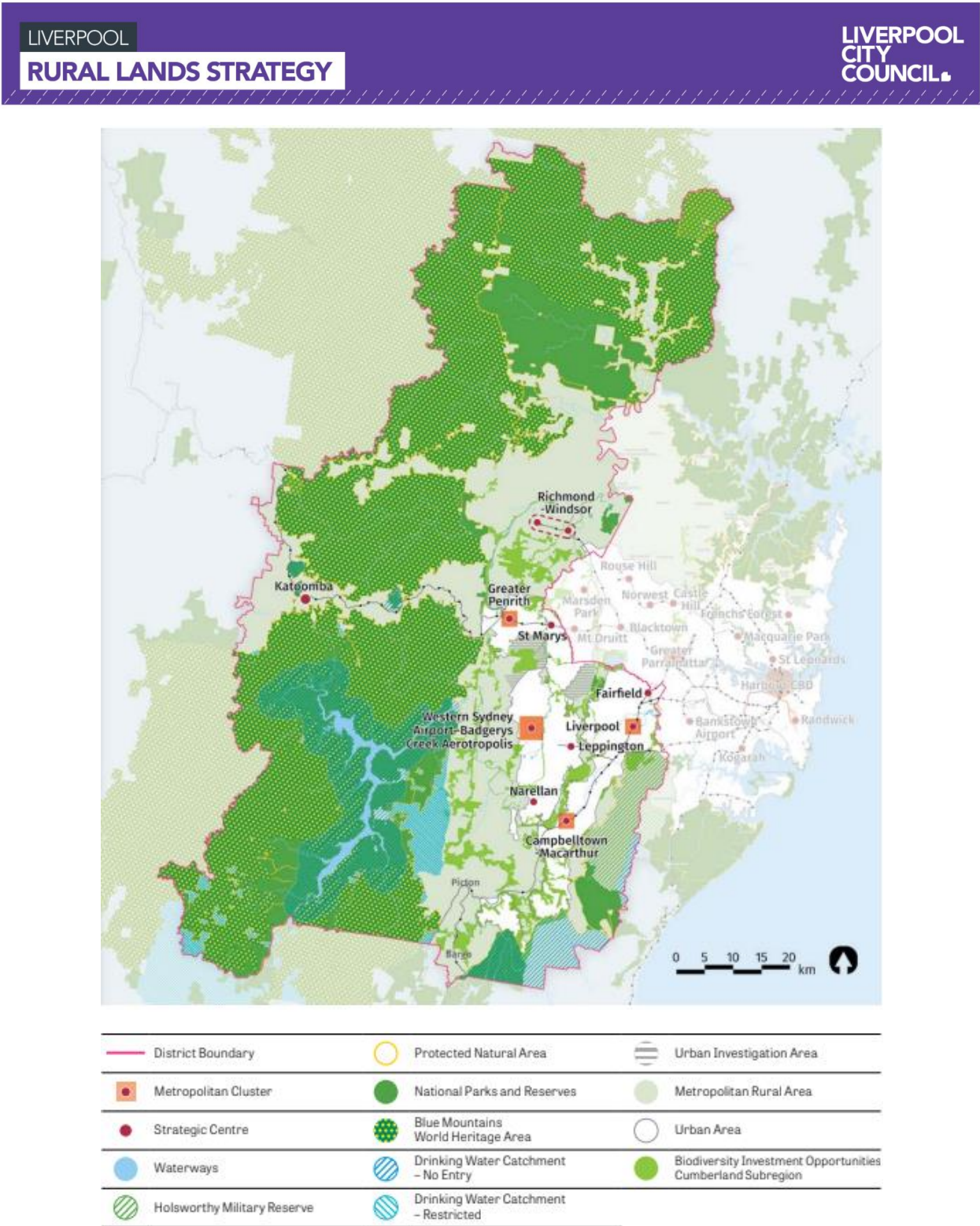


Figure 1 - Western City District Protected Natural Area and Metropolitan Rural Area (GSC)

LIVERPOOL

RURAL LANDS STRATEGYLIVERPOOL
CITY
COUNCIL

The Liverpool Rural Lands Strategy responds to the following priorities and actions of the WCDP:

Table 2 - Relevant WCDP priorities and actions

Priority	Action
W8 - <i>Leveraging industry opportunities from the Western Sydney Airport and Badgerys Creek Aerotropolis</i>	Action 35 - Protect and support agricultural production and mineral resources (in particular, construction materials) by preventing inappropriately dispersed urban activities in rural areas
	Action 36 - Provide a regulatory environment that enables economic opportunities created by changing technologies
	Action 39 - When preparing plans for tourism and visitation, consider: <ul style="list-style-type: none"> • encouraging the development of a range of well-designed and located facilities • enhancing the amenity, vibrancy and safety of centres and township precincts • supporting the development of places for artistic and cultural activities • improving public facilities and access • protecting heritage and biodiversity to enhance cultural and eco-tourism • supporting appropriate growth of the night-time economy • developing industry skills critical to growing the visitor economy
W13 - <i>Creating a Parkland City urban structure and identity, with South Creek as a defining spatial element</i>	Action 71 - Implement the South Creek Corridor Project and use the design principles for South Creek to deliver a cool and green Western Parkland City
W15 - <i>Increasing urban tree canopy cover and delivering Green Grid connections</i>	Action 74 - Progressively refine the detailed design and delivery of: <ul style="list-style-type: none"> • Greater Sydney Green Grid priority corridors and projects important to the District • opportunities for connections that form the long-term vision of the network • walking and cycling links for transport as well as leisure and recreational trips

LIVERPOOL

RURAL LANDS STRATEGYLIVERPOOL
CITY
COUNCIL

	Action 75 - Create Greater Sydney Green Grid connections to the Western Sydney Parklands
W14 - <i>Protecting and enhancing bushland and biodiversity</i>	Action 72 - Protect and enhance biodiversity by: <ul style="list-style-type: none"> • supporting landscape-scale biodiversity conservation and the restoration of bushland corridors • managing urban bushland and remnant vegetation as green infrastructure • managing urban development and urban bushland to reduce edge-effect impacts
W16 – <i>Protecting and enhancing scenic and cultural landscapes</i>	Action 77 - Enhance and protect views of scenic and cultural landscapes from the public realm
W17 – <i>Better managing rural areas</i>	Action 78 - Maintain or enhance the values of the Metropolitan Rural Area using place-based planning to deliver targeted environmental, social and economic outcomes Action 79 - Limit urban development to within the Urban Area, except for the investigation areas at Horsley Park, Orchard Hills, and east of The Northern Road, Luddenham

Cumberland Plain Conservation Plan (CPCP)

The Cumberland Plain Conservation Plan (CPCP) seeks to support the delivery of housing, jobs and infrastructure within the Cumberland Plains. It provides biodiversity approvals that will form the basis of conservation efforts across the Western Parkland City. The plan requires consent authorities to consider biodiversity values when determining development applications and planning proposals for land within strategic conservation areas.

Ensuring land use planning and decision making supports ecological health and protects biodiversity will allow Liverpool's rural areas to thrive, particularly as it underpins the basis for many of the rural livelihoods of residents. As Liverpool is a Council undergoing immense future developmental transformation, it relies upon the preservation of existing natural areas to define rural character.

LIVERPOOL
RURAL LANDS STRATEGY

LIVERPOOL
CITY
COUNCIL

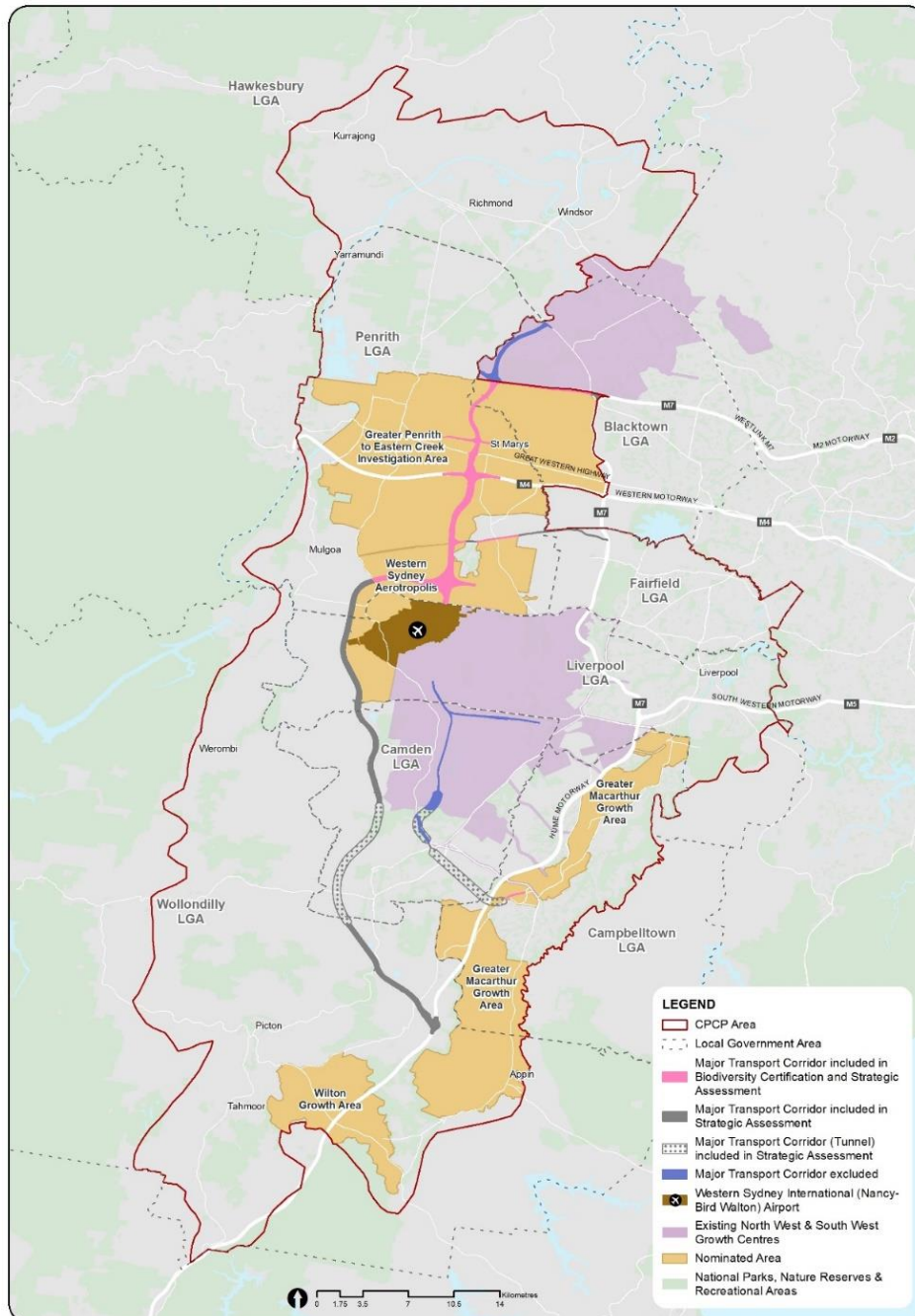
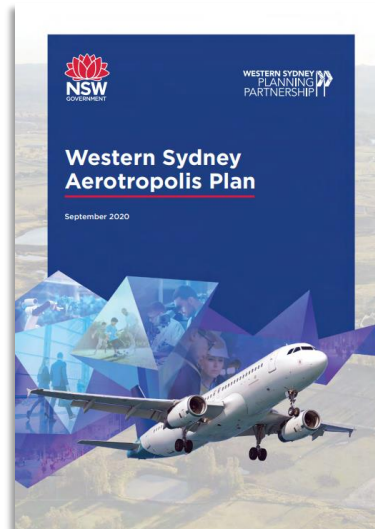


Figure 2 - Map of CPCP Area (DPE)

LIVERPOOL

RURAL LANDS STRATEGY**LIVERPOOL
CITY
COUNCIL*****Western Sydney Aerotropolis Plan (WSAP)***

The Western Sydney Aerotropolis straddles the Liverpool and Penrith LGAs. The Western Sydney Aerotropolis Plan (WSAP) sets out precinct priorities for each part of the Aerotropolis. The WSAP aligns with the Greater Sydney Regional Plan objectives and directions, creating a more detailed series of planning principles for the Aerotropolis. The WSAP contains the Structure Plan, which show where new zones are to be applied based on the SEPP, as well as the location (in most cases still high level) of planned infrastructure and the vision and preferred land uses for each precinct. It sets parameters for appropriate, shorter-term development outcomes, while seeking to preserve longer-term opportunities.



In summary:

- Rural uses will be directed west of the Aerotropolis;
- The mixed-use component of the Aerotropolis core will be located outside of the noise exposure contour;
- Approximately 80 per cent of the land will be used for employment services;
- Residential development will be outside of the 20 ANEF1 area; and
- In the Liverpool LGA, Kemps Creek, Rossmore and Dwyer Road have been identified as non-initial precincts.

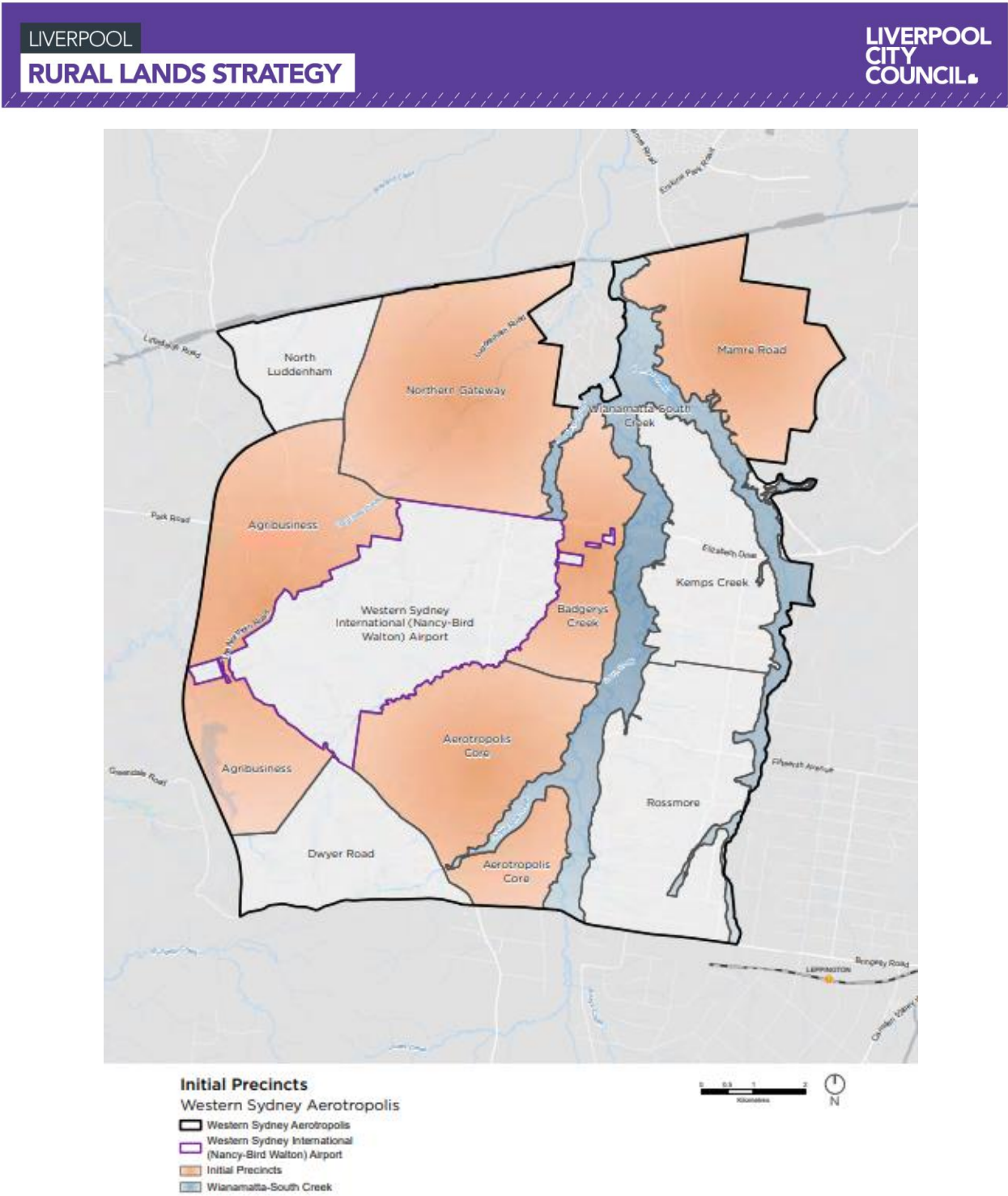


Figure 3 – Initial Aerotropolis Precincts (Department of Planning & Environment)

LIVERPOOL
RURAL LANDS STRATEGY

LIVERPOOL
CITY COUNCIL

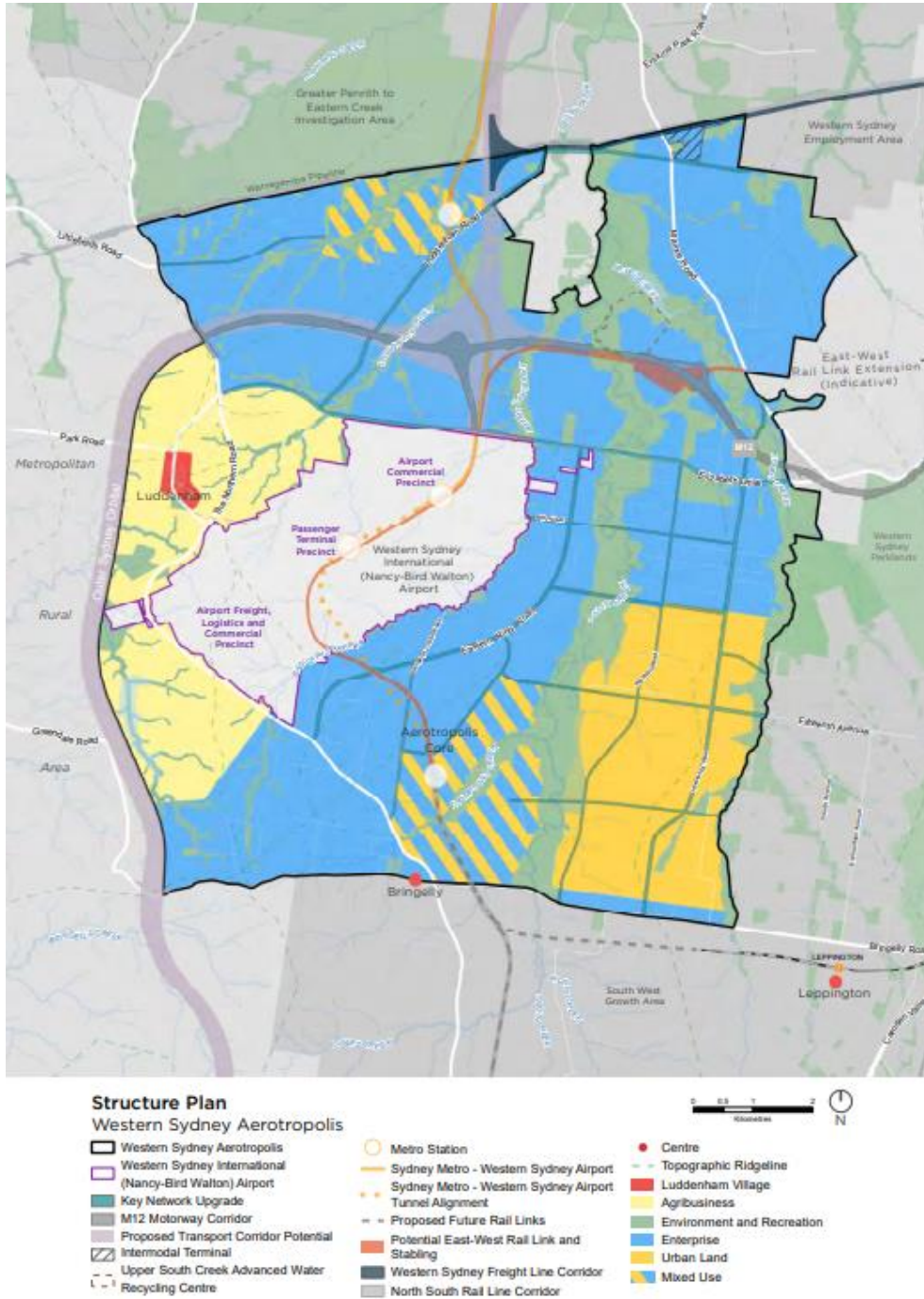


Figure 4 – Aerotropolis Structure Plan (Department of Planning & Environment)

LIVERPOOL

RURAL LANDS STRATEGY**LIVERPOOL
CITY
COUNCIL****Local Policies*****Connected Liverpool 2040: Local Strategic Planning Statement (LSPS)***

The LSPS is Council's long-term plan to shape Liverpool's future which will help guide the development of suburbs and balance the need for housing, jobs and services as well as parks, open spaces and the natural environment. The LSPS recognises the contribution of peri-urban agriculture to city resilience, sustainability, liveability and the economy; this ensures that valuable agricultural lands are protected. Accordingly, the strategy addresses the following LSPS actions:

Action 16.1 – Develop Rural Lands Strategy and review LEP to ensure alignment

Action 16.2 – Investigate placemaking opportunities in Wallacia and Luddenham, including addressing transition of development controls from Liverpool LGA to Penrith LGA and Camden LGA



LIVERPOOL

RURAL LANDS STRATEGY**LIVERPOOL
CITY
COUNCIL**

Findings of Relevant Technical Studies

This strategy is informed directly by the data, insights and recommendations presented within two key studies that have been prepared for Council in recent years. These studies provide a robust technical basis for the vision, strategies and implementation actions within this strategy.

Liverpool Rural Lands Study (2020)

The study was prepared by SGS Economics and RM Consulting in April 2020 to understand the likely effects of the Western Sydney International (Nancy-Bird Walton) Airport project on local agricultural productivity. The study also includes an analysis of current land uses, economic activity, agricultural activity, food production, rural based tourism, and employment (existing direct and indirect jobs in the rural area).

Building on place-based planning directions from the Greater Sydney Region Plan and Western City District Plan, the study identifies the different landscape qualities of precincts across Liverpool's rural area, highlighting where the Western Sydney Aerotropolis and current local plans diverge.



Key insights

- Liverpool's most agriculturally productive land is fragmented and abuts the edge of the residential growth corridor coming from the east (Kemps Creek, Badgerys Creek and Rossmore).
- Rural land to the west (Wallacia and Greendale) is less fragmented, however is also less agriculturally productive due to low land capability.
- The WSAP emphasises that the rural land around the Agribusiness precinct should be protected for its ongoing use for industry and agriculture into the future, with uses that complement the Agribusiness precinct and/or benefit from their proximity to the airport (in some areas).



- The Liverpool Local Environmental Plan permits a range of non-agricultural uses including dual occupancies, which allows for greater residential intensification on RU1 and RU4 zoned land. In the context of preserving rural activities in the Western Rural Lands, and managing transition to Aerotropolis uses, this flexibility may lead to greater residential and agricultural land use conflicts, against the core purpose of those zones.

The key insights and descriptions of rural precincts in the study have been used to inform the recommend actions and deliverables in this strategy.

Green Grid Implementation Study (2020)

The study was prepared by McGregor Coxall in 2020 to provide insight into the current state of Liverpool's Green Grid, identify opportunities to expand and improve the Green Grid, and implement actions that will ensure priorities are achieved successfully. The Green Grid consists of the following layers:

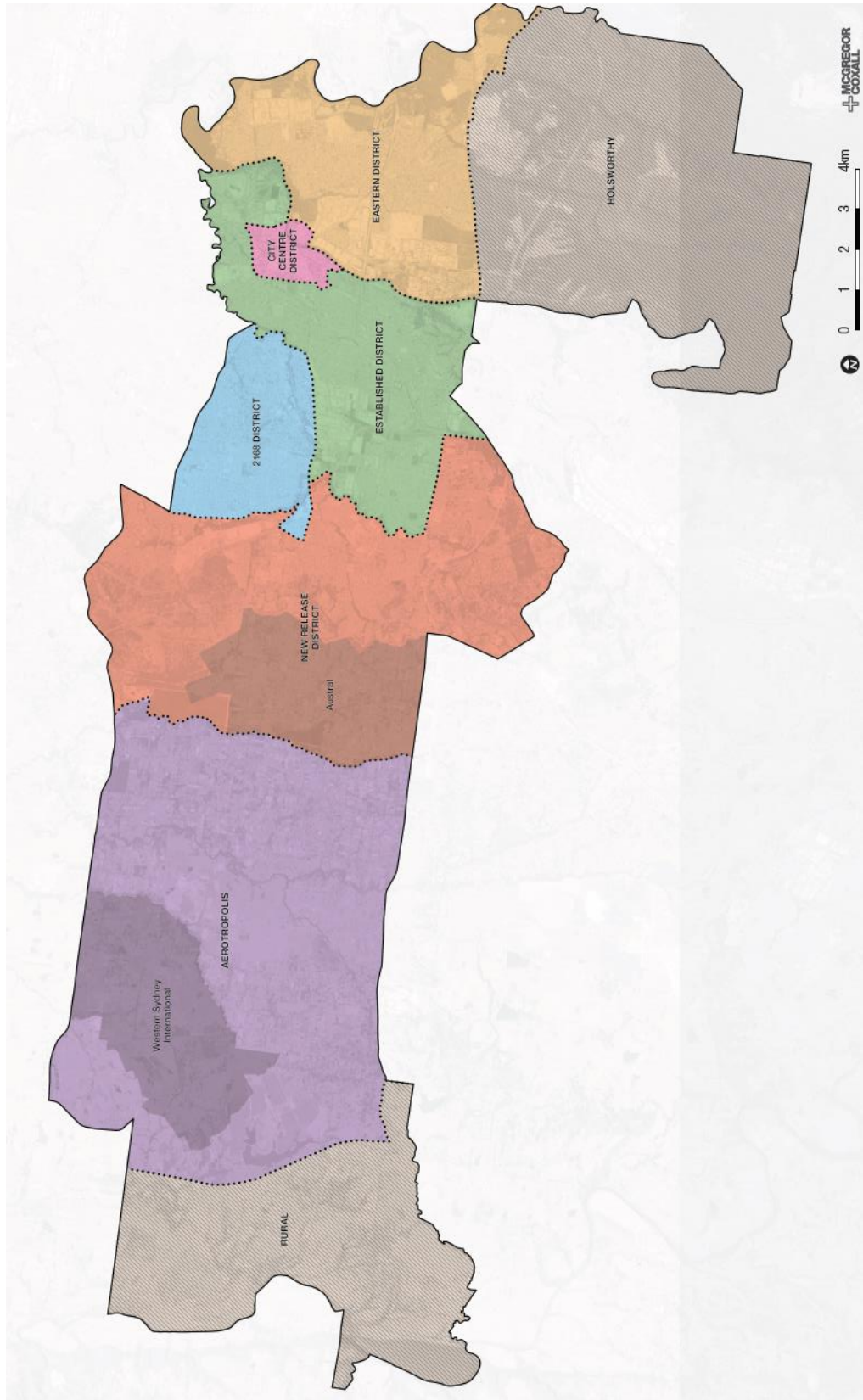
- Ecological grid (e.g., biodiversity, biological hierarchy and organisation, ecosystems (forest, grassland and wetland, aquatic and freshwater));
- Hydrological/blue grid (Including stormwater detention network);
- Recreational grid (e.g., parks, gardens, squares, plazas, public and private courtyard and forecourt, sports and playing fields, riparian corridor passive recreation); and
- Connectivity and access grid (e.g., street and laneway network, cycleway network, infrastructure easements, key activity nodes such as town centres, street tree planting, topography, transport nodes and network).

The implementation study divides the Liverpool LGA into 8 districts (Figure 5).

LIVERPOOL
CITY
COUNCIL

LIVERPOOL

RURAL LANDS STRATEGY



LIVERPOOL

RURAL LANDS STRATEGYLIVERPOOL
CITY
COUNCIL

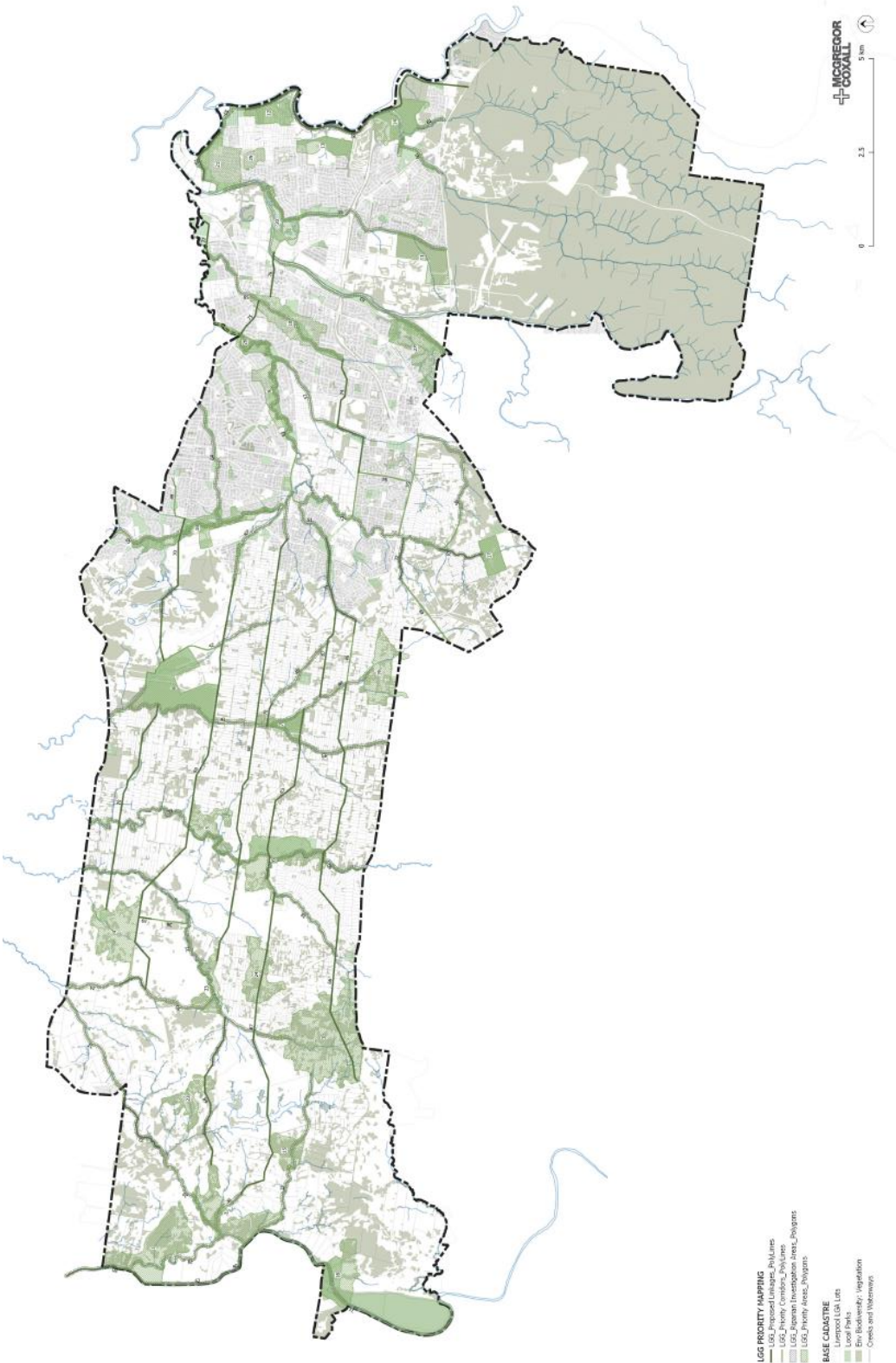
The Rural, Aerotropolis and New Release districts are relevant to the Liverpool Rural Lands Strategy. Opportunities for each district are described as follows:

Rural: Connect remnant bushland and ecological corridors, restore riparian areas and improve water quality management along river/creeks. Priority projects in this district include the revitalisation of riparian corridors along the Hawkesbury-Nepean River and its tributaries.

Aerotropolis: Provide green corridors, regional parks, conservation areas, and walking/cycling links. Priority projects in this district include the delivery of The Northern Road Green Boulevard, South Creek Corridor and Kemps Creek Nature Reserve.

New Release: Enhance open space corridors and active transport along creek lines and improve east-west connections. Priority projects in this district include the Upper canal revitalisation and establishment of Edmondson Regional Park

The above opportunities are to be incorporated into future LEP and DCP amendments as outlined in the action and delivery plan of this strategy.



LIVERPOOL

RURAL LANDS STRATEGY

LIVERPOOL
CITY
COUNCIL

Rural Lands Snapshot

Economic and Agricultural context

In 2015-16 the Sydney Basin produced 34 per cent of NSW vegetables, 25 per cent of NSW poultry and 63 per cent of NSW strawberries of which, Liverpool contributed:

- 15 per cent of vegetables including mushrooms, lettuces and tomatoes;
- 23 per cent of poultry; and
- 19 per cent of strawberries.

Liverpool's top commodities by gross value of agricultural production include poultry, mushrooms, nursery, tomatoes, cut flowers, lettuces and strawberries. The diversity of agricultural products has reduced over time as production has moved from largely soil-based to protected cropping or 'indoor' farming. Commodities that are no longer produced or largely disappeared from Greater Sydney include: orchard fruit such as nectarines and peaches; livestock such as pig and sheep; vegetables including artichokes, beetroot, butter beans, cabbages, cauliflowers, Chinese cabbage (bok choy and wombok), cucumbers, green peas, onions, parsnips, potatoes, pumpkins, radish, silverbeet, spinach, snow peas, spring onions, swedes, sweet corn, zucchinis, eggplant, leeks and parsley.

There is a high number of mushroom and vegetable growing jobs in Rossmore. Greendale has a mix of agricultural activities including dairy cattle farming, poultry farming and mushroom and vegetable farming.

Kemps Creek and Rossmore have the greatest soil capability, while Wallacia and Greendale have the greatest soil fertility. Low fertility is associated with a sandier soil, making it more suited to horticultural crops that don't thrive in clay soils. In these locations, growers can make up for a nutrient shortfall by using fertiliser and frequent watering for soil moisture.

Agriculture has flow-on effects to other industry sectors such as manufacturing, retail trade, accommodation and food services and wholesale trade. Maintaining economically feasible agriculture in Liverpool helps to diversify Liverpool's economy, making it more resilient and resistant to economic shocks which may impact other industry sectors.

Key Challenges and Opportunities

The rural lands of the Liverpool LGA have been progressively rezoned for urban purposes in last 50 years. Former rural localities such as Prestons, Casula and Hoxton

Park have developed into residential suburbs. Other localities such as Austral, Leppington and Edmondson Park are currently transitioning from rural to urban land, while Rossmore, Kemps Creek, Badgerys Creek and Bringelly are due to undergo extensive urbanisation as part of plans for the Western Sydney Aerotropolis as plans are developed further over coming decades. The encroachment of urban development towards the western fringes of the LGA have resulted in:

- Abandoned enterprises prior to rezoning;
- A noticeable transition from commercial scale agriculture to sub-commercial or hobby farming;
- A decline in standards of land management; and
- Increased land use conflicts on the borders of urban and rural land.



Figure 7 – Encroachment of urban development into rural areas (Nearmap)

This strategy aims to address the above issues by:

- Ensuring that agricultural lands are recognised for their economic value, as well as their intrinsic and landscape values;
- Considering a suitable range of land uses that can be permitted in rural zones to encourage productive utilisation of such lands before they are rezoned in future (i.e. highest and best use under current circumstances), while ensuring that zone objectives are not compromised;
- Considering the objectives of the Metropolitan Rural Area and any other plans/zoning across adjoining Council boundaries;
- Improving land management outcomes through increased resources dedicated to the monitoring of illegal dumping and unauthorised land uses;
- Considering the future transition of land-uses near the Mamre Road Precinct at Cecil Park;
- Advocating for the prevention of further encroachment of non-agricultural uses that introduce land use conflicts; and

LIVERPOOL

RURAL LANDS STRATEGYLIVERPOOL
CITY
COUNCIL

- Encouraging measures that provide opportunities for uses that value add to agriculture and leverage its proximity to urban development such as roadside stalls, farmers markets etc.

LIVERPOOL

RURAL LANDS STRATEGY**LIVERPOOL
CITY
COUNCIL**

Rural Precincts

Denham Court

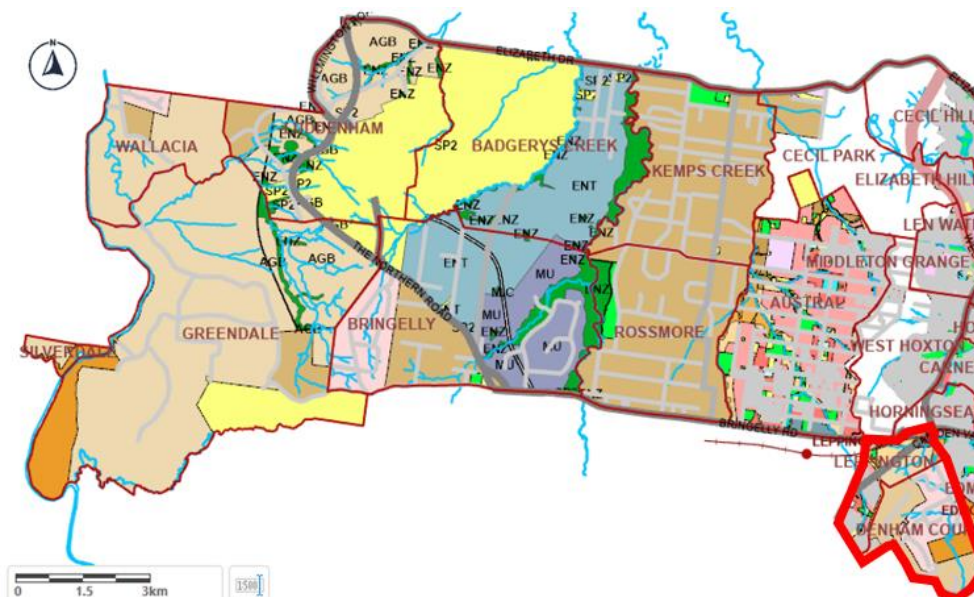


Figure 8 – Location of Denham Court Precinct

Current Context

The Denham Court precinct includes the suburbs of Leppington and Denham Court. The precinct is bounded by (from the north in a clockwise direction) Bringelly Road, Camden Valley Way, The South-West Rail Link, Zouch Road, Campbelltown Road, Denham Court Road, Camden Valley Way, and Cowpasture Road.

The Denham Court portion of the precinct is characterised by rural-residential uses on large lots accentuated by scenic lands. Long views of the Sydney CBD and Blue Mountains from properties along Fox Valley Road and properties on the ridgeline in Leppington are afforded by the precinct's elevated position. This prominent ridgeline also forms a green backdrop, which is visible from several areas in the east and west of the LGA. Maintaining this green backdrop is important in preserving amenity to areas beyond Denham Court.

The remainder of the land in the precinct is gently undulating and the precinct forms the upper catchment of the Cabramatta Creek.

LIVERPOOL

RURAL LANDS STRATEGY**LIVERPOOL
CITY
COUNCIL**

Figure 9 – View of Sydney CBD from Fox Valley Road (REA Group Ltd)

Denham Court is primarily zoned R5 – Large Lot Residential and RU2 – Rural Landscape under the *Liverpool Local Environmental Plan 2008*. Smaller portions of the suburb are zoned C1 – Environmental Conservation and C4 - Environmental Living under the *State Environmental Planning Policy (Precincts - Western Parkland City) 2021*. There are undersized RU2 zoned lots along Church Road and Campbelltown Road with areas ranging from 0.2ha to 2.5ha. These sites require amalgamation in accordance with 7.34 of the Liverpool LEP.

The Leppington portion of the precinct, south of Camden Valley Way, is characterised by rural land transitioning to urban land uses. Urbanised land is largely situated on the eastern side of the Upper Canal with rural land uses being situated to the west. Rural land is largely limited to a 57-hectare parcel of land to the south of Camden Valley Way being zoned RU1 – Primary Production under the *Liverpool Local Environmental Plan 2008*, and a collection of landholdings on the northern side of Camden Valley Way, zoned C2 Environmental Conservation and C4 Environmental Living under *State Environmental Planning Policy (Precincts - Western Parkland City) 2021*.

LIVERPOOL

RURAL LANDS STRATEGY**LIVERPOOL
CITY
COUNCIL**

Figure 10 – Rural residential development in Denham Court (RM Consulting Group)

Vision

The existing character of the Denham Court precinct is to be maintained with further fragmentation of larger lots being discouraged, and scenic qualities being protected in the rural and large lot residential zones. Particularly, any development along Fox Valley Road, Camden Valley Way and the upper regions of Denham Court Road should be designed to retain view corridors to the Sydney metropolitan basin and scenic hills to the south of Denham Court.

It is expected that urban zoned land in Leppington will be developed for residential, recreation and commercial purposes. However, the landscaped backdrop this area provides from Bringelly Road, and the broader LGA, are not to be undermined by future development in the conservation zones to the north of Camden Valley Way.

Recommended Actions (refer to Action and Delivery Plan)

Action 1: Review existing Liverpool Local Environmental Plan (LEP) and Development Control Plan (DCP) provisions for rural land

Action 2: Encourage economic use of rural land

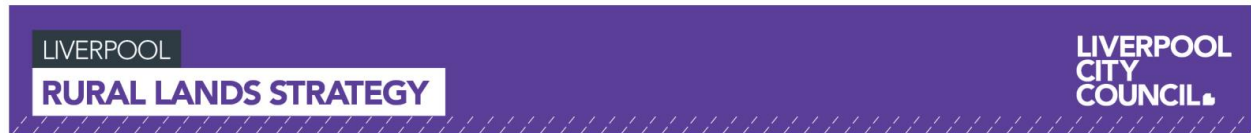
Action 3: Review environmental health provisions for rural land

Action 4: Ensure green and blue grid networks are supported

Action 6: Protect rural heritage

Action 7: Identify the RU1 zone and Metropolitan Rural Area as 'prime' agricultural land

Action 8: Manage transition to urban land



Action 9: Increase resources dedicated to handling compliance matters in the rural areas

LIVERPOOL

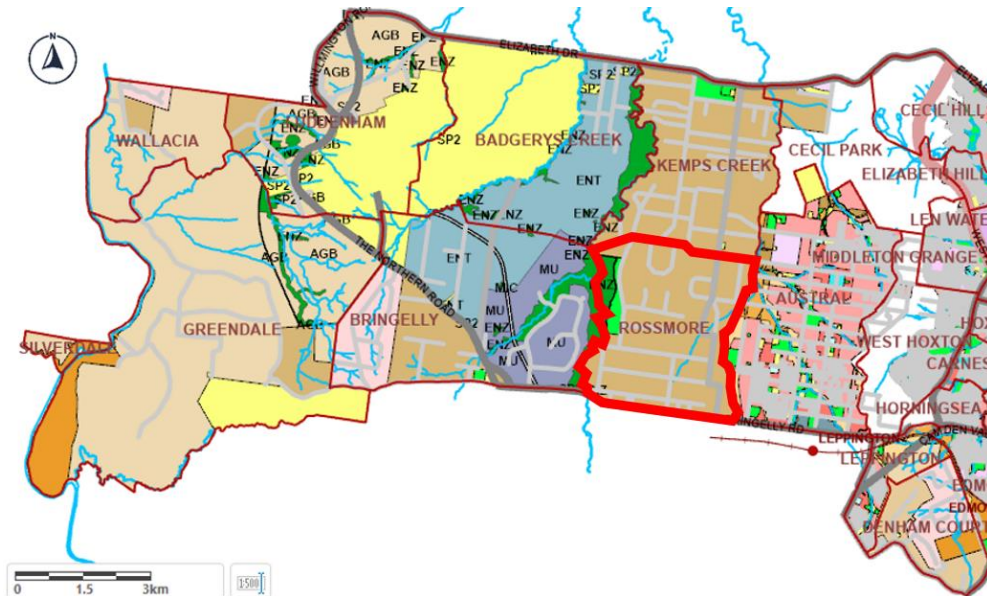
RURAL LANDS STRATEGY**LIVERPOOL
CITY COUNCIL****Rossmore**

Figure 11 - Location of Rossmore Precinct

Current Context

The Rossmore precinct is bounded by Fifteenth Avenue to the north, Kemps Creek to the east, Bringelly Road to the south and South Creek to the west. The precinct is zoned RU4 – Primary Production Small Lots and RE1 - Public Recreation under the *Liverpool Local Environmental Plan 2008* with most allotments being between 2 and 10 hectares in size. A small portion of the locality is zoned ENZ - Environment and Recreation under the *State Environmental Planning Policy (Precincts - Western Parkland City) 2021*.

The precinct is characterised by a mix of horticulture, hobby farming, and rural residential land including hydroponic and soil-based production systems. A large parkland, called Rossmore Grange, is located in the suburb, which is used for non-competitive equestrian activities and passive recreation with future plans to accommodate an animal shelter. The suburb of Rossmore is identified as a non-initial precinct in the *Western Sydney Aerotropolis Plan (2020)*.

LIVERPOOL

RURAL LANDS STRATEGY**LIVERPOOL
CITY
COUNCIL**

Figure 12 - Hydroponic lettuce under plastic weather protection (RM Consulting Group)

Vision

The existing character of the precinct is to be maintained until land is rezoned for urban purposes as part of the Western Sydney Aerotropolis. Agriculture is to be identified as the primary land use in the locality, with further land fragmentation and intensification of rural residential land uses being avoided.

The maintenance of agriculture is to be supported by initiatives to suppress speculative land investment and promote agricultural industries. Landowners are to be encouraged to maintain farmland and consider complementary non-agricultural land-uses such as garden centres, nurseries, roadside stalls, and agritourism.

Any proposed land uses are to be compatible with environmental and landscape protection and enhancement of bushland and riparian corridors along creeks.

Recommended Actions (refer to Action and Delivery Plan)

Action 1: Review existing Liverpool Local Environmental Plan (LEP) and Development Control Plan (DCP) provisions for rural land

Action 2: Encourage economic use of rural land

Action 3: Review environmental health provisions for rural land

Action 4: Ensure green and blue grid networks are supported

Action 6: Protect rural heritage

Action 9: Increase resources dedicated to handling compliance matters in the rural areas

LIVERPOOL

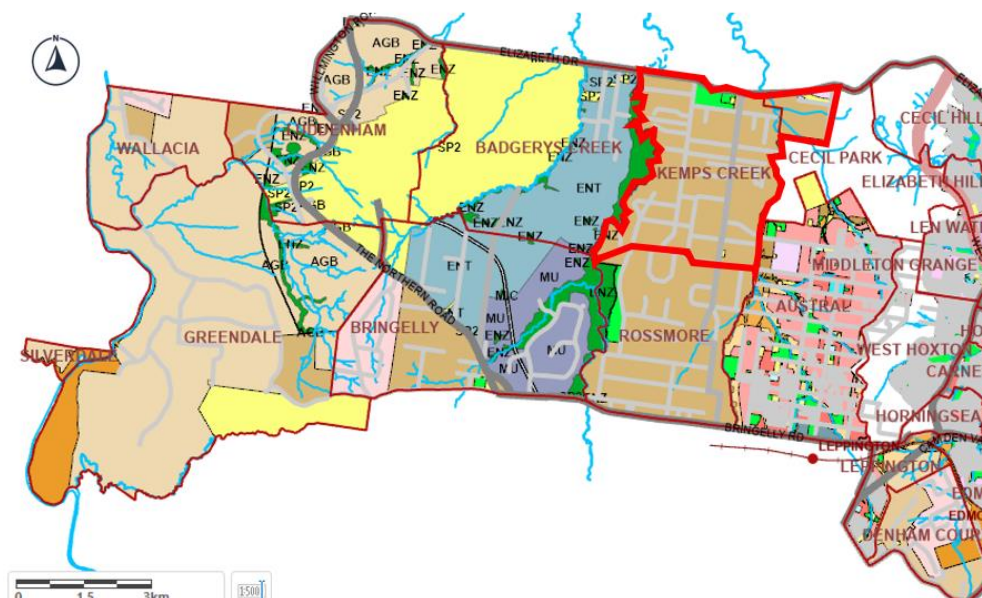
RURAL LANDS STRATEGYLIVERPOOL
CITY COUNCIL**Kemps Creek**

Figure 13 - Location of Kemp's Creek Precinct

Current Context

The Kemp's Creek precinct also includes the suburb of Cecil Park and is generally bounded by Elizabeth Drive to the north, Western Sydney Parklands to the east, South Creek to the west and Fifteenth Avenue to the south. The Kemp's Creek precinct is characterised by a mix of annual horticulture and rural residential. Annual horticulture is mainly undertaken as hydroponic and soil-based protected cropping under plastic tunnels and shade structures. High quality bushland characterises land to the north of Cross Street between Devonshire Road and Western Road.

The Cecil Park portion of the precinct is near the Mamre Road precinct of the Western Sydney Employment Area. Cecil Park is characterised by a waste processing facility and growing industrial development along Range Road.

The precinct is largely zoned RU4 – Primary Production Small Lots with smaller portions being zoned RE1- Public Recreation, Public Recreation - Regional, SP2 (Educational Establishment, Depot, and Classified Road) and IN2 - Light Industrial under the *Local Environmental Plan 2008* and *State Environmental Planning Policy (Precincts - Western Parkland City) 2021*. Kemp's Creek is identified as a non-initial precinct in the Western Sydney Aerotropolis Plan (2020).

LIVERPOOL

RURAL LANDS STRATEGY

LIVERPOOL
CITY
COUNCIL



Figure 14 – Hydroponic farm in Kemps Creek (RM Consulting Group)



Figure 15 – Rural residential development in Kemps Creek (RM Consulting Group)

Vision

The existing character of the precinct is to be maintained until land is rezoned for urban purposes as part of the Aerotropolis. Agriculture is to be identified as the primary land use in the locality with further land fragmentation being avoided. The maintenance of agriculture is to be supported by initiatives to suppress speculative land investment. Landowners are to be encouraged to maintain farmland and consider complementary non-agricultural uses such as garden centres, nurseries, roadside stalls and agritourism.

Any proposed land uses are to be compatible with environmental and landscape protection and enhancement of bushland and riparian corridors along creeks.

LIVERPOOL

RURAL LANDS STRATEGYLIVERPOOL
CITY
COUNCIL**Recommended Actions (refer to Action and Delivery Plan)**

Action 1: Review existing Liverpool Local Environmental Plan (LEP) and Development Control Plan (DCP) provisions for rural land

Action 2: Encourage economic use of rural land

Action 3: Review environmental health provisions for rural land

Action 4: Ensure green and blue grid networks are supported

Action 6: Protect rural heritage

Action 9: Increase resources dedicated to handling compliance matters in the rural areas

LIVERPOOL

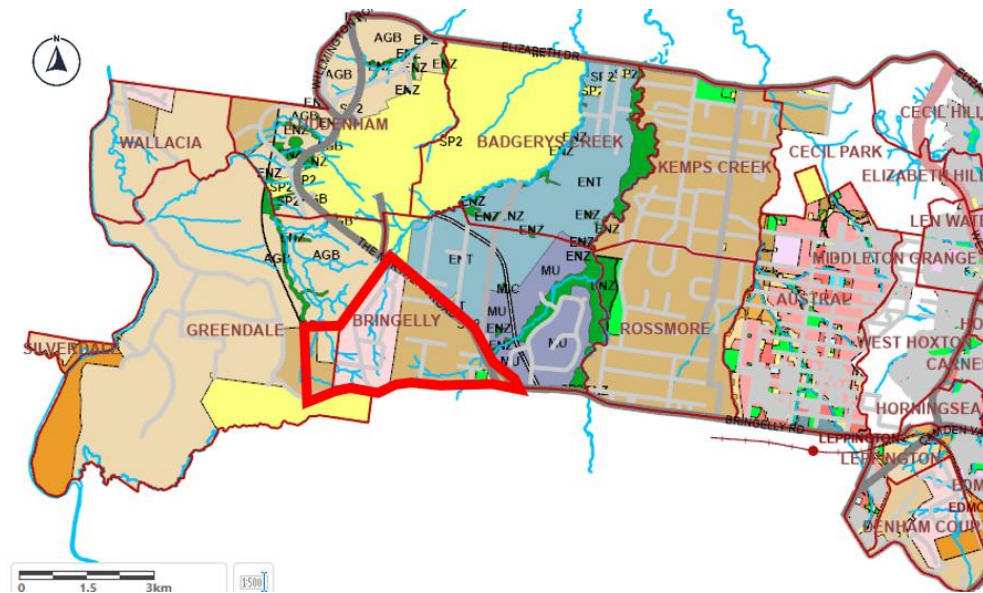
RURAL LANDS STRATEGY**LIVERPOOL
CITY COUNCIL****Dwyer Road**

Figure 16 - Location of Dwyer Road Precinct

Current Context

The Dwyer Road precinct includes parts of Greendale and Bringelly. The precinct is generally bounded by Greendale Road in the south, the Northern Road to the east, the Western Sydney International (Nancy-Bird Walton) Airport to the north and pastoral land holdings to the west. The precinct is largely zoned R5 – Large Lot Residential, RU1 – Primary Production and RU4 – Primary Production Small Lots, with smaller portions being zoned RE1 - Public Recreation and SP2 – Educational Establishment under the *Liverpool Local Environmental Plan 2008*.

The precinct is characterised by a rural residential estate in the R5 Large Lot Residential zone, with livestock grazing and intensive agriculture (poultry) being carried out in the rural zones. Although the Dwyer Road precinct is identified as a non-initial precinct in the Western Sydney Aerotropolis Plan (2020), part of the precinct has been identified as being susceptible to an Australian Noise Exposure Concept (ANEC) rating between 20 and 25. The ANEC rating is a forecast of potential aircraft noise exposure based on various operational scenarios with a rating between 20 and 25 being the lowest.

The locality is also within the 3km and 13km wildlife buffer zones. Livestock processing industries, turf farming and waste or resource management facilities that consist of outdoor processing, storage or handling of organic or putrescible waste are prohibited

LIVERPOOL

RURAL LANDS STRATEGY**LIVERPOOL
CITY
COUNCIL**

in the 3km buffer zone as they attract wildlife. Proposals for specified land uses such as agricultural produce industries, camping grounds and recreation facilities (outdoor) need to be accompanied by a wildlife hazard assessment and a waste management plan for the operation of the use of the land.



Figure 17 - Large lot residential development in Dwyer Road R5 zone (Google Maps)

Vision

The existing character of the precinct is to be maintained until land is rezoned for urban uses as part of the Western Sydney Aerotropolis. Speculative land investment is to be suppressed by identifying agriculture and large-lot residential as the primary land uses in the locality. Consideration should be given to preserving and enhancing the landscape character and environmental values of this area as part of the Metropolitan Rural Area. Particularly, land uses that value add to agriculture and leverage its proximity to urban development such as roadside stalls, outdoor recreation, and farmers markets should be considered within the precinct. Development which is more commercial and industrial in nature is more suited to land which has already been rezoned nearby. Any proposed land uses are to be compatible with environmental and landscape protection, constraints as a result of airport operations, and enhancement of bushland and riparian corridors along creeks.

Recommended Actions (refer to Action and Delivery Plan)

Action 1: Review existing Liverpool Local Environmental Plan (LEP) and Development Control Plan (DCP) provisions for rural land

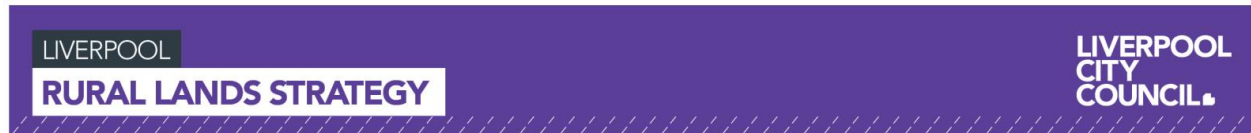
Action 2: Encourage economic use of rural land

Action 3: Review environmental health provisions for rural land

Action 4: Ensure green and blue grid networks are supported

Action 6: Protect rural heritage

Action 8: Manage transition to urban land



Action 9: Increase resources dedicated to handling compliance matters in the rural areas

LIVERPOOL

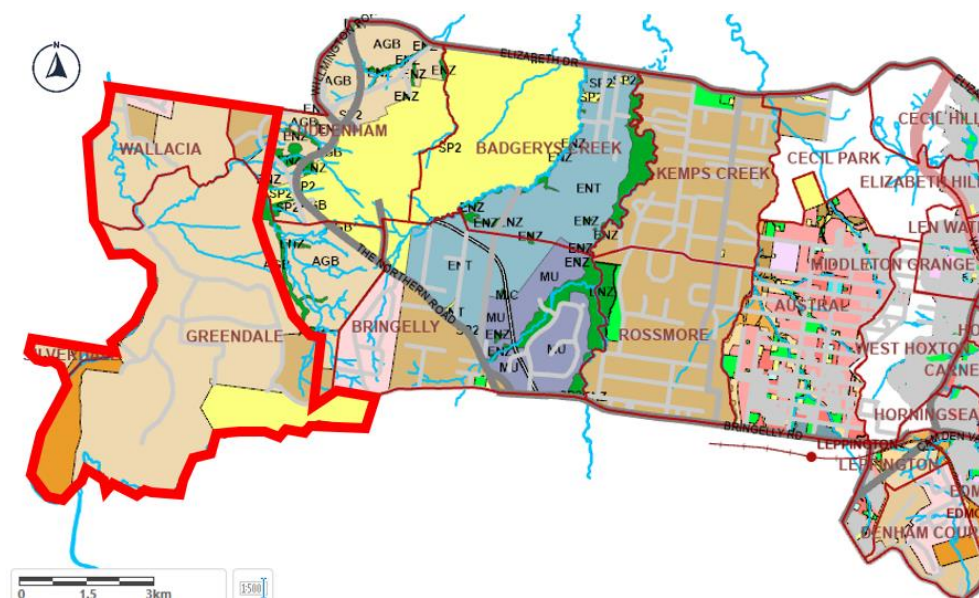
RURAL LANDS STRATEGYLIVERPOOL
CITY
COUNCIL**Western Rural Lands**

Figure 18: - Location of Western Rural Lands Precinct

Current Context

The Western Rural Lands include the suburbs of Silverdale, Greendale, Wallacia and Luddenham. The precinct is generally bounded by Greendale Road, Park Road and the western and southern boundaries of the LGA. The precinct is largely zoned RU1 – Primary Production, with smaller portions being zoned R5 – Large Lot Residential, RU4 – Primary Production Small Lots, C1 – National Parks and Nature Reserves, and SP2 – Educational Establishment under the *Liverpool Local Environmental Plan 2008*.

The precinct is characterised by horticultural land uses on the Nepean River flats, the Bents Basin State Conservation Area in the far southwest and livestock grazing and poultry land uses. There are smaller rural zoned lots and residential uses closer to the town of Wallacia. The four small lots along Greendale Road are undersized with areas ranging from 0.3ha to 0.5ha. Under the provisions of the Liverpool LEP the sites do not meet the minimum lot size criteria of 40ha and require amalgamation under Clause 7.34.

LIVERPOOL

RURAL LANDS STRATEGY**LIVERPOOL
CITY
COUNCIL**

Figure 19 – Horticulture farm in Nepean River floodplain (RM Consulting Group)



Figure 20 – Bent's Basin (Nearmap)

Vision

It is envisioned that existing rural land uses will be maintained and that the Western Rural Lands will be the prime agricultural land within the LGA after the Rossmore and Kemps Creek precincts are rezoned. The minimisation of further land fragmentation is critical in ensuring that residential developments remain on single allotments and that existing enterprises continue to be economically sustainable.

Recommended Actions (refer to Action and Delivery Plan)

Action 1: Review existing Liverpool Local Environmental Plan (LEP) and Development Control Plan (DCP) provisions for rural land

Action 2: Encourage economic use of rural land

Action 3: Review environmental health provisions for rural land

Action 4: Ensure green and blue grid networks are supported

LIVERPOOL

RURAL LANDS STRATEGYLIVERPOOL
CITY
COUNCIL

Action 6: Protect rural heritage

Action 7: Identify the RU1 zone and Metropolitan Rural Area as 'prime' agricultural land

Action 9: Increase resources dedicated to handling compliance matters in the rural areas

Action 10: Investigate placemaking opportunities in Wallacia and Luddenham, including addressing transition of development controls from Liverpool LGA to Penrith LGA and Camden LGA

LIVERPOOL

RURAL LANDS STRATEGY

LIVERPOOL
CITY COUNCIL

Airport/Aerotropolis Core

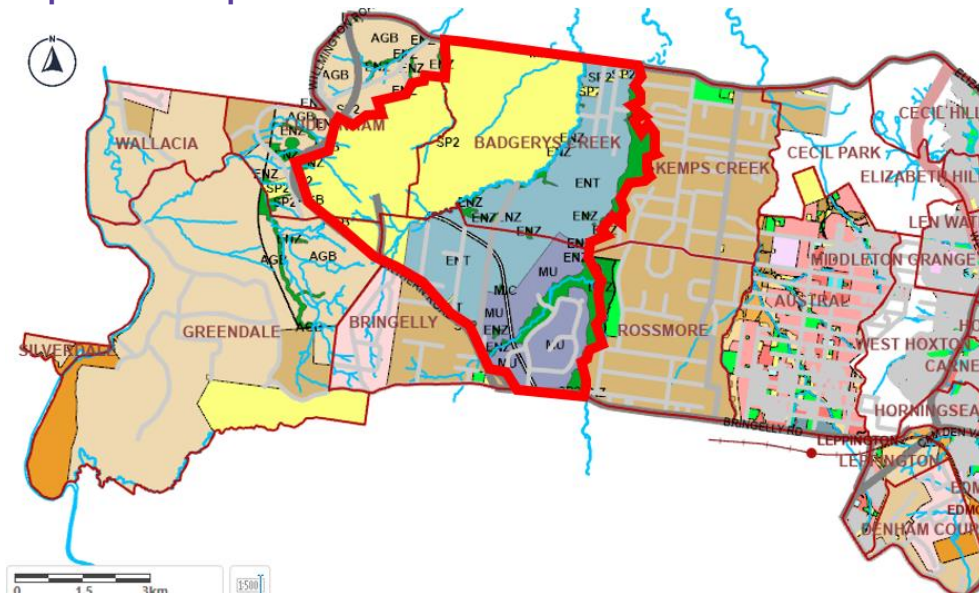


Figure 21: - Location of Airport/Aerotropolis Core Precinct

Current Context

The Airport/Aerotropolis Core precinct includes the suburbs of Badgerys Creek, Bringelly and Luddenham. The precinct is generally bounded by South Creek, Bringelly Road, Elizabeth Drive and the Northern Road.

The precinct is predominantly zoned a combination of SP2 – Infrastructure, ENT – Enterprise, ENZ – Environment and Recreation and MU - Mixed Use under the *State Environmental Planning Policy (Precincts - Western Parkland City) 2021*. Smaller portions of the precinct are zoned SP1 - Commonwealth Activities and AGB - Agribusiness within proximity of the Northern Road.

The precinct is characterised by rural land uses in the vicinity of the airport construction site. Existing allotments in the Enterprise zone are between 2 and 10 hectares, with most lots in the MU zone being less than 2 hectares.

Vision

It is envisioned that this precinct will offer a range of employment uses within the immediate vicinity of the Western Sydney International (Nancy-Bird Walton) Airport. Additional commercial and residential uses will be offered in the Mixed Use zone on the periphery of the Aerotropolis Core. The green and blue grid is to be protected and enhanced as development occurs to enable a cooler and greener city.

Recommended Actions (refer to Action and Delivery Plan)

LIVERPOOL

RURAL LANDS STRATEGY

LIVERPOOL
CITY
COUNCIL

Action 4: Ensure green and blue grid networks are supported

Action 6: Protect rural heritage

Action 8: Manage transition to urban land

Action 9: Increase resources dedicated to handling compliance matters in the rural areas



Figure 22 – Artist's impression of Aerotropolis Core precinct (Department of Planning & Environment)

LIVERPOOL

RURAL LANDS STRATEGY

LIVERPOOL
CITY
COUNCIL

Agribusiness

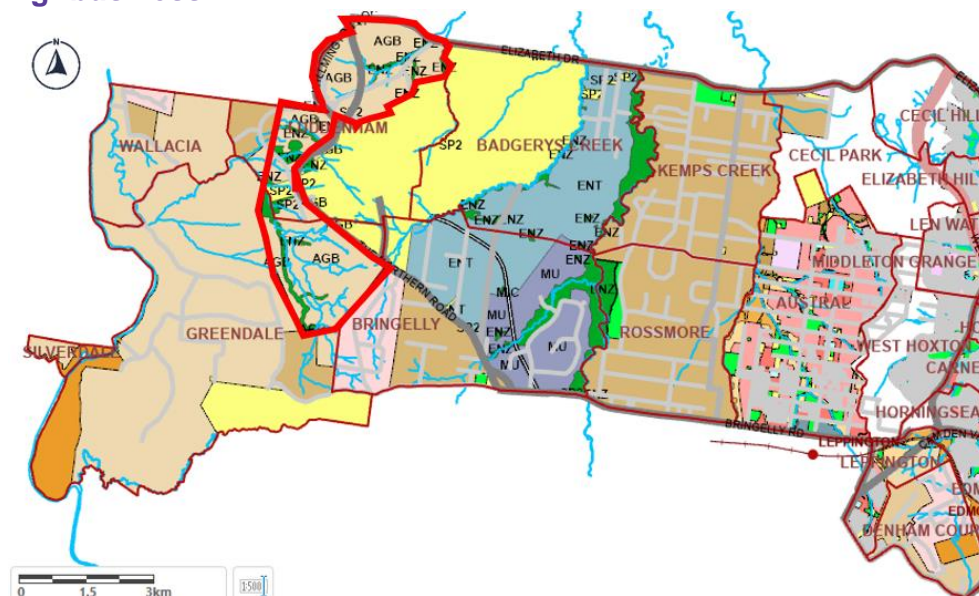


Figure 23 - Location of Agribusiness Precinct

Current Context

The Agribusiness precinct includes the suburbs of Greendale and Luddenham. The precinct is generally bounded by Willmington Road, the Penrith LGA and Elizabeth Drive in the north, the Western Sydney International (Nancy-Bird Walton) Airport in the east, Dwyer Road precinct in the south and the proposed Outer Sydney Orbital to the west. Allotments within the precinct range in size from 1 to 10 hectares and are currently used for agriculture in accordance with existing use rights.

Vision

It is envisioned that this precinct will cater for land uses such as high technology industry, commercial offices, small and medium enterprises, urban services, warehousing and logistics, food technology and research, food production and processing, agribusiness, and fresh food produce markets. The Luddenham Village is contained within this zone. Although, the vision for the village itself will largely be reflected in the precinct planning undertaken by the Department of Planning and Environment, community members have highlighted the importance of the Village's heritage and position as a gateway to the Airport from a tourist and visitor perspective. This should be captured in future plans to guide the growth of the Village.

Recommended Actions (refer to Action and Delivery Plan)

Action 2: Encourage economic use of rural land

Action 3: Review environmental health provisions for rural land

LIVERPOOL

RURAL LANDS STRATEGYLIVERPOOL
CITY
COUNCIL

Action 4: Ensure green and blue grid networks are supported

Action 6: Protect rural heritage

Action 8: Manage transition to urban land

Action 9: Increase resources dedicated to handling compliance matters in the rural areas

Action 10: Investigate placemaking opportunities in Wallacia and Luddenham, including addressing transition of development controls from Liverpool LGA to Penrith LGA and Camden LGA



Figure 24 - Artist's impression of Agribusiness precinct (Department of Planning & Environment)

LIVERPOOL

RURAL LANDS STRATEGY

LIVERPOOL
CITY
COUNCIL

Guiding Criteria for Planning Proposals

Table 3 - Guiding Criteria for Planning Proposals

#	Guiding Criteria	Rationale
1	<i>Proposals are consistent with the rural lands strategy</i>	Proposals that are consistent with the provisions of the Rural Land Strategy, Regional Plan, District Plan, LSPS and WSAP are likely to be supported. Particularly, any rezoning of land outside of the Metropolitan Rural Area, Western Rural Lands and non-initial precincts of the Western Sydney Aerotropolis may be considered with sufficient justification.
2	<i>The proposal fosters planning outcomes which enhances: the economic feasibility of primary industries, rural landscape amenity, and environmental values</i>	The NSW government has identified approximately 8000ha of land to be rezoned for urban purposes as part of the Western Sydney Aerotropolis in the Liverpool LGA. Therefore, any application that seeks to enable additional land uses on rural land outside of the Western Sydney Aerotropolis may be considered, should it demonstrate consistency with existing land use zone objectives or be supported by a comprehensive precinct plan endorsed by a planning authority.
3	<i>Rural activities take precedence</i>	<p>Land Use Conflict Risk Assessment (LUCRA) is a system to identify and assess the potential for land use conflict to occur between neighbouring land uses. It helps land managers and consent authorities assess the possibility for and potential level of future land use conflict.</p> <p>There are four key steps in undertaking a LUCRA.</p> <ol style="list-style-type: none"> 1. gather information about proposed land use change and associated activities 2. evaluate the risk level of each activity 3. identify risk reduction management strategies 4. record LUCRA results. <p>Rezoning proposals justified by a LUCRA may be supported in rural areas where they support agricultural activities.</p>

LIVERPOOL

RURAL LANDS STRATEGY**LIVERPOOL
CITY
COUNCIL**

#	Guiding Criteria	Rationale
4	<i>Economic viability of rural lands is to be enhanced</i>	Productive agricultural land is being lost to encroaching urban sprawl in the Western City District. Facilitation of new, innovative, or complimentary land-uses which support agricultural activity may be accommodated in rural areas, provided that an Economic Impact Study is provided with any rezoning application.
5	<i>New opportunities are supported by adequate infrastructure</i>	Some rural areas don't have access to potable water, sewerage and high capacity electricity networks. Some land-uses will also be challenged by a lack of access to open space, public services, and road infrastructure capable of carrying heavy, or large volumes of traffic. Therefore, proposals that increase demand for such infrastructure must provide a mechanism to enable its delivery.

Action and Delivery Plan

For the purposes of this Strategy, the following short, medium and long-term timeframes have been established for the proposed actions.

Short term: 2023/2024
Medium term: 2023/2024–2026/2027
Long term: 2027/2028+

Table 4 - Action and Delivery Plan

#	Action	Rationale	Deliverable	Timing
1	Review existing Liverpool Local Environmental Plan (LEP) and Development Control Plan (DCP) provisions for rural land	<p>“Landscape Material Supplies” are permitted within the RU1 and RU4 zones. However, development applications lodged for “Landscape Material Supplies” frequently include elements associated with waste resource recovery premises and truck depots. Consideration should be given to reviewing all land uses and objectives in the rural zones to ensure that proposed land uses do not have adverse impacts on the rural precincts.</p> <p>Schedule 1 (Clause 29) of the LEP permits Recreation Facilities (Outdoor) as an additional permitted uses on land at Bringelly, in the R5 zone. Therefore, consideration should be given to permitting</p>	<p>Review existing land use tables, and their objectives and permissible/prohibited uses for RU1, RU2, RU4, RU6 and R5 zones.</p> <p>Consider a Development Control Plan (DCP) amendment to support Clause 4.2 requiring an 88b restriction to ensure that undersized allotments in rural zones are not provided with a dwelling entitlement.</p>	Short Term

		<p>Recreation Facilities (Outdoor) in all R5 zoned land in the LGA.</p> <p>Clause 7.34 of the LEP enables amalgamation of land in Denham Court and Wallacia. Clause 4.2 prohibits the construction of a dwelling house on undersized lots unless they are consolidated with other adjoining lots (in the same ownership and forming part of the same curtilage). However, the LEP does not detail objectives of the prohibition, or how the prohibition should be enforced. Therefore, consideration should be given to reviewing the prohibition.</p> <p>Currently, there are no controls governing the maximum size of farm buildings in rural zones. Large Farm Buildings can interfere with rural amenity and landscapes. Therefore, a maximum floor area needs to be investigated to ensure that any farm building is integrated into the character of its respective locality.</p>	<p>Investigate history of Clause 7.34 and ensure that it is still relevant.</p> <p>Set an appropriate maximum floor area for farm buildings in the LEP or DCP.</p>	
2	Encourage economic use of rural land	<p>The Department of Planning & Environment has implemented planning reforms to ensure agritourism is permitted in the RU1, RU2 and RU4 zones under the Liverpool Local Environmental Plan (LEP) and exempt and complying development codes where agriculture is already permitted.</p>	<p>Educate local businesses, landowners, and industry professionals about the planning reforms.</p>	Short Term

		It is pertinent that Council promotes the opportunities afforded by the planning reforms and complementary land uses that encourage the economic use of land before urban development occurs.	Review existing land use tables, and their objectives and permissible/prohibited uses for RU1, RU2, RU4, RU6 and R5 zones. Review DCP to ensure alignment with agritourism reforms and any proposed complementary land use where required. Review Council's Destination Management Plan to ensure that landowners and patrons can take full advantage of any tourism opportunities in rural areas where appropriate.	
3	Review environmental health provisions for rural land	It has been identified that consideration for impacts of noise, odour, and sewerage management systems require supporting documentation and specific reports for specific development that has the potential to impact upon the amenity of the area.	Review and augment the current Liverpool Local Environmental Plan and Development Control Plan.	Short term
4	Ensure green and blue grid	The rural and scenic lands of Liverpool are serviced by South Creek, Kemps Creek, and the Nepean	Review current Environmentally Significant Land overlay and	Short term

	networks are supported	River. It is important that creek beds and adjoining riparian corridors are protected from encroaching development. Any initiatives to protect vegetation and water ways must be complemented by the key principals of the Cumberland Plain Conservation Plan (CPCP) and Green Grid study to protect local biodiversity values.	implement new riparian corridor and native vegetation maps.in Liverpool LEP and DCP.	
5	Investigate appropriate land-uses in Cecil Park, including addressing transition of development controls from Liverpool LGA to Penrith LGA	In 2020, the Mamre Road Precinct of the Western Sydney Employment Area (WSEA) was released in the Penrith LGA. In 2021, 1400-1480 Elizabeth Drive, Cecil Park was rezoned from RU4 Primary Production Small Lots to IN2 – Light Industrial in the Liverpool LGA. Given the encroachment of industrial uses within Cecil Park, there is scope to investigate opportunities to rezone the remaining rural land in this suburb.	Investigate rezoning opportunities in Cecil Park.	Medium term
6	Protect rural heritage	The rural areas of Liverpool hold evidence of European colonisation and First Nations occupation. Currently, heritage impacts are assessed on a site-by-site basis rather than a single conducive analysis. Scenic or landscape value of our rural areas needs to account for European and First Nations heritage.	Conduct an LGA wide Comprehensive European Heritage review. Conduct an LGA wide Comprehensive Aboriginal Heritage Study.	Medium term

7	<p>Identify the RU1 zone and Metropolitan Rural Area as 'prime' agricultural land</p> <p>The Department of Primary Industries (DPI) guide <i>Planning for Agriculture in Rural Land Use Strategies</i> recommends that the highest quality agricultural land in an LGA should be zoned RU1 - Primary Production.</p> <p>The Metropolitan Rural Area (MRA) has been identified in the Regional and District Plans as an area that has been set aside for rural development.</p> <p>Although the RU4 Primary Production Small Lot zone in Rossmore and Kemps Creek is the highest quality agricultural land in the Liverpool LGA, it will be rezoned for urban purposes in the long term.</p> <p>Therefore, the RU1 zones in the Western Rural Lands are likely to be the remaining agricultural land in the LGA.</p> <p>Accordingly, further fragmentation of landholdings in the RU1 – Primary Production zone are to be minimised to support viable agricultural operations and maintain areas of scenic value.</p>	<p>Suppress speculative land investment by educating landowners about the primacy of agriculture in the Western Rural Lands precincts.</p> <p>Collaborate with the Future Food Systems Cooperative Research Centre and the Sydney Peri-Urban Network (SPUN) to identify key projects that would reinforce and support ongoing agricultural and associated activities, given the importance of supporting and maintaining Sydney's food bowl.</p> <p>Avoid planning proposals that facilitate urban development in the MRA and RU1 zoned land.</p>	Short/ Long Term
8	<p>Manage transition to urban land</p> <p>Rural lands are under pressure to be rezoned for urban purposes. Therefore, it is important that any transition is managed by:</p>	Collaborate with state agencies to ensure infrastructure is ready to be delivered prior to any	Medium/long term

	<ul style="list-style-type: none"> - Maintaining the primacy of agricultural production, and minimise land speculation. - Working with state agencies to develop land release timeframes (for non-MRA precincts). - Advocating for infrastructure planning to occur early in the precinct planning process, to avoid release of precincts when servicing cannot be provided in the near term. - Maintaining the boundary of the Metropolitan Rural Area (MRA). 	<p>rezoning of land from rural to urban.</p> <p>Require applicants to submit a land use conflict risk analysis (LUCRA) where a change of land use is proposed, and an appropriate buffer distance to the MRA and existing rural areas is unable to be achieved.</p>	
9	Increase resources dedicated to handling compliance matters in the rural areas	<p>Council has received an increased volume of complaints and court appeals concerning cut and fill, land clearing, illegal dumping and illegal land uses in rural localities. Therefore, Increased resourcing is required to address these issues.</p>	<p>Organisational review of resources dedicated to enforcing complaints, attending court and issuing fines in accordance with the Local Government Act and planning legislation.</p> <p>Long term</p>
10	Investigate placemaking opportunities in Wallacia and Luddenham, including addressing transition of development	<p>Council LSPS action 16.2 requires this investigation to be undertaken. Any investigation should seek to maintain or enhance the environmental, social and economic values of rural villages as they lie within the Metropolitan Rural Area.</p>	<p>Review and update DCP controls as they relate to rural villages.</p> <p>Long term</p> <p>Working collaboratively with the Western Sydney Planning Partnership, investigate the transition of development controls from the Liverpool LGA</p>

	controls from Liverpool LGA to Penrith LGA and Camden LGA		to Penrith LGA and Camden LGA. Earmark potential sites in Wallacia and Luddenham suitable for placemaking opportunities.	
--	---	--	---	--

**LIVERPOOL
CITY
COUNCIL**

For further information

**Visit Us***Customer Service Centre*

Ground Floor, 33 Moore Street, Liverpool, NSW 2170

Open Monday - Friday, 8.30am - 4.30pm

**Phone**

1300 36 2170

Calling from interstate: (02) 8711 7000

National Relay Service (NRS): 133 677

(for hearing and speech impaired customers)

**Email**

lcc@liverpool.nsw.gov.au

**Post**

Locked Bag 7064, Liverpool BC, NSW 1871

**Website**www.liverpool.nsw.gov.au**Subscribe**www.liverpool.nsw.gov.au/subscribe



LIVERPOOL RURAL LANDS STUDY

FINAL
APRIL 2020Prepared for
Liverpool City CouncilIndependent
insight.



© SGS Economics and Planning Pty Ltd 2020

This report has been prepared for Liverpool City Council. SGS Economics and Planning has taken all due care in the preparation of this report. However, SGS and its associated consultants are not liable to any person or entity for any damage or loss that has occurred, or may occur, in relation to that person or entity taking or not taking action in respect of any representation, statement, opinion or advice referred to herein.

It is noted that the analysis in this report was undertaken prior to the Global COVID-19 Pandemic.

SGS Economics and Planning Pty Ltd
ACN 007 437 729
www.sgsep.com.au
Offices in Canberra, Hobart, Melbourne, Sydney

TABLE OF CONTENTS

GLOSSARY OF TERMS	III
1. INTRODUCTION	1
1.1 Introduction	1
1.2 Project context	1
1.3 Methodology	3
1.4 Study area	4
1.5 Report structure	4
2. OVERVIEW OF THE WESTERN SYDNEY AEROTROPOLIS	7
2.1 Introduction	7
2.2 Planning for the Western Sydney Aerotropolis	11
2.3 Proposed aerotropolis precincts	16
2.4 Planned infrastructure to support the Aerotropolis	23
2.5 Potential impacts on agricultural land	26
3. POLICY CONTEXT	31
3.1 Introduction	31
3.2 State government policy overview	32
3.3 Local government policy setting	34
3.4 Past Rural Lands Studies	35
4. LIVERPOOL CONTEXT	37
4.1 Demographic context	37
4.2 Economic and employment profile	41
5. AGRICULTURAL CONTEXT	68
5.1 Overview	68
5.2 Poultry	71
5.3 Fruit and vegetables	74
5.4 Ornamental Horticulture	78
5.5 Land capability	80
5.6 Impact of the Western Sydney Airport	84
5.7 Future industry scenarios	88
5.8 Key findings: agriculture assessment	94
6. LANDSCAPE CONTEXT	95
6.1 Background and overview of landscape methodology	95
6.2 Overview	97
6.3 Rural landscape precincts	99

6.4 Denham Court	99
6.5 Kemps Creek	101
6.6 Rossmore	102
6.7 Airport Precinct	104
6.8 Agriculture and agribusiness precinct	105
6.9 Western rural lands	107
7. SUMMARY AND RECOMMENDATIONS	109
7.1 Summary	109
7.2 Future directions	111
7.3 Planning principles	112
7.4 Place-based recommendations	114
APPENDIX 1	117
Policy context	
APPENDIX 2	139
Proposed Western Sydney Aerotropolis SEPP land use table	
APPENDIX 3	142
Agricultural land uses across Liverpool	
APPENDIX 4	154
Liverpool LGA output by industry	
APPENDIX 5	155
Land and soil capability assessment scheme: classes	
APPENDIX 6	158
Fertility classes of great soil groups	

GLOSSARY OF TERMS

Term	Definition
ANEC 20	Australian Noise Exposure Concept (ANEC) is a noise exposure chart produced for a hypothetical aircraft usage pattern that describe cumulative aircraft noise during a typical day of aircraft operations. The 20 signifies on average 20 or more events where the noise levels are at or greater than 70 decibels which is considered the level where external noise has no impact on amenity inside your property.
DCP	Development Control Plan
Greater Sydney Region	Defined as the Sydney Metropolitan Area by the Greater Sydney Commission districts
GRSP	Greater Sydney Region Plan
LEP	Local Environmental Plans
LUIIP	Land Use and Infrastructure Implementation Plan
Sydney Airport	Kingsford Smith Airport and surrounding precincts
Sydney Greater Metropolitan Area	Includes the Sydney Metropolitan Area including Greater Newcastle and Wollongong
SPUN	Sydney Peri-urban Network
Western Sydney Aerotropolis; or simply the Aerotropolis	Aerotropolis precincts as defined in the <i>Land Use and Infrastructure Implementation Plan</i> released by the Department of Planning and Environment (2018). NB: Does not include Western Sydney Airport.
WSA or Airport	Western Sydney Airport
WSAP	Western Sydney Aerotropolis Plan
WCDP	Western City District Plan

1. INTRODUCTION

This section provides an overview of the project background and purpose, and identifies the study area.

1.1 Introduction

A core part of this Rural Land Study is to understand the likely effects of the Western Sydney International (Nancy-Bird Walton) Airport project on local agricultural productivity. The project also involves an analysis of current land uses, economic activity, value and contribution to the urban economy, agricultural activity and output, contribution to local and regional food production, rural based tourism, and employment (existing direct and indirect jobs in the rural area).

Building on place-based planning directions from the Greater Sydney Region Plan and WCDP, the study identifies the different landscape qualities of precincts across Liverpool's rural area, highlighting where the aerotropolis and current local plans diverge.

1.2 Project context

Liverpool City Council is undertaking an accelerated review of its *Local Environment Plan 2008* (LEP) to ensure it aligns with the GSRP and the WCDP. This includes preparing several detailed studies to inform the review and interpret local implications of planning priorities listed in the WCDP (see Figure 1 for those relevant to the *Rural Lands Study*).

As part of this process, Council commissioned a Rural Lands Study (this project), to address various actions and requirements set out in the District Plan about rural lands. This work will inform Council's long-term social, economic and environmental vision for its Local Strategic Planning Statement (LSPS), and inform more detailed planning directions in an updated Liverpool Local Environment Plan (LEP) (see Figure 2).

FIGURE 1: RELEVANT WESTERN CITY DISTRICT PLAN PRINCIPLES, STRATEGIES AND ACTIONS



■ Planning principle related to the Western City District Plan vision

■ Planning priority W8, related objectives and actions

■ Planning priority W17, related objectives and actions

Source: Western City District Plan, 2018.

*Planning Priority W8 includes protecting and supporting rural industries. [^]Includes Luddenham, in the Liverpool LGA.

FIGURE 2: KEY STRATEGIC DOCUMENTS THAT INFORM THE RURAL LANDS STUDY PLANNING CONTEXT

Greater Sydney Region Plan (GRSP)	Western City District Plan (WCDP)	Liverpool Local Strategic Planning Statement (LSPS): <i>Connected Liverpool 2040</i>	Liverpool Local Environment Plan (LEP) and Development Control Plans (DCP)
Creates a long-term strategic vision, sets planning principles and objectives for Greater Sydney. Creates an obligation under the <i>Environmental Planning Act 1979</i> for Council to ensure its LEP aligns with the GRSP and WCDP.	Western City District Plan (WCDP) is a 20-year plan to manage growth and achieve the 40-year vision for Greater Sydney. It focuses on planning for infrastructure, liveability, productivity, and sustainability.	The LSPS synthesises a range of studies (including this project) to inform the LEP review. This document sets a long-term social, economic and environmental vision for land use planning across the LGA.	The primary tool councils use to guide planning decisions. LEPs help to shape the character of an area using zoning and other development controls. The <i>Liverpool DCP</i> contains details planning and design guidelines that support the LEP.

Source: SGS Economics and Planning, 2020.

Strategic planning context

The key documents that have informed this Study are the:

- The Western Sydney Airport Land Use and Infrastructure Implementation Plan Stage 1 (LUIIP), 2018
- Draft Western Sydney Aerotropolis Plan, 2019
- Draft Western Sydney Aerotropolis SEPP Discussion Paper, 2019
- Greater Sydney Region Plan, 2018
- Western City District Plan, 2018
- Connected Liverpool (Liverpool City Council's draft LSPS), 2019
- Liverpool Rural Lands Study (2007, 2012)
- Liverpool Local Environment Plan, 2008
- Liverpool Development Control Plan, 2008.

These documents are discussed in more detail throughout the relevant sections of this report:

- Chapter 2: Overview of the Western Sydney Aerotropolis
- Chapter 3: Policy Context
- Chapter 4: Liverpool Context
- Chapter 5: Agricultural Context
- Chapter 6: Landscape Context.

1.3 Methodology

This project has been undertaken from August 2019 to February 2020. Figure 3 shows the project timeline and key tasks.

FIGURE 3: PROJECT TIMELINE AND KEY TASKS



Source: SGS Economics and Planning, 2019.

SGS has undertaken a range of tasks to prepare the Liverpool Rural Lands Study:

- Review the strategic planning and legislative planning context of the rural lands within Liverpool LGA, including the following plans:
 - Metropolis of Three Cities – Greater Sydney Region Plan
 - Western City District Plan
 - Western Sydney Aerotropolis Plan 2019
 - Liverpool Local Environmental Plan 2008
 - Liverpool Rural Lands Studies 2007 and 2012.
- Provide a high-level overview of the Liverpool rural lands, addressing:
 - their context in the metropolitan region and Western City district;
 - physiography and environmental issues; and
 - rural character, culture and functions, including the local rural communities.
- Undertake a detailed desk top analysis of the Liverpool rural lands addressing:
 - current land uses;
 - economic activity, value and contribution to the urban economy;
 - agricultural activity and output;
 - contribution to local and regional food production;
 - rural based tourism; and
 - employment – existing direct and in-direct jobs.
- Analyse future agricultural production and employment potential of the Liverpool rural lands based on current land use controls on 10, 20 and 30 year projections.
- Analyse the contribution of the current Liverpool rural land uses on the biodiversity, sustainability and liveability of the local and metropolitan area.
- Investigate and analyse the impacts and benefits to the local and metropolitan economy, employment (direct and indirect) and food production, arising from the development of the WSA and associated land uses, including residential, as identified in the LUIIP and WSAP, addressing likely development phases and timeframes.
- Investigate the opportunities to retain existing rural land uses and how these activities could value-add in social, environmental and economic terms, recognising the development of the Western Sydney International.

1.4 Study area

The maps overleaf show how the rural area has been broken up for analysis in this project (Figure 4) and how these rural areas overlap with the planning area for the Western Sydney Airport and its precincts (which are identified in Figure 5).

The distinction between the two planning areas is important to understand when looking at possible outcomes for current rural land within the Western Sydney Airport structure plan area, and for the rural area that does not fall into the Western Sydney Airport and Aerotropolis boundary.

1.5 Report structure

The remainder of the report is structured as follows:

Section 1 presents the review of rural lands in Liverpool, focussed on a review of background documents and data, and previous Liverpool Rural Lands studies (2007 and 2012). It outlines landscape character for the rural lands, based on rural precincts identified in the 2012 study.

Section 2 focusses on planning for the Western Sydney Airport and Aerotropolis, and considers what impact the airport, Aerotropolis and proposed agri-business precinct may have on Liverpool's rural area.

Section 3 describes the State and Local policy context.

Section 4 shows the demographic context for Liverpool, and includes information on housing profile, dwelling type as well as the economic and employment profile.

Section 5 provides a comprehensive overview of the agricultural context, including a discussion on land capacity. Current and future impacts of the Western Sydney Airport are also considered, as are future scenarios. The key findings of the agricultural assessment and implications for the study are discussed.

Section 6 provides the landscape context for each precinct.

Section 7 presents a report summary and next steps.

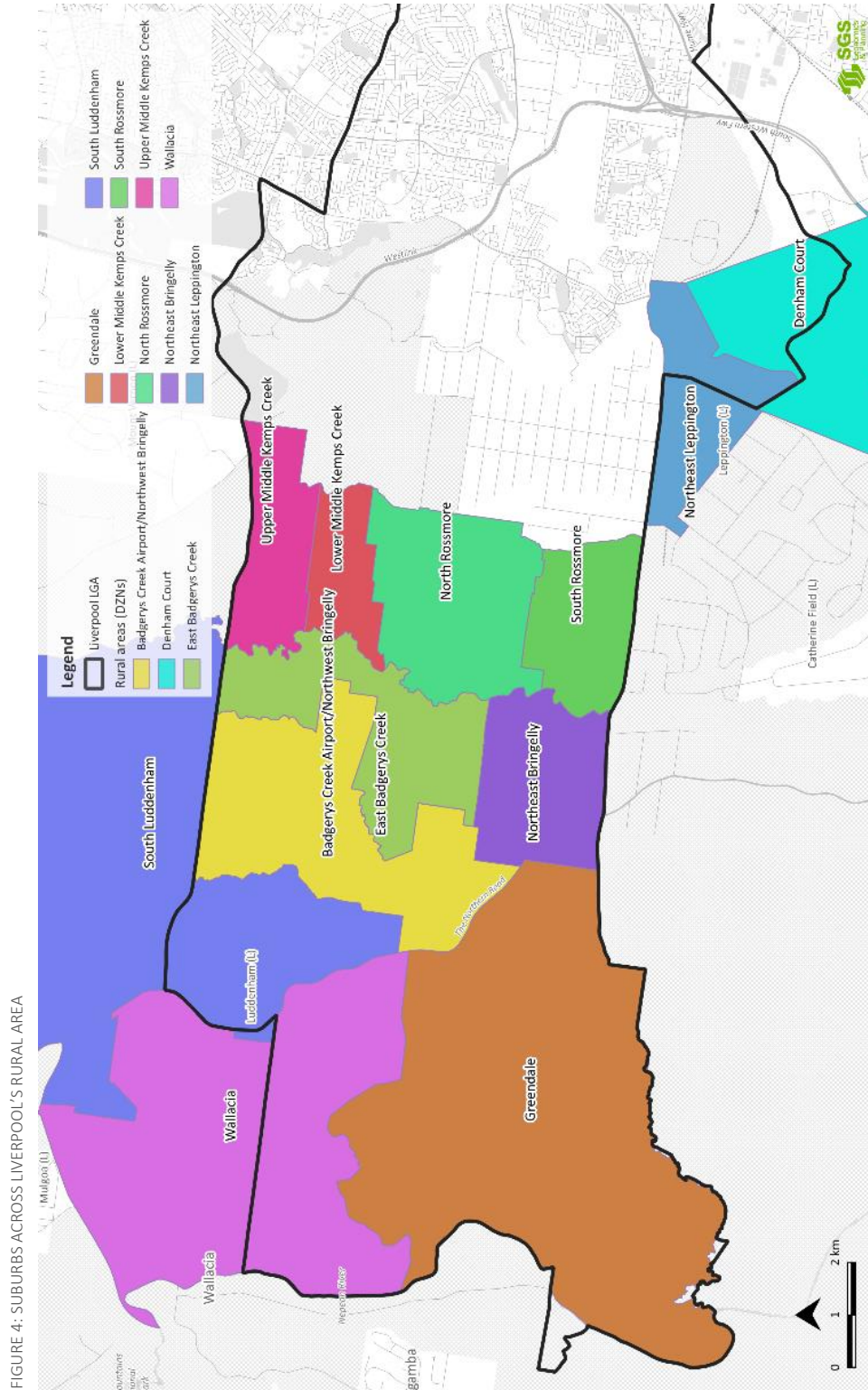
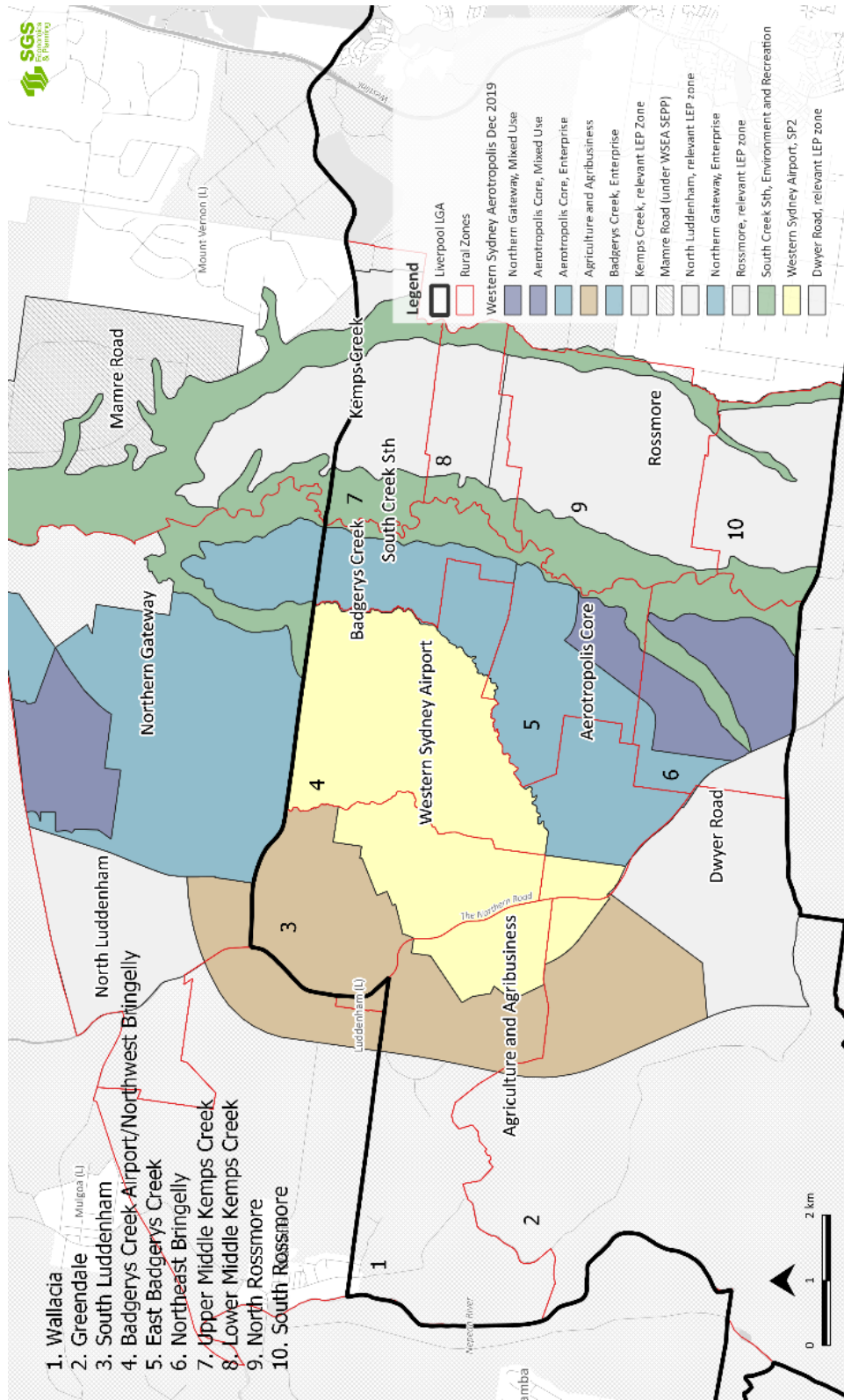


FIGURE 5: LIVERPOOL RURAL AREAS ALONGSIDE THE AEROTROPOLIS PRECINCTS



Source: SGS Economics and Planning, 2019.

2. OVERVIEW OF THE WESTERN SYDNEY AEROTROPOLIS

The Western Sydney Aerotropolis was announced in 2016, and the precincts cover a significant part of Liverpool's rural area. As a result, a key focus of this report is to understand how planning for the airport will affect both rural lands within and outside the Aerotropolis boundary. This chapter considers the planning aspirations for the Aerotropolis, and how Liverpool's rural area may be affected.

2.1 Introduction

Western Sydney Aerotropolis

The proposed Western Sydney Airport and aerotropolis applies to a large part of Liverpool's rural land. The proposal will have a significant impact on the future of the rural area in the LGA. Accordingly, this chapter presents an in-depth review of the NSW Government's *Western Sydney Aerotropolis Plan* (WSAP) (2019) and earlier *Land Use Infrastructure and Implementation Plan* (2018).

The 11,200 hectare Western Sydney Aerotropolis is proposed to become a **significant economic hub for Greater Sydney**, at the heart of the emerging Western Parkland City. An 'Aerotropolis Core' precinct will sit at the centre of the Aerotropolis, containing the new Western Sydney Airport. Its mix of uses, activities, development and places will rely on and be complementary to the operation of the new airport, as a major trade and passenger gateway. Based on the *Western Sydney Aerotropolis Plan* (December 2019), the vision for the Aerotropolis is:

The Aerotropolis accommodates high value jobs closer to where people live. It is an accessible, innovative 24-hour metropolitan centre, connected globally, nationally, locally and digitally.

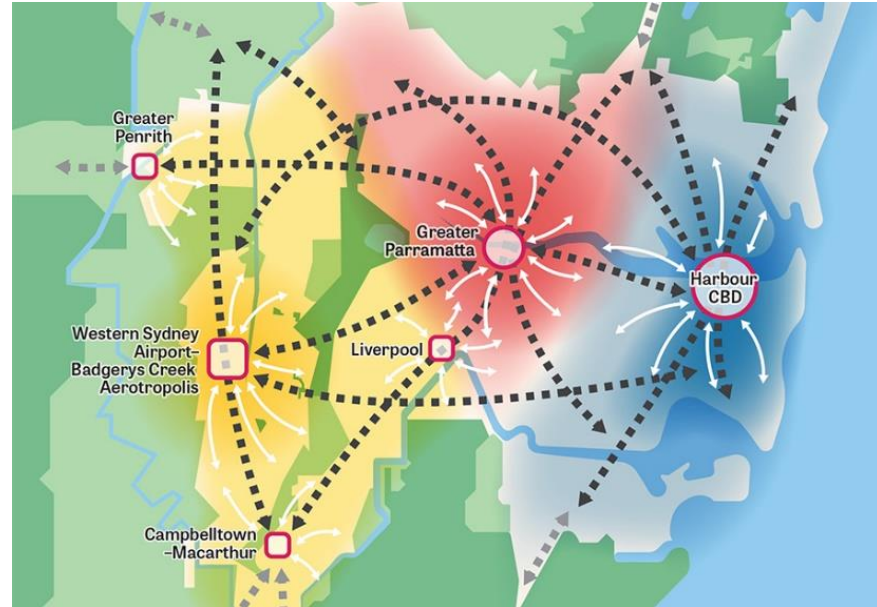
Supporting the vision are several precincts whose core function is to provide housing, employment, and high value agricultural and industrial activity, that could provide diverse export opportunities in the longer-term.

The Aerotropolis is part of metropolitan planning for Sydney underpinned by a need to have multiple 'Sydneys' that serve diverse populations, improve housing affordability and provide better job choice closer to home, for more people in Greater Sydney.

FIGURE 6: WESTERN SYDNEY AEROTROPOLIS



FIGURE 7: HOW THE WESTERN SYDNEY AEROTROPOLIS FITS WITH THE VISION FOR GREATER SYDNEY AS A METROPOLIS OF THREE CITIES



Source: Greater Sydney Region Plan, 2018.

Planning background

The Aerotropolis is a core action from the *Greater Sydney Region Plan* (GRSP) and *Western City District Plan*.

FIGURE 8: PLANNING PROCESS FOR THE AEROTROPOLIS



Source: Western Sydney Aerotropolis Plan, 2019.

The planning process since 2016 progressed with drafting of the *Land Use Infrastructure and Implementation Plan* (LUIIP, Stage 1) (August 2018). The LUIIP identified the new Western Sydney Airport precinct and surrounding Aerotropolis, containing housing and employment precincts. The LUIIP was prepared in the context that the *Greater Sydney Region Plan* confirmed a second airport in Western Sydney at Badgerys Creek, and created a planning framework to enable the project to commence.

Public consultation on the LUIIP took place over 2019, and in late 2019 the *Draft Western Sydney Aerotropolis Plan* (WSAP), draft *State Environmental Planning Policy* (SEPP) *Discussion Paper* and draft *Aerotropolis Development Control Plan* (DCP) (Phase 1) were released. After another round of community consultation, the State government will finalise the *Western Sydney Aerotropolis Plan*, and commence more detailed precinct planning in mid-2020.

Liverpool City Council has a role on the Planning Partnership run by the State government. This is comprised of representatives of all eight Western Parkland City councils as well as Blacktown Council, and representatives from the NSW Department of Planning, Industry and Environment, Transport for NSW, Sydney Water and the Greater Sydney Commission.

However, it will still make a formal submission to the draft WSAP and SEPP for the airport.

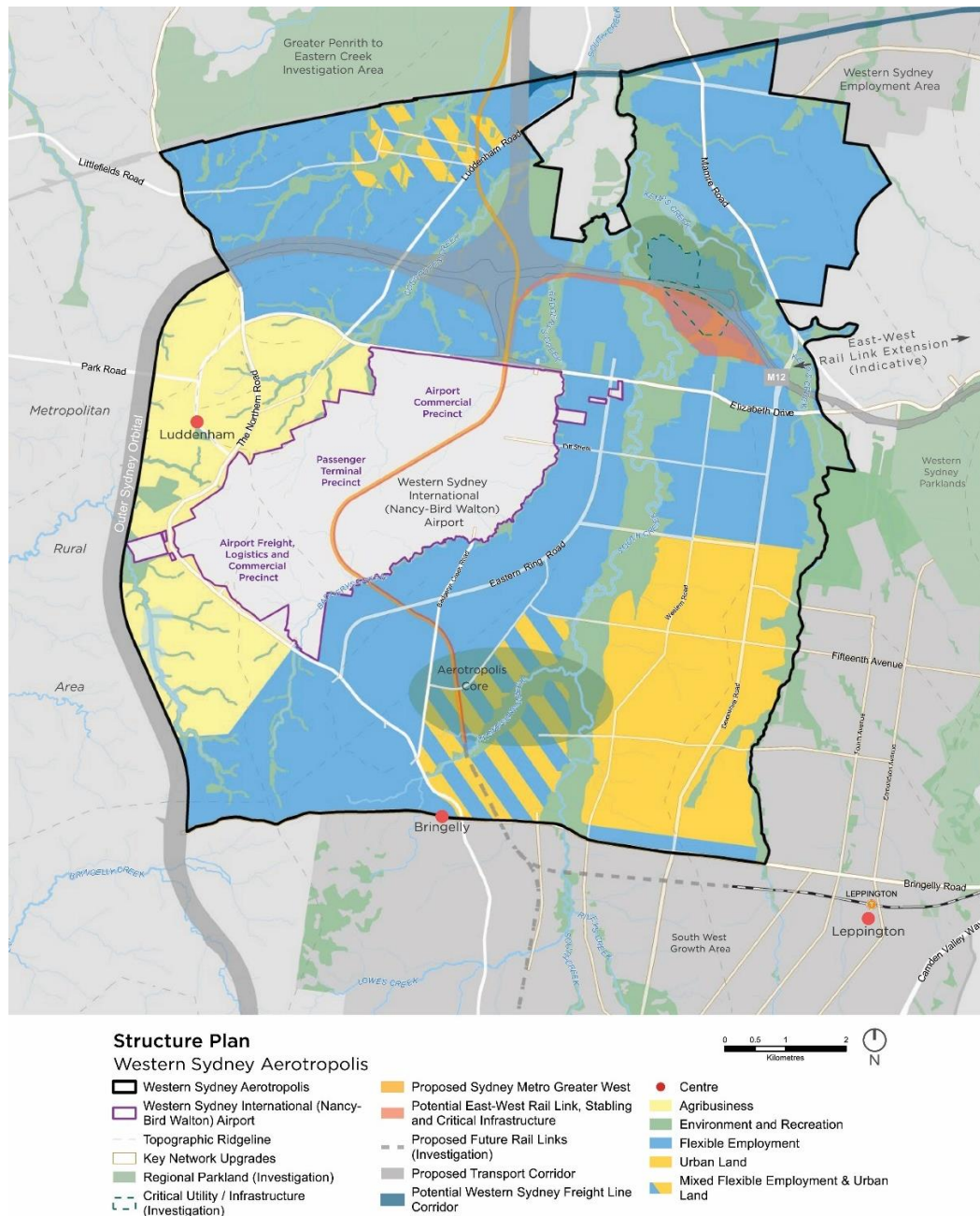
Extent of the Western Sydney Aerotropolis Plan

The *Western Sydney Aerotropolis Plan* applies to a significant part of Liverpool Council's rural area, including successful existing agricultural operations. The plan identifies 10 precincts (see Figure 9), including:

- **Rossmore Precinct** to the south east of the airport which is proposed as a large concentration of mixed living communities and Kemps Creek to the east which is proposed as mixed flexible employment and urban land; and
- The **Agriculture and Agribusiness Precinct** on the western edge of the airport. This area is proposed to support the transition of existing agriculture in the area, as well as the development of new agricultural opportunities, including an agri-port that will provide for the movement and storage of agricultural commodities.
- The **Badgerys Creek** precinct currently contains agricultural activity and has been identified for enterprise activities in proposed WSAP zoning. This precinct is on the eastern edge of the airport.
- The **South Creek-Wianamatta** precinct will become the central element of the Aerotropolis' blue-green grid, running along the South Creek system through the eastern half of the Aerotropolis.

The plan and proposed zoning are further discussed in the next section (Section 2.2).

FIGURE 9: WESTERN SYDNEY AEROTROPOLIS STRUCTURE PLAN



Source: NSW Department of Planning, Industry and Development, Western Sydney Aerotropolis Discussion Paper on the proposed State Environmental Planning Policy, (2019).

2.2 Planning for the Western Sydney Aerotropolis

The draft *Western Sydney Aerotropolis Plan* (WSAP) was released in December 2019, and is the key guiding document that will link transport investment with sequenced precinct planning for the Aerotropolis. It sets out a vision, precinct-specific land use policies and proposed infrastructure. The plan defines and will support detailed precinct planning, to facilitate development in the Aerotropolis and guide public investment in major infrastructure.

There are three documents that advance planning for the Aerotropolis:

- The draft *Western Sydney Aerotropolis Plan* (WSAP)
- *Western Sydney Aerotropolis Discussion Paper on the Proposed SEPP*.
- The draft *Aerotropolis Development Control Plan*.

A summary of each document, and its implications for this *Rural Lands Study*, is outlined in this section. The sequence and relationship between plans are shown in the diagram below, highlighting the current stage.

Western Sydney Aerotropolis Plan, December 2019

The Western Sydney Aerotropolis straddles the Liverpool and Penrith LGAs. The plan sets out precinct priorities for each part of the Aerotropolis, and planning priorities and objectives were informed by local planning. For the Liverpool LGA, the following LSPS priorities were identified as relevant, from *Connected Liverpool 2040*:

- **‘Planning Priority 2:** A rapid smart transit link between Liverpool and Western Sydney International Airport – the FAST Corridor will connect Liverpool to the Aerotropolis and Airport.
- **Planning Priority 13:** A 24-hour Western Sydney International Airport growing to reach its potential – through the Planning Partnership, Council will ensure the Airport’s curfew-free status is protected.
- **Planning Priority 16:** Rural lands are protected and enhanced – an updated Rural Lands Study and protected agricultural land will support the rural economy, ecosystem services and natural landscapes.’

The WSAP aligns with the *Greater Sydney Regional Plan* objectives and directions, creating a more detailed series of planning principles for the Aerotropolis. In its revised format (building on the LUIIP Stage 1), a draft *State Environmental Planning Policy (Western Sydney Aerotropolis)* (SEPP) has been proposed (outlined in more detail in the following section).

The WSAP contains draft precinct plans, which show where new zones are to be applied based on the SEPP, as well as the location (in most cases still high level) of planned infrastructure and the vision and preferred land uses for each precinct. It sets parameters for appropriate, shorter-term development outcomes, while seeking to preserve longer-term opportunities.

In summary:

- Rural uses will be directed west of the airport
- The mixed-use component of the Aerotropolis core will be located outside of the noise exposure contour
- 80 per cent of the land will be used for employment services
- Residential development will be outside of the 20 ANEF¹ area.

The Aerotropolis Structure Plan (Figure 9) identifies the land uses proposed for the Aerotropolis, as set out in WSAP. The Liverpool City Council boundary is along Elizabeth

¹ For land use planning around airports, Australia has adopted the *Australian Noise Exposure Forecast* (ANEF) system, which describes cumulative aircraft noise for an ‘average annual day’. An aircraft noise exposure level of less than 20 ANEF is considered acceptable for the building of new residential dwellings (Department of Infrastructure, Regional Development and Cities, 2019). Some jurisdictions include further noise attenuation requirements based on sensitive land use impacts.

Drive, to the north of the Agriculture and Agribusiness, Western Sydney Airport, Badgerys Creek and Kemps Creek precincts. The Rossmore and Aerotropolis Core precincts are within the Liverpool LGA boundary (Elizabeth Drive forms the LGA's northern boundary).

Draft State Environmental Planning Policy (Western Sydney Aerotropolis)

A draft *State Environmental Planning Policy (Western Sydney Aerotropolis)* is the proposed statutory planning framework for the Aerotropolis. The SEPP aims to:

- 'manage and sequence growth to reflect demand and infrastructure delivery, and
- recognise existing agricultural and agribusiness land uses to be retained, either into the future or in the interim until transitioning precincts are rezoned.'²

The SEPP proposes planning zones that will facilitate development and land use based on precinct-specific controls. The zones will apply to the different Aerotropolis precincts, which overlap with the rural precincts previously identified in Liverpool's 2012 *Rural Lands Study*. The proposed zones that will apply to precincts around the airport are:

- Enterprise Zone
- Mixed Use Zone
- Environment and Recreation Zone
- Agribusiness zone.

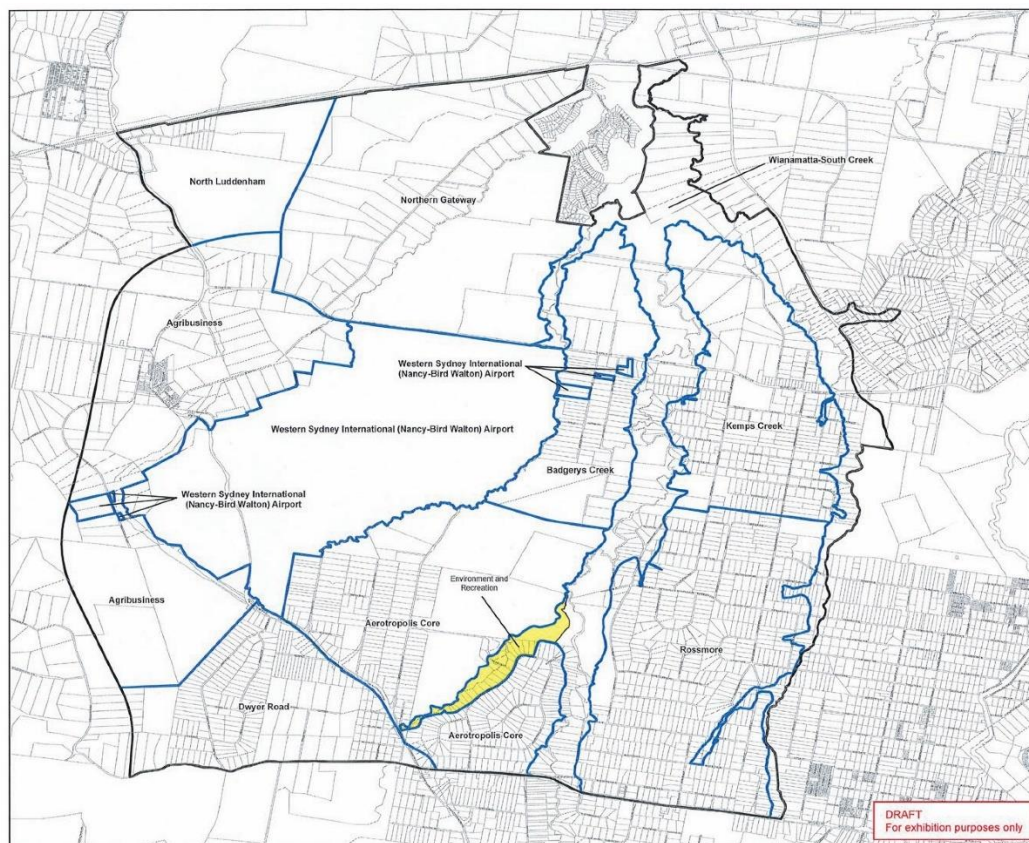
In addition, three special zones will be applied to the airport:

- SP1 Special Activities (Airport) Zone
- SP1 Special Activities Commonwealth Zone
- SP2 Infrastructure Zone.

The Aerotropolis precincts and extent of proposed zones under the new SEPP are shown on maps at Figure 10 and Figure 11. The policy intent is to prepare a flexible policy framework that protects or supports existing land uses, while the precincts are progressively rezoned and as infrastructure is delivered.

² NSW Government, 2019, 'Western Sydney Aerotropolis Discussion Paper on the proposed State Environmental Planning Policy', https://shared-drupal-s3fs.s3-ap-southeast-2.amazonaws.com/master-test/fapub_pdf/A+Aerotropolis/Western+Sydney+Aerotropolis+Discussion+Paper+on+the+proposed+State+Environmental+Planning+Policy.pdf, date accessed 15/01/2019.

FIGURE 10: PROPOSED EXTENT OF THE NEW STATE ENVIRONMENTAL PLANNING POLICY (WESTERN SYDNEY AEROTROPOLIS)



**DRAFT State Environmental
Planning Policy (Western
Sydney Aerotropolis) 20XX**

**DRAFT Land Reservation
Acquisition Map**

- Legend**
- Land Application
 - Land Reservation Acquisition**
 - Environment and Recreation

Source: NSW Department of Planning, Industry and Development, Western Sydney Aerotropolis Discussion Paper on the proposed State Environmental Planning Policy, (2019).

TABLE 1: PRECINCT DIRECTIONS ACROSS LIVERPOOL'S RURAL AREA AND THE AEROTROPOLIS

Zone	Artist's impression of the precinct vision	Description and zone purpose	Future land uses
Infrastructure Zone (Special Purpose 1)		This zone applies to land under Commonwealth ownership, aimed to protect land which will be utilised for the new airport. While this zone will be identified, the land to which it applies is subject to the planning regime stipulated within the Airports Act 1996 (Cth).	<p>The parcel of land to which this zoning applies was acquired by the Commonwealth Government following initial investigations into the site for a new airport between 1986 and 1991. It has not since changed ownership.</p> <p>Land under this zoning will be utilised for the construction and long-term operation of the new international airport and development ancillary to that purpose on Commonwealth land.</p> <p>Areas under this zoning will become the key connections to and from the Aerotropolis and Airport. This will take the form of major road and rail projects, such as the proposed Outer Sydney Orbital.</p>
Infrastructure Zone (Special Purpose 2)		This zone will cover land where key infrastructure is planned, including along Northern Road and Elizabeth Road, connecting to the airport (main road and rail corridors). Until the location of proposed rail corridors is confirmed, the zone will restrict development that is not compatible with proposed infrastructure.	<p>Current zoning for the Badgenys Creek precinct is predominantly RU1 Primary Production. The Aerotropolis Core is mostly covered by RU4 Primary Production Small Lots.</p> <p>The Western Sydney Aerotropolis Discussion Paper indicates that establishing new agricultural uses would be prohibited within this zone, with the exception of existing uses.</p> <p>The intent of this zoning provision is to <i>foster the development of employment lands surrounding the airport and in the Aerotropolis Core</i>. Therefore, the zone will focus on educational, commercial, retail and light industrial land uses.</p> <p>Aircraft noise levels in excess of ANEC 20 will affect the Northern and Eastern sections of the Badgenys Creek and Aerotropolis Core precincts, preventing development of sensitive uses; this may affect the intent that some education-related uses locate in this precinct.</p>
Enterprise Zone		The zone will facilitate development for employment uses and will apply to the Northern Gateway, Badgenys Creek and the Aerotropolis Core precincts. Residential uses are not permitted in this zone. Commercial and industrial uses will support the function of the 24-hour air transport hub.	

Zone	Artist's impression of the precinct vision	Description and zone purpose	Future land uses
Mixed Use Zone		The Mixed Use Zone will include commercial and residential uses. It will be applied to part of the Aerotropolis Core and parts of the Northern Gateway precincts. The vision for this zone is to create high amenity for residents, with excellent access to public transport, open space and waterways. A key focus is on active transport outcomes, and public squares and a range of uses to support vibrant mixed use areas. <i>Note: Commonwealth-owned land located at Bringelly and zoned SP2 Land that is located in 20 ANEC/ANEF will not be zoned as mixed use. under the Liverpool Local Environmental Plan 2008, is proposed to be zoned for mixed use purposes. The Commonwealth government has agreed to enable the development of this land to help build the Western Parkland City.</i>	Areas earmarked for future Mixed Use zoning within the Liverpool LGA are predominantly zoning RU4 Primary Production Small Lots. Rural uses will no longer be permitted. Existing use rights will apply to all current uses. Predominant land uses will transition to residential and ancillary population-serving uses, including retail, community facilities and services etc. A diverse range of urban uses will be permitted, including multiple residential typologies, commercial and light industrial.
Environment and Recreation Zone		The Environment and Recreation Zone will apply to lands that are identified for their biodiversity values. Its purpose will be to support water management, environmental protection, amenity and recreation; it will be applied along the Thompsons Creek and other creekline riparian corridors. The zone will also apply to land affected by a 1:100 year flood AEP. The zone's controls prohibit high-quality native vegetation clearing.	The Wianamatta-South Creek Precinct, which will account for most of the Environment and Recreation Zone, is currently governed by a number of zones, with RU4 Primary Production Small Lots, RE1 Public Recreation and SP2 Infrastructure the most widespread. The future land uses within this zone will be concerned with the preservation and cultivation of natural assets and open space. The scope of permitted uses is quite narrow within this zone, with no residential, commercial, industrial or rural uses permitted. Parts of this zone will be classified for environmental conservation, with additional regulation preventing activities or uses which degrade natural value.
Agribusiness Zone		This zone will permit agricultural uses such as rural industry and intensive plant agriculture. The zone will apply land in the Agribusiness precinct, including Luddenham Village. The zone's purpose is to support the existing agricultural lands as well as delivering fresh produce to domestic and international markets (via the airport). Residential uses will be permitted on land outside the 20 ANEC/AEF.	This land is within the Metropolitan Rural Area (MRA). The existing zoning is RU1 Primary Production and RU4 Primary Production Small Lots. Under current zoning provisions, Extensive Agriculture is not a permissible land use. Current policy supports the long-term retention of agricultural uses, encouraging intensification of agricultural practices. Permitted uses are contained to mostly rural/agricultural in nature, with some scope for warehousing, logistics and other industrial uses. Residential development ancillary to rural uses will be permitted, subject to aircraft noise levels (< ANEC 20). Although Luddenham Village is contained within this zone, the vision for the village itself will be largely determined during precinct planning. Large parts of the Agribusiness Zone are also within the Metropolitan Rural Area (MRA), outside the established and planned urban area.

Source: Western Sydney Aerotropolis Plan, 2019, images sourced from State Government WSAP-related materials published online for each precinct: <https://www.governmentnews.com.au/stage-set-for-aerotropolis-precinct-rezone/>, <https://www.governmentnews.com.au/stage-set-for-aerotropolis-precinct-rezone/>, and <https://www.youtube.com/watch?v=G-OKXusy70>.

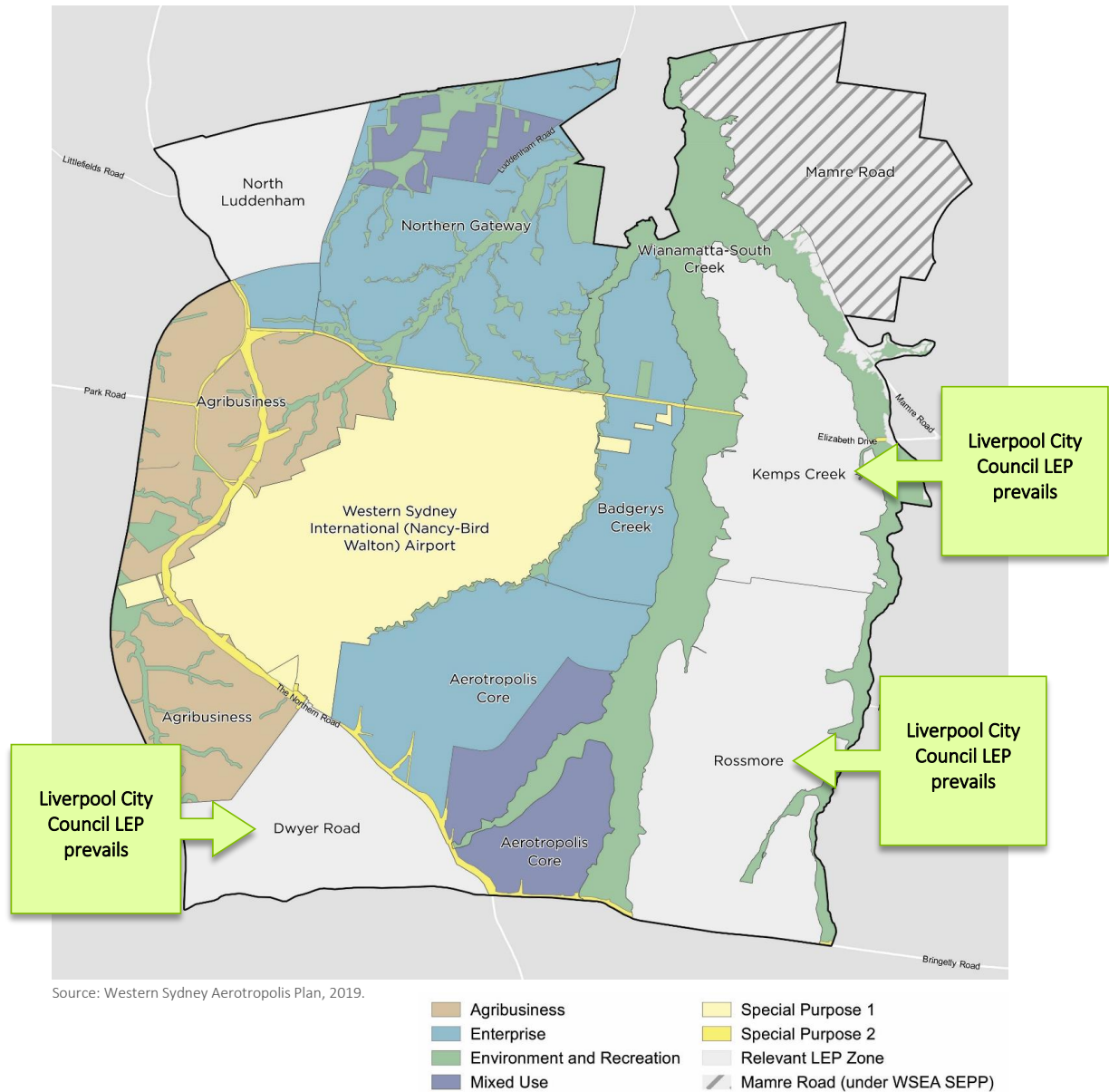
2.3 Proposed aerotropolis precincts

The WSAP nominates ten precincts for the Western Sydney Aerotropolis (Figure 11). The draft WSAP contains high level objectives, and proposed zones for each precinct. More detailed precinct plans will soon be developed for each area, containing objectives and recommendations.

Of the ten proposed, seven precincts that are relevant to *Liverpool Rural Lands Study*. The intent of these of the precincts is briefly summarised below, alongside the local planning principles (where available) from Liverpool City Council's 2012 *Rural Lands Study*.

The state and local planning context for Liverpool's rural area is presented in Chapter 3 of this report.

FIGURE 11: WESTERN SYDNEY AEROTROPOLIS PRECINCTS AND PROPOSED ZONES

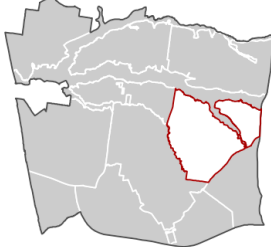


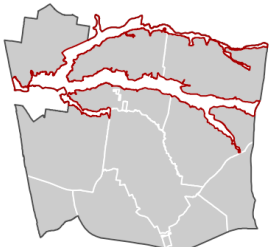
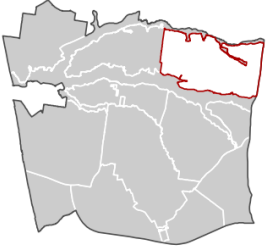
Aerotropolis precinct vision and aims in State and local policy

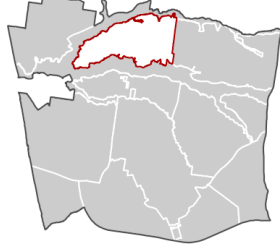
The table below provides an overview of the current Aerotropolis vision, and aims, for each precinct, compared to Liverpool directions set out in the Rural Lands Study 2012. It includes any directions arising from the draft LSPs (Connected Liverpool 2040). Further information about precinct-specific land uses permitted under the draft SEPP (Western Sydney Aerotropolis) zones for each precinct is attached at Appendix 1.

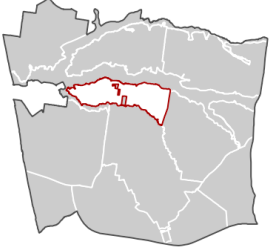
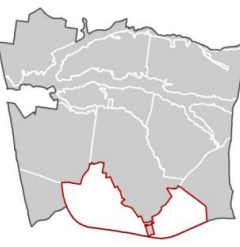
It should be noted that the 2012 *Rural Lands Study* was written without certainty surrounding the future of the Badgerys Creek Airport. During the study's preparation, the Federal Government had indicated an intention not to proceed with construction of the airport on this site, leading authors of the 2012 study to recommend that Council seek removal of ANEF contours. However, the study notes that Badgerys Creek was still the most probable site for a new airport should one be developed, due to its proximity to the M7 motorway and South West Rail Link. Council's 2019 LSPs review, *Connected Liverpool 2040*, recognises the Western Sydney Aerotropolis and key infrastructure precincts; where relevant these overlap an existing rural area, those priorities have been listed in the table.

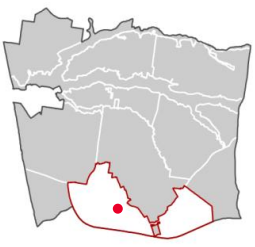
TABLE 2: PLANNING FOR EACH AEROTROPOLIS PRECINCT, ALONGSIDE LIVERPOOL CITY COUNCIL OBJECTIVES

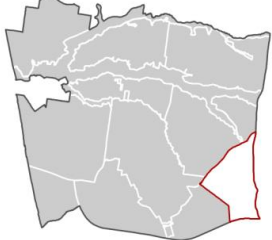
Location	Aerotropolis policy	Rural Lands Study (2012)	Draft LSPs, other local strategy/policy
Aerotropolis Core Precinct vision: <i>The Aerotropolis Core will be a diverse, dynamic and sustainable global airport city.</i>	 <p>Total area: 1,382 ha</p> <p>Draft SEPP: Special Purpose 1 (Airport), Enterprise, Mixed Use Planned role: Metropolitan core Jobs: +50,000—60,000 Residents: +20,000—24,000 Dwellings: +8,000 homes Timeframe: Identified by the Aerotropolis Plan as an initial precinct, to be developed surrounding a new Sydney Metro station, set to be opened in 2036.</p> <ul style="list-style-type: none"> Major metropolitan 24-hour, vibrant global centre and robust economy built around professional services, high technology-advanced manufacturing, research, training, education and creative industries Aerospace and defence land use cluster on airport fringe Aviation-related industries Tourism/conference centre at airport STEM education Significant residential development capacity in areas adjoining the precinct outside the Aerotropolis Residential development, retail, sports facilities, commercial offices, health services, to achieve a high-amenity precinct for business and residents Area of Commonwealth-owned land within the mixed-use precinct (to be developed and designed by the Aerotropolis Authority) Infrastructure (to be investigated): Rapid bus connections to Liverpool, Greater Penrith, Blacktown and Campbelltown—Macarthur, rail connections to St Marys, Parramatta, Leppington and Macarthur 	Liverpool Rural Precinct: Airport <ul style="list-style-type: none"> The Aerotropolis Core is in the Badgerys Creek Airport rural precinct Few land use constraints identified that would development feasibility (e.g. noise exposure impacts) Moderate agricultural capacity Class 3 soil capability As recommended a 10-hectare minimum subdivision lot size has been applied to ensure consistency with other RU4-zoned land (Small lot primary production) 	Current zone: Special Activities, Large Lot Residential, Primary Production Small Lots Draft LSPs: <ul style="list-style-type: none"> Planning Priority 2: A rapid smart transit link between Liverpool and Western Sydney International Airport – The FAST Corridor will connect Liverpool to the Aerotropolis and Airport Planning Priorities 11,12 and 13 focus on leveraging the airport's development to generate employment and develop employment lands surrounding the airport Planning Priority 12 focuses on ensuring the airport's curfew free status is protected Advocacy for an Aerotropolis stop on future railway extensions.

Location	Aerotropolis policy	Rural Lands Study (2012)	Draft LSPS, other local strategy/policy
Wianamatta-South Creek  Total area: 1,392 ha	<p>Draft SEPP: Environment and Recreation</p> <p>Planned role: Recreational area / conservation zone.</p> <p>Jobs: Minimal</p> <p>Residents: 0</p> <p>Timeframe: Identified by the Aerotropolis Plan as an initial precinct, it will define the structure of the Aerotropolis.</p> <ul style="list-style-type: none"> Green-blue spine within the Environmental Zone and Recreation Zone Preserve and enhance the South Creek waterway through maintenance and planning Plan follows the 1:100-year flood extent with a wider application to enable space for recreation uses Focus on landscape and environmental values/health (tree canopy, waterway, riparian, reforestation), along the Wianamatta-South Creek Catchment Focus on Elizabeth Drive as the main approach to the Airport Fifteenth Avenue to be upgraded to an attractive landscaped boulevard Scope for restaurants and cafes, community and cultural facilities as well as open space and recreation land uses 	<p>Liverpool Rural Precinct: Airport, Kemps Creek, Rossmore</p> <ul style="list-style-type: none"> Land fragmentation should be avoided in this area Minimum lot size was retained as per the lot size controls in the Liverpool LEP 2008 (Refer to Chapter 3) 	<p>Current zone: Primary Production, Primary Production Small Lots, Infrastructure, Special Activities</p> <p>Draft LSPS:</p> <ul style="list-style-type: none"> Designated as a protected green corridor within the Draft Structure Plan Planning Priority 14: Bushland and waterways are celebrated, connected, protected and enhanced.
Rossmore 	<p>Draft SEPP: (Relevant LEP Zone)</p> <p>Total area: 1,361 ha</p> <p>Jobs: N/A</p> <p>Population: N/A</p> <p>Time frame: Not an initial precinct, timing of delivery will be determined by the timing of infrastructure provision and the amount and nature of development in adjoining areas following the airport's opening.</p> <ul style="list-style-type: none"> Mixed-use precinct will provide social, cultural and connected active streets The area will be used to support existing agricultural operations as interim uses Housing and jobs provided around centres Flexible employment lands for aerospace, defence and high technology industries with a campus-style setting along with freight and logistics Fifteenth Avenue as a shaded landscaped transport boulevard with public transport priority Local employment and live/work opportunities in local centres and along key corridors such as Fifteenth Avenue 	<p>Liverpool Rural Precinct: Rossmore</p> <ul style="list-style-type: none"> Avoid land fragmentation Support ongoing activities in line with the existing zone Minimum lot sizes should be retained at 10 ha, as per the lot size controls in the Liverpool LEP 2008 	<p>Current zone: Primary Production Small Lots</p> <p>Draft LSPS:</p> <ul style="list-style-type: none"> Planning Priority 2: A rapid smart transit link between Liverpool and Western Sydney International Airport Planning Priority 16: The Rural Lands are protected and enhanced. On the route of the Fifteenth Avenue Smart Transit Corridor. Designated as within the Aerotropolis in the Draft Structure Plan, despite not being an initial precinct. This area will not fall (initially) under the jurisdiction of an Aerotropolis SEPP, and Council should therefore continue planning for the future on the basis that development control will fall under Council jurisdiction (see Chapter 6 and 7).

Location	Aerotropolis policy	Rural Lands Study (2012)	Draft LSPs, other local strategy/policy
	<ul style="list-style-type: none"> Higher-density development along Fifteenth Avenue transport nodes, recognising its role as a centre serving corridor Desired land uses: Residential, Small and medium enterprises, Creative industries, High technology industries, Urban services, Community and cultural facilities, Market gardens, Local health and education, retail, open space, schools Strategic direction advocates for “flexible zones” to achieve the precinct vision 		
Kemps Creek 	<p>Draft SEPP: (Relevant LEP Zone)</p> <p>Total area: 906 ha</p> <p>Jobs – N/A</p> <p>Population – N/A</p> <p>Time frame – Not an initial precinct, timing of delivery will be determined by the timing of infrastructure provision and the amount and nature of development in adjoining areas following the airport’s opening.</p> <ul style="list-style-type: none"> Liverpool City Council will progress the planning for Kemps Creek Employment precinct will aim to attract industries that are looking for more affordable out of centre accommodation Smaller innovative industries and creative industries Mixed business area Aerospace, defence and high technology industries with a campus style setting along with freight and logistics Small and medium enterprises, Creative industries, High technology industries, Urban services Proposed M12 Motorway and east-west rail link, including a potential stabling and maintenance facility Focus on connections between Kemps Creek and precincts to the west, with cycle paths and the extension of the local road network. 	<p>Liverpool Rural Precinct: Kemps Creek</p> <ul style="list-style-type: none"> Avoid further land fragmentation Minimum lot sizes should be retained at 10 ha, as per the lot size controls in the Liverpool LEP 2008 Impending release as part of SWGC 	<p>Current Zone: Primary Production Small Lots</p> <p>Draft LSPs:</p> <ul style="list-style-type: none"> Planning Priority 14: Bushland and waterways are celebrated, connected, protected and enhanced. Planning Priority 16: The Rural Lands are protected and enhanced. Designated as within the Aerotropolis in the Draft Structure Plan, despite not being an initial precinct. This area will not fall (initially) under the jurisdiction of an Aerotropolis SEPP, and Council should therefore continue planning for the future on the basis that development control will fall under Council jurisdiction.

Location	Aerotropolis policy	Rural Lands Study (2012)	Draft LSPS, other local strategy/policy
<p>Badgerys Creek</p>  <p>Draft SEPP: Enterprise Total area: 612 ha Jobs: 9,000 – 11,000 Population: 0 Timeframe: An initial precinct used to support the infrastructure that enables the construction of the Airport and Aerotropolis. Some land uses, buildings and structures may be temporary in the short to medium term and transition to higher order uses in the longer term.</p> <ul style="list-style-type: none"> ▪ Range of employment uses that do not require public transport ▪ Uses that will benefit from being close to airport and the new centres ▪ Early release to ensure that infrastructure is delivered to support the airport ▪ Desired land uses: Defence and aerospace, advanced manufacturing activity, high technology industry, airport supporting development, local retail, Aerotropolis-enabling industries, modernised resource recovery industries, light industrial, social infrastructure ▪ Interface treatments may be required between existing rural industries and new land uses until they either transition to other uses or are modernised to co-exist with adjoining land uses ▪ Opportunity for heavier industries which require larger buffers to more sensitive uses 	<p>Liverpool Rural Precinct: Airport (part) (Badgerys Creek)</p> <ul style="list-style-type: none"> ▪ Retain existing RU1 <p>This will provide greater redevelopment opportunities for the South West Growth Corridor</p>		<p>Current Zone: Special Activities, Primary Production</p> <p>Draft LSPS:</p> <ul style="list-style-type: none"> ▪ Planning Priority 16: Rural lands are protected and enhanced – an updated Rural Lands Study and protected agricultural land will support the rural economy, ecosystem services and natural landscapes ▪ Planning Priorities 11,12 and 13 focus on leveraging the airport's development to generate employment and develop employment lands surrounding the airport ▪ Planning Priority 12 focuses on ensuring the airport's curfew free status is protected.
<p>Agriculture and Agribusiness Precinct</p>  <p>Draft SEPP: Agribusiness, Environment and Recreation Total area: 1,572 ha Jobs – 8,000 to 10,000 Population– minimal Time frame – An initial precinct, with current agricultural uses will be maintained, and then gradually developed and intensified following commencement of Airport operations.</p> <ul style="list-style-type: none"> ▪ Notes productive soil and 'reliable water supply ▪ Support the transition of existing agriculture in the area ▪ Development of new agricultural opportunities (including an Agri-port) that will provide for the movement and storage of agricultural commodities ▪ Dairying, poultry farming, intensive horticulture, food processing and food research and technology ▪ Potential for fresh food markets that benefit from connections to the Airport ▪ Residential uses are only permissible if ancillary to agriculture 	<p>Liverpool Rural Precinct: Agribusiness</p> <ul style="list-style-type: none"> ▪ Land use patterns should reflect agricultural industries ▪ Minimum lot sizes should be retained at 40 ha, in line with the controls of the LEP 2008 ▪ Continue to pursue the State and Federal Government regarding future land use options for the Badgerys Creek Airport land reservation 		<p>Current zone: Primary Production and Primary Production Small Lots</p> <p>Draft LSPS:</p> <ul style="list-style-type: none"> ▪ Planning Priority 16: Rural lands are protected and enhanced. Reiterates the value of agricultural enterprise in light of the airport's construction, highlighting the role of the Agribusiness precinct. ▪ Planning Priorities 11,12 both reference the opportunities for agribusiness in light of the airport's development.

Location	Aerotropolis policy	Rural Lands Study (2012)	Draft LSPS, other local strategy/policy
	<p>Planning for this precinct has changed direction since the LUJP:</p> <ul style="list-style-type: none"> ▪ Agricultural and Agribusiness precinct should be complementary and not diminish or impact ongoing agriculture/industry operations and clusters ▪ Agricultural viability is important now and into future ▪ Planning must consider biosecurity, water supply/demand and access, competition and land use conflicts ▪ Transition of existing agricultural lands to alternative uses is not envisaged in current planning ▪ These issues will be considered as long-term planning for the Aerotropolis is reviewed and monitored <p>In the WSAP:</p> <ul style="list-style-type: none"> ▪ Agribusiness precinct area reduced to account for the Dwyer Road Precinct, to support airport functions ▪ Desired land uses: High technology industry, Commercial offices, Small and medium enterprises, Urban services, Warehousing and logistics, Food technology and research, Food production and processing, Agribusiness and Fresh food produce markets 		
Luddenham Village	 <p>Draft SEPP: Agribusiness</p> <ul style="list-style-type: none"> ▪ Establish and understand the rate of change and expectations of the local community of the area ▪ Understand How the communities would like to 'integrate with the Aerotropolis' ▪ Protect the character and history of the Luddenham Village 	<p>Liverpool Rural Precinct: Luddenham</p> <ul style="list-style-type: none"> ▪ Luddenham village boundary should be maintained within the R2 (Rural landscape) zoning limits ▪ Potential expansion of R5 and RU4 Zones to the South once ANEF contours are deleted. ▪ It is recommended that zoning limits not be expanded within the village or to the South/East unless ANEF contours are deleted ▪ Scenic value of hills to the East is noted. 	<p>Current zone: Large Lot Residential, Neighbourhood Centre</p> <p>Draft LSPS:</p> <ul style="list-style-type: none"> ▪ Marked as a retail centre within the structure plans.

Location	Aerotropolis policy	Rural Lands Study (2012)	Draft LSPS, other local strategy/policy
Dwyer Road Precinct 	<p>Draft SEPP: (Relevant LEP Zone) Total area: 748 ha People – N/A Jobs – N/A Timeframe – Not an initial precinct, Dwyer Road will gradually transition from agricultural to flexible employment uses over time.</p> <ul style="list-style-type: none"> Support the operations of the precinct and transition from agriculture to flexible employment uses Encourages future application of 'flexible zoning' to achieve strategic outcomes <p>Consider the existing rural village character of Bringelly, and manage the interface with the South West Growth Area.</p> <p>It should be noted that a portion of the Dwyer Road Precinct is within the MRA. This produces some inconsistency within the aerotropolis policy over whether land use will be intensified or retained.</p>	<p>Liverpool Rural Precinct: Bringelly</p> <ul style="list-style-type: none"> Rezone land from RU1 to RU4, applying a minimum subdivision lot size control of 10 Ha. This is supported as only a small part of the precinct is affected by the ANEF contours. Land is also only marginally affected by land use constraints in terms of flooding and environmental significance. 	<p>Current Zone: Large Lot Residential, Primary Production, Primary Production Small Lots</p> <p>Draft LSPS:</p> <ul style="list-style-type: none"> Planning Priority 16: Rural lands are protected and enhanced – an updated Rural Lands Study and protected agricultural land will support the rural economy, ecosystem services and natural landscapes Planning Priorities 11,12 and 13 focus on leveraging the airport's development to generate employment and develop employment lands surrounding the airport Planning Priority 12 focuses on ensuring the airport's curfew free status is protected Designated as within the Aerotropolis in the Draft Structure Plan, despite not being an initial precinct. This area will not fall (initially) under the jurisdiction of an Aerotropolis SEPP, and Council should therefore continue planning for the future on the basis that development control will fall under Council jurisdiction.

Source: SGS Economics and Planning, 2019, based on the WSAP (2019), Rural Lands Study (2012), Liverpool Draft LSPS (2019).

2.4 Planned infrastructure to support the Aerotropolis

Overview

Strategic aspirations for WSA and the Aerotropolis are supported by planned major transport infrastructure, as outlined in the NSW Government's *State Infrastructure Strategy* and long-term transport plan, *Future Transport 2056*.

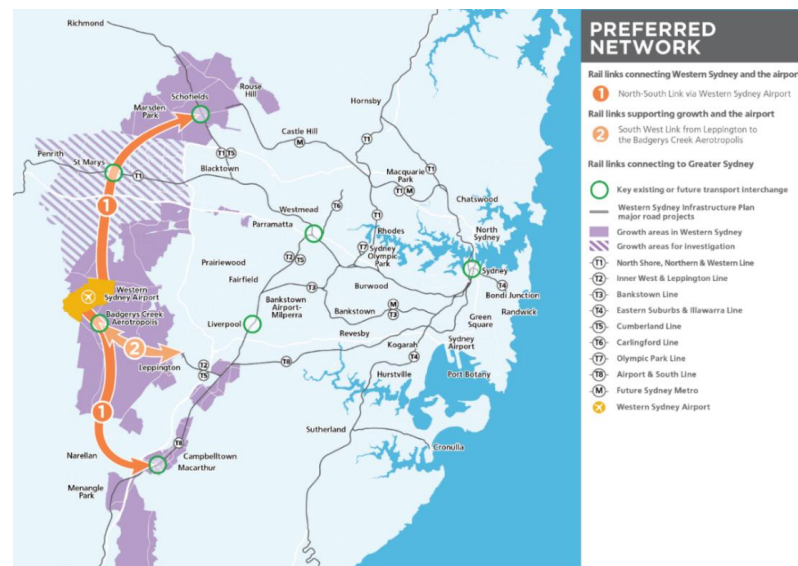
Passenger railways

The need for rail infrastructure in Western Sydney was investigated in the *Western Sydney Rail Needs Scoping Study*, which informed the initiatives discussed in *Future Transport 2056*. The scoping study identified the need for a north-south rail link between Rouse Hill and Campbelltown-Macarthur, connecting the growth areas in the north-west and south-west of Sydney to the future economic engine of WSA and the Aerotropolis. The need for a connection from the South-West Rail Link at Leppington to the Aerotropolis is also identified. A further connection to WSA from Parramatta is also identified in *Future Transport 2056* to be investigated as a long-term project. This will further improve the accessibility of WSA and its attractiveness as an employment location. Further details on timing and scope of this project are unknown at this stage.

The NSW and Australian Governments have committed to the first stage of a new Metro from St Marys to the Aerotropolis via WSA in the *Western Sydney City Deal*. This rail line is planned to open in time for WSA commencing operations in 2026.³ The NSW Government has fully committed to extension of the metro line although options are currently being investigated.

Future Transport 2056 identified several core stations which are proposed in the existing and planned centres of Rossmore, Bringelly, North Bringelly, Oran Park and Narellan. A station is also proposed at Badgerys Creek to serve the Aerotropolis (see Figure 12). Two metro stations are currently planned for WSA: one for the Airport terminal and another for the WSA Business Park.

FIGURE 12: PREFERRED RAIL CORRIDORS FOR WESTERN SYDNEY AIRPORT



Source: Department of Infrastructure and Regional Development, 2018.

³ Commonwealth of Australia, *Western Sydney City Deal Implementation Plan*, available from URL: <https://citydeals.infrastructure.gov.au/sites/default/files/2018-12/WSCD%20Implementation%20Plan.pdf>

Rail connections to WSA and Aerotropolis will provide an impetus for business location and economic development. However, this will only be fully realised if it provides fast connections to existing economic centres and the population.

Other public transport

Rapid bus links are also planned between WSA, the Aerotropolis and Liverpool, Greater Penrith and Campbelltown-Macarthur. These are intended to connect the existing major centres of the Western Parkland City with the emerging centres of the Aerotropolis and WSA, especially until the North-South Rail Line is built. The *Western Sydney City Deal* commits to the delivery of these bus lines by the time the Airport opens in 2026.

In addition, Liverpool City Council has proposed the Fifteenth Avenue Smart Transit (FAST) Corridor. This will aim to bring fast and regular transport between the Western Sydney Airport and Liverpool (see Figure 13).

FIGURE 13 ARTISTS IMPRESSION OF LIVERPOOL'S FAST CORRIDOR



Source: Liverpool City Council, 2018

Roads

Major new road connections to WSA will increase the accessibility of the Airport to much of Western Sydney. This is required to provide access to populations who will not be able to take public transport to the Airport, noting that many people drive to Sydney Airport despite its railway line. Major roads will also be required to make the Business Development Lands at the Airport attractive for industrial and logistics uses.

The NSW Government is currently planning for and constructing new roads under a program called the *Western Sydney Infrastructure Plan*. This program includes:

- The **M12 motorway**, which would connect the M7 to WSA and the Northern Road. According to the preliminary design released by Roads and Maritime Services in December 2018, an airport interchange design is being developed from a spur leading south from the M12. A grade-separated interchange will be provided with the M7 at Elizabeth Drive and a signalised intersection connection with the Northern Road between Eaton Road and Littlefields Road.

- An **upgrade of The Northern Road** to re-route it around WSA and to increase its capacity with at least two travel lanes each way from Macarthur to Penrith. This would improve access for buses to the Airport and would connect to the proposed Business Park access.
- An **upgrade of Bringelly Road** to increase its capacity, which would service growth areas near the Airport, including the Aerotropolis.
- The **Outer Sydney Orbital (M9)** is a proposed motorway which would connect the North-West Growth Area with the South-West Growth Area and Hume Motorway, with potential long-term extensions to the Central Coast and Wollongong.
- An **interchange is planned with the M12** immediately north of the Airport. The first stage of this project from the Great Western Highway to the Aerotropolis is identified in *Future Transport 2056* as a project for investigation in 10-20 years, and the later stages as a visionary project with a 20+ year timeframe.
- The NSW government has exhibited a **proposed corridor for the Outer Sydney Orbital** which is designed to accommodate up to four traffic lanes in each direction and three freight lines.
- *Future Transport 2056* also discusses an **extension of the M5 motorway** from the interchange with the M31 and M7 at Prestons to the Outer Sydney Orbital. This is classified as a *visionary project* with a 20+ year timeframe.

Freight

The major roads proposed and planned around the Airport are intended to serve a freight transport function as well as increasing accessibility around WSA. The Outer Sydney Orbital corridor has also been designed to accommodate a freight railway line along its length, which would provide a dedicated freight corridor between the different strategic employment precincts in Western Sydney including around the future Airport.

A further freight line connecting the Outer Sydney Orbital corridor to the existing freight rail network is planned. A corridor from the M7 to the Outer Sydney Orbital has been exhibited, which would lie immediately south of the Warragamba Pipeline. The design and alignment of this line east of the M7 has not yet been determined.

Future Transport 2056 also discusses a potential intermodal terminal near WSA which would connect to the nearby freight rail network. If paired with the Maldon-Dombarton rail line, which is identified for investigation in 10-20 years, this would provide rail straightforward rail freight access to both Port Kembla and Port Botany. In combination with the Airport's potential freight role, this would make the area attractive for large-scale logistics uses.

Water and wastewater and recycled services

With regards to water, wastewater and recycled services, Sydney Water is finalising the site selection, financing and delivery of the Upper South Creek Water Factory with associated Resource Recovery Plant and corresponding network location requirements. The plant, once reached an appropriate scale, is expected to produce recycled water appropriate for agricultural, industrial, open space irrigation and residential dual reticulation.

2.5 Potential impacts on agricultural land

The following impacts have been identified as a result of the analysis conducted by SGS Economics and Planning, and RMCG.

Current agricultural activities in the Liverpool rural area

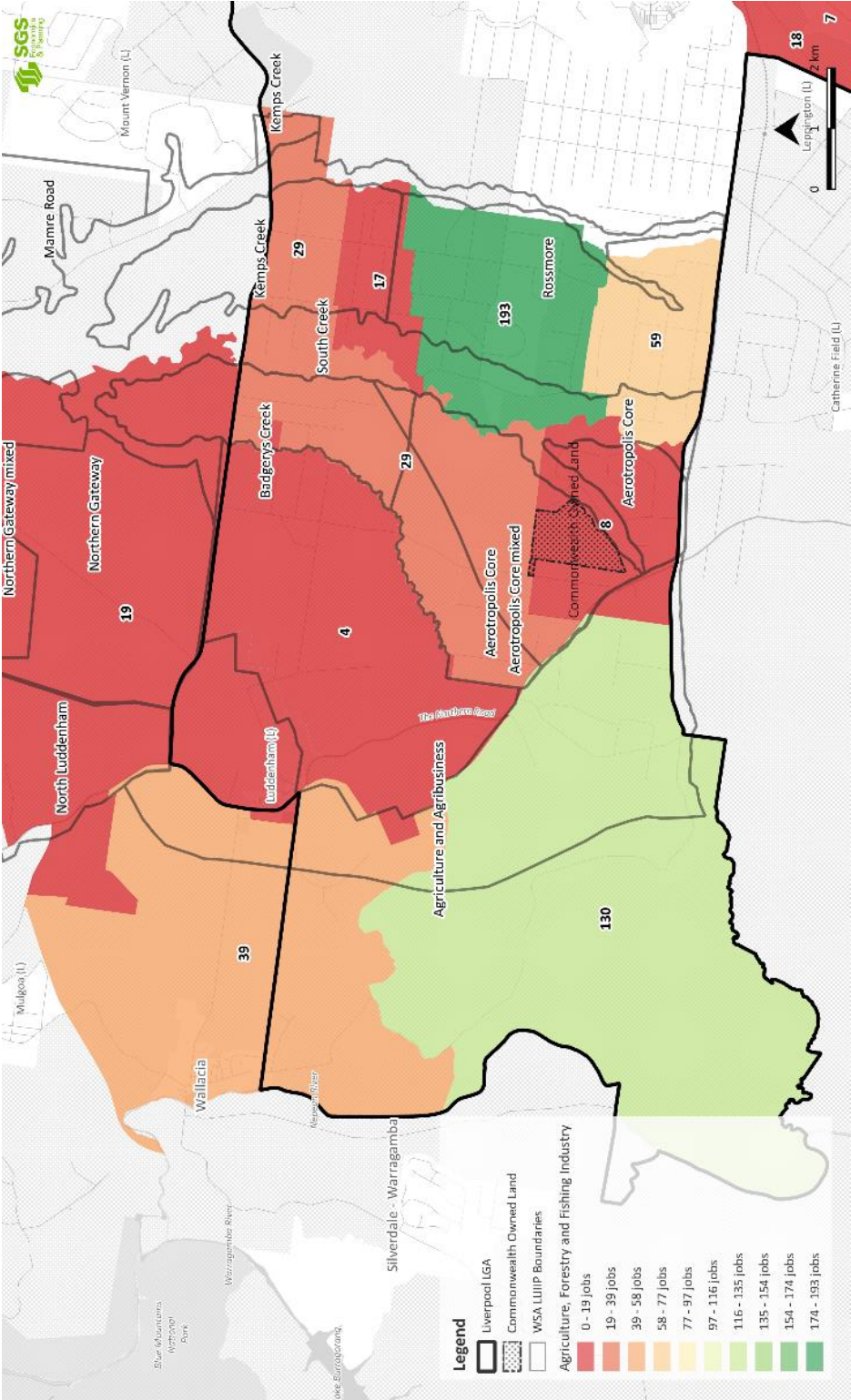
The economic and employment profiles of Liverpool's rural area are presented in Section 4.2 of this report. Detailed information about each agricultural subsector is also set out in Chapter 5.

Within Liverpool's rural area:

- Construction and Agriculture are rural Liverpool's industry strengths. Employment numbers are high for Site Preparation Services in Northwest Bringelly, and for Mushroom and Vegetable Growing in Rossmore. Greendale has a mix of agricultural activities including Dairy Cattle Farming, Poultry Farming and Mushroom and Vegetable Farming. There is also a high presence of Poultry Processing jobs in East Badgerys Creek. These two industries are also projected to grow.
- Land zones influence activity across the rural area. Most of the Construction jobs (40 per cent) are currently located on land zoned for Large Lot Residential, while most Agriculture, Forestry and Fishing jobs (23 per cent) are within the Primary Production Small Lots-zoned areas.
- Agriculture has flow-on effects to other industry sectors. While most of the output is exported, it also has strong links with Manufacturing, Retail Trade, Accommodation and Food Services and Wholesale Trade.
- Kemps Creek, Rossmore and East Badgerys Creek have the greatest soil capability, while Wallacia and Greendale are more limited.
- In contrast, Wallacia and Greendale have the greatest soil fertility. The eastern and central parts of rural Liverpool have moderately low soil fertility.
- The eastern strip of rural Liverpool is more 'agriculturally intensive'. Residential and farm infrastructure or grazing native vegetation makes up most of the land. The eastern end (Rossmore and Kemps Creek) has more intensive irrigated perennial and irrigated horticultural uses.
- Planning for the Aerotropolis forecasts high and diverse job growth. Industries such as Retail Trade, Transport, Postal and Warehousing, Professional, Scientific and Technical Services and Accommodation and Food Services are projected to grow significantly in South Luddenham and Greendale, while eastern rural Liverpool will see continued growth primarily in Construction and Agriculture, Forestry and Fishing.

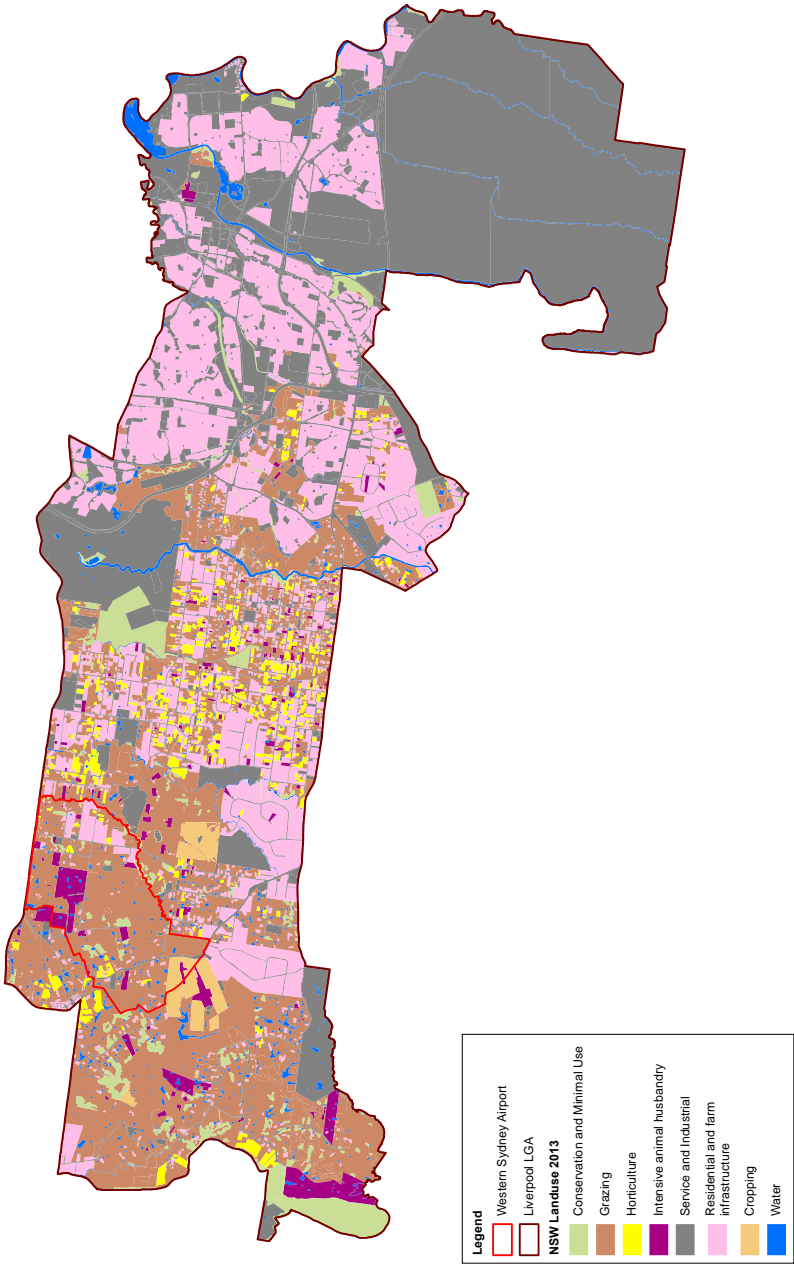
Overleaf, the maps show the highest number of agricultural jobs are in the Rossmore, Agriculture and Agribusiness, Aerotropolis Core precincts. Below (and described in further detail in Appendix 1), the map shows the variety of agricultural activities currently occurring across the Liverpool rural area.

FIGURE 14: NUMBER OF JOBS IN AGRICULTURE ACROSS THE LIVERPOOL RURAL AREA



Source: SGS Economics and Planning, 2019.

FIGURE 15: LAND USE ACROSS THE LIVERPOOL LGA*



Source: RMCG, based on the NSW Landuse dataset, 2013.
*Note: Maps detailing the land use by precinct across the rural area are included in Appendix 1.

Urban encroachment

The impacts on agriculture and the agricultural value chain from urban encroachment and fragmentation are well-documented. They include:

- An 'impermanence syndrome' for commercial agriculture⁴ as:
 - The price of land increases fuelling land speculation
 - Tracts of farmland become isolated
 - Farmers are deterred from investing in their operations as they anticipate the conversion of their land out of commercial agriculture resulting in an absence or certainty in their industry.
- Loss of critical mass of commercial farms and farmers to sustain an agricultural industry and value chain as higher land prices act as an inducement to sell or commercial agriculture is substituted for sub-commercial agricultural activities. This places a strain on remaining farmers to survive and reduces opportunities for commercial farmers to expand businesses, further exacerbating conversion of agricultural land to non-agricultural uses.
- A reduced ability for farmers to generate sufficient income to sustain a standard of living or provide for retirement such that they speculate in their land rather than farm it.
 - Rural land use conflict as new migrants in an agricultural landscape have an expectation of an emission-free rural environment, and often don't anticipate the likely odour and dust emissions, and spraying activities that occur in fully functioning agricultural areas.

In the peri urban region, these changes may take place over several decades as urban release areas are identified well ahead of urban development.

Future scenarios

As outlined in the above discussion, the Aerotropolis plans identify job targets and set land aside for both agricultural and non-agricultural uses. Significant infrastructure projects are also identified (Figure 12, earlier in this section); all of which will influence land values across the Liverpool Rural Area.

According to work undertaken by RMCG for the agricultural investigation, over the next 10 years it is envisaged that the commercial agricultural industry will gradually withdraw from the Liverpool LGA.

Where the transition out of agriculture will occur and the rate at which it takes place will depend on the proximity to urban and infrastructure development and individual business circumstances. In the eastern precincts transition is already underway and under the current policy setting will continue. Some business owners in non-initial precincts may cease commercial horticultural production and wait to capitalise on future urban development or they may 'soldier on' and wind back production over time. Others wishing to continue in the industry are more likely to transition out of Liverpool LGA to a less constrained rural area. The rate of transition in western precincts will be slower as agricultural businesses benefit from larger properties and less disruption from urban encroachment. Land speculation is, however, likely to be a key consideration in future business plans.

The proximity to the airport is not a significant enough lever on its own to attract new industry investment. New investment in soil-based horticulture is unlikely due to the lack of suitable land and an affordable water supply in the proposed agriculture precinct. There is some potential for new generation protected cropping in large scale glasshouses, (some new developments are up to 30 ha in size) that enable year round production of large volumes of

⁴ Lennon, N (2004) The costs of hobby farming: A literature review.

commodities as well as freight, logistics and cold storage for distribution interstate and export.

These changes, alongside macro trends in agriculture production, are further discussed in Chapter 5.

Key findings:

- The WSAP outlines potential transport and social infrastructure to be delivered for the Aerotropolis but does not commit to developing it.
- The WSAP acknowledges the importance of preserving and enhancing the natural assets, particularly of Wianamatta and South Creek.
- Existing infrastructure and current land holdings and ownership patterns will have an impact on the form and function of the Aerotropolis particularly in the interim when development is beginning to occur.
- Planning for the Aerotropolis notes the importance of exploring in how the existing community of Luddenham would like to integrate into the Aerotropolis.

Implications

State Government planning policy sees the Aerotropolis as Western Sydney's future economic heart, which will see the area transform in the years to come. The Aerotropolis has been committed to via the Western Sydney City Deal, which is also intended to spur on economic activity from businesses wishing to invest early.

A tension exists between retaining current environmental, social and economic values and respecting the environmental and cultural heritage constraints while allowing the region to transform into the Aerotropolis in the future.

The precincts defined by the WSAP Structure Plan show a clear direction for where the Aerotropolis should arrive at, however there is a need to map the path between these outcomes and how the Rural Lands are currently operating.

As highlighted in the WSAP, the Agribusiness precinct should be complementary and not impact upon the viability of effective ongoing agriculture and industry operations within the surrounding area, both now and into future. Despite this, findings from the agriculture assessment (Chapter 6) suggest that both the poultry and fruit and vegetable industries will be significantly impacted by the scale of infrastructure investment, urban encroachment and changing land prices influenced by the Aerotropolis projects and accompanying development. Furthermore, RMC found that new investment in soil-based horticulture is unlikely due to lack of suitable land and an affordable water supply in the new agriculture precinct.

For poultry, it is unlikely that there will be a poultry industry in the City in 20 to 30 years' time. New investment is unlikely as major processors are investing in regional areas of the state such as Tamworth and the proximity to the airport is not a significant enough lever for industry investment due to other significant downside factors. There may be some opportunity for freight, logistics and cold storage for distribution interstate and export in the agribusiness precinct.

There are opportunities for agricultural industries which can occur on industrial land (such as mushrooms, grown commercially in sheds). However, it is noted that this type of land use would not be permissible under the draft SEPP for the Western Sydney Aerotropolis currently on exhibition; something Council may wish to explore further with the Western Sydney Planning Partnership. Additional discussion regarding zoning and the planning context is included in the next chapter.

3. POLICY CONTEXT

This section provides an overview of State and local government strategy that is relevant to the rural lands study.

3.1 Introduction

This section includes a review of Council's past Rural Lands Studies (2007 and 2012) and considers the recommendations of those reports in the context of the Western Sydney Aerotropolis Plan.

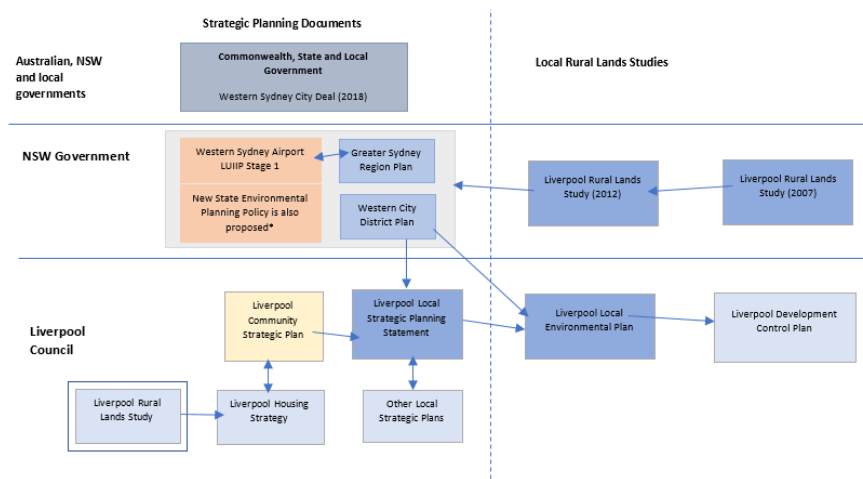
It also considers the implications of other State government documents such as the Metropolis of Three Cities and Western City District Plan, which set directions for local planning in rural areas.

The following State policy documents were reviewed:

- Greater Sydney Regional Plan (2018)
- Western City District Plan (2018)
- Western Sydney City Deal (2018)
- Western Sydney Aerotropolis Plan (2019)

- The following key strategic documents have been reviewed from Liverpool Shire Council:
- Liverpool Local Environmental Plan (2008)
- Liverpool Development Control Plan (2008)
- Liverpool rural lands study (2007)
- Liverpool rural lands study (2012).

FIGURE 16: PLANNING POLICY FRAMEWORK



Source: SGS Economics and Planning, 2019

3.2 State government policy overview

The state government planning policy framework sets a very high-level vision for planning across the Western City District. However, as set out above the creation of a Western Sydney Aerotropolis Authority under the City Deal process, and preparation of the LUIIP, has significant implications for Liverpool City Council and management of the rural lands.

Key policies from the GSRP and WCDP that will influence this project are the directions which require land management, landscape units and place-based planning principles to be applied to planning for rural areas. An added layer of complexity is that the Aerotropolis precinct and planning for this area sets out a vastly different vision to the presumed ongoing agricultural land use across the broader Metropolitan Rural Area (the rural areas within Greater Sydney).

For the Rural Lands Study and planning at the local government level, the implications of the State policy context are:

- *State planning policy states the natural and scenic landscape functions of rural areas are to be protected and enhanced, for their intrinsic value.*
- *The GSRP and WCDP require the various roles of rural areas to be identified by Council, then strategies outlined to protect, enhance and manage these areas in line with overarching objectives from those State-level plans.*
- *The role of the rural area is not to transition into residential areas and accommodate population growth; rather, agricultural productivity and mining (where relevant) opportunities should be preserved. The focus of the rural area is to respect environmental constraints, while retaining social and economic value through the land rural land uses (and supporting uses – for example, tourism, recreation) allowed there.*
- *As rural lands surrounding the urban parts of Sydney are diverse, the GSC propose a place-based framework so that planning policies can be identified based on identified values that relate to a local area. The place-based framework requires Council to identify the economic, social and environmental values of its rural areas, using identified 'landscape units' to highlight different locations across the rural area that are unique, based on the interplay between landform, land uses, development. These qualities are then used to identify different challenges and opportunities that underpin localised planning policies.*
- *The potential for land use conflicts throughout peri-urban rural areas is high. To manage these conflicts and protect 'Right to Farm' principles, rural areas need policy direction that enables careful management to retain the identified cultural, social and economic values (as outlined above).*
- *Planning for rural areas must consider the changing nature of agriculture and farming in the Sydney Basin, and the economic challenges for communities that may have ageing and declining populations. With the Western Sydney City Deal and Aerotropolis, this challenge is even greater for Liverpool City Council.*
- *The Western Sydney City Deal introduces a vision for transformative development in Western Sydney, which must be considered alongside other policy visions for preservation and enhancement of agricultural activities and landscape values across Liverpool's rural area. This proposed transformation means Liverpool City Council must consider how to plan for two vastly different agricultural areas – one that will transition to the Aerotropolis and Agribusiness precinct, while the other (may) remains a conventional rural area.*
- *WSAP provides a strategic direction intended to catalyse economic development at the Aerotropolis, however there are many uncertainties (for example, will jobs target be achievable?) due to the preliminary stage of planning and uncertainty regarding infrastructure delivery.*
- *This Rural Lands Study process will help Council explore how to balance and manage these tensions across Liverpool's rural area, alongside any anticipated impacts of the Aerotropolis.*

Does the draft WSAP address Council's feedback on the LUIIP Stage 1?

In its submission to the LUIIP Stage 1, Council emphasised that while it supports the economic imperative of the airport and the growth that it may create within the LGA, it does not support the extent and application of proposed land use zones in their current form. Council was also seeking clarity regarding the emerging governance structure and the approach to community consultation, which remains unclear under the new Draft WSAP (hasn't changed).

In its LUIIP submission, Council recommended amendments to the plan, to ensure that planning for and implementation of the Aerotropolis is staged in a way that is sustainable, and responsive to local context of the area.

In some instances, Council's feedback was not addressed and no changes were made. These are as follows:

- Environmental sustainability priorities will give developers and the council options to not uptake sustainable development such as the implementation of green roofs.
- Best practice examples suggest that council and stakeholders must have a clear commitment to successfully implement solar and green roofs into development and ensure that there are incentives.
- High level Precinct Plans/visions still suggest that some residential development may occur within 1km of the airport, within land identified for the new Mixed Use Zone (albeit with height and noise attenuation requirements, especially for land affected by an ANEF of 20 or higher).
- The precautionary noise principle should be taken, to ensure that the airport is set back at least 5 kilometres from residential development. This would require removing residential development from the commercial core of the aerotropolis.
- Locating residential development away from the airport will also ensure that the airport will be able to expand in the future and not face the challenges currently felt by the Sydney Airport.
- Given the above, the suggested location of residential development conflicts with the plan's intention to create a centre that promotes an active and healthy lifestyle.
- Locating residential development away from the core will also ensure that environmental pollutants are diminished at a higher rate. Poor air quality and traffic congestion would thus be mitigated.
- More clarity has been provided around land use tables for each new zone in the draft SEPP, however the vision for Kemps Creek, Rossmore and Dwyer Road has been pushed back through the non-initial precinct planning designation meaning Council's Rural Lands Study should fill the gap about what happens in these locations over the short-medium term (see Chapters 4-7).
- Although the WSAP acknowledges that growth of the airport will be slow, meaning industrial development will happen gradually at the airport, it designates certain precincts where agriculture should continue in the short term, while clearly identifying land for urban uses and development, creating a tension around certainty for current landowners and businesses.
- Agriculture is seen as an existing interim use in Rossmore and Kemps Creek but the reality of the Aerotropolis planning and current infrastructure construction means transition is already visible in these eastern rural precincts (see Chapter 6).
- The importance of new local infrastructure for existing centres with new rail lines has been overshadowed by WSAP activity, creating a logical sequencing of development challenge in existing and establishing growth areas.

3.3 Local government policy setting

This local policy review focusses on those relevant to Liverpool's rural lands, and any pertinent legislative requirements in the Liverpool Local Environmental Plan (LEP) and the Development Control Plan (DCP).

In Liverpool's rural area, the current local policy context is based on the 2012 Rural Lands Study. Most land falls within the Primary Production, or Primary Production Small Lots, zone. In the southern part of Greendale and the western parts of South Luddenham, some land is also set aside for Large Lot Residential.

There are three infrastructure precincts across the rural area: in Greendale, Northeast Bringelly and East Badgerys Creek. The Badgerys Creek Airport precinct has been rezoned for Special Activities but is currently surrounded by land for which the primary purpose is agriculture (Primary Production Zone).

Key considerations are:

- *The Liverpool LEP permits uses such as dual occupancies through Clause 7.24, which allows for some residential intensification on RU1 and RU4 zoned land. This flexibility may lead to greater residential and agricultural land use conflicts, as the purpose of the zone is to support primary production on agricultural land. A starting point to understand the impact of this policy on land use conflicts would be to examine the take-up rate over recent years and review proliferation of dual occupancies across the rural area.*
- *The suite of rural zones that apply across the Liverpool LGA contain several 'non-rural' uses that provide an important support to nearby urban areas (for example, dog- and cat-boarding services, waste recovery, mining for construction materials and bed-and-breakfast accommodation). For the Rural Lands Study, some analysis has been undertaken to understand (at a high level) the extent of other non-rural uses and their impact on broader agricultural activities. For further information, refer to Section 4.2 and Section 5.*
- *Council's submission to the LUIP suggests that there are many social, environmental and economic factors that need to be managed and assessed further to ensure the sustainable development of the aerotropolis. This submission is further discussed in Appendix 1.*
- *In its LUIP submission, Council suggested a staging plan should be established that enables other land use and development patterns (including ongoing agricultural uses) to occur in the event the proposed airport does not proceed, or where the number of jobs achieved is lower than the current plans anticipate.*
- *Considering impacts of the WSAP on rural lands, the Draft WSAP plan contains significantly more detail regarding its commitment to economic (circular economies) and environmental sustainability, where the draft LUIP provided limited details regarding sustainability.*
- *Current rural policies and zones within the DCP and LEP were prepared prior to the airport announcement. The airport announcement significantly changes land values across the rural area (especially in the immediate surrounds), especially as significant infrastructure is delivered.*
- *Given the flexibility that currently exists within the rural zones (in terms of land use), some non-rural uses that have been limited until now could become more prevalent in future; especially where the land use may benefit from connections to the airport and Aerotropolis precincts (for example, enhanced freight connections).*
- *There is a need to identify where some transition is acceptable, or where greater protection of rural lands is required; this includes considering whether the current zoning would remain appropriate as the airport progresses.*
- *As the rural zones are closed, any land use not specified in the RU1 Primary Production item 2 or 3 is prohibited. In future, there may be scope to explore what other uses could be*

permitted within the RU1, to facilitate additional activities in line with the land around the Western Sydney Airport and Aerotropolis.

Principles and recommendations relating to the second-last dot point are included at Section 7, on page 109.

3.4 Past Rural Lands Studies

The *Liverpool Rural Lands Study* 2012 updated a 2007 study that had been prepared to inform the preparation of the *Liverpool Local Environmental Plan* 2008. It identified precincts across the rural area, responding to plans for the South West Growth Centre and Airport reservation, which at the time was uncertain (since confirmed as the Western Sydney Aerotropolis area in the 2018 LUIIP and 2019 WSAP).

The plan considered emerging uses and pressures affecting Liverpool's rural areas, and examined the ongoing viability of agriculture, especially related to pressure for rural lifestyle housing and the nearing urban growth front. It highlighted that:

- 'Any future study needs to balance the needs for urban sprawl (230 000 of Sydney's new dwellings are to be provided Greenfield areas over the next 20 to 30 years), landowners seeking highest and best use of rural land, visual and scenic qualities, the demand for fresh produce and agricultural uses, extractive industry and environmental constraints.
- Overall, the greatest pressure on rural land and its character in Liverpool is attributed to the push for rural lifestyle housing. The demands for additional housing rights may somewhat erode the qualities of rural areas that attract residents to the area in the first place.'

When the 2012 Study was prepared, land had already been identified for a future airport at Badgerys Creek, however at the time directions from the Minister suggested the airport may not go ahead. Regarding agriculture, the Study found:

- 'Large scale agricultural production was generally confined to land along the Nepean River and the large holdings of the Leppington Pastoral Company.
- There are also a number of smaller agricultural business that produce a high per centage of Sydney's perishable vegetables.
- However, the majority of the study area was not being used for economic agricultural purposes.
- Regardless of the number of lots being used for agriculture, the importance of agriculture within the Sydney basin, from an economic and food supply point of view, is considerable and thus future planning should restrict the ability for subdivision and increased development potential from areas adjacent to significant agricultural pursuits and on land that is Class 1 or Class 2 agricultural capability.'

The Study concluded:

- 'The proposed changes to planning policy seek to better balance the challenges facing rural lands which include the use of land for primary production, extractive industry and recreational pursuits, protecting land with scenic qualities and environmental constraints whilst allowing some reasonable development types such as dual occupancies.
- Other challenges include the relatively recent proliferation of cemetery proposals and the delivery of new neighbourhoods within the Liverpool Rural Lands Study 2012 South West Growth Centre. The importance of the rural areas for fresh food production is reiterated and is the extractive potential for land as outlined in SREP 9.'

Agricultural viability

The previous Rural Lands Studies acknowledged the difficulty of maintaining agricultural viability on fragmented land subject to peri-urban pressures and residential encroachment.

Even in 2007, these effects were being felt. At the same time, Commonwealth land around Badgerys Creek had already been set aside with the suggestion of a second airport for Sydney, and agricultural productivity was significantly reduced, with several farms reporting they were in a stage of 'run off.'

- The 2007 Study focussed on the south-west growth area, and the potential development of a Badgerys Creek Airport.
- The Commonwealth land around Badgerys Creek had an impact on agricultural productivity, and agricultural industries were in decline.
- This decline was caused by several factors, including residential/urban encroachment (limiting emissions necessary for commercial-scale farms), and challenges with land fragmentation and lot sizes too small to enable further intensification (in the case of market gardens).
- In 2012, the Rural Land Study recommended retention and enhancement of agricultural lands.
- A wider range of non-agricultural uses were permitted in rural lands after 2012, with zoning changes introduced. This responded to peri-urban pressures across the Sydney Basin, and further enabled the transition towards greater residential and light industrial activities in the eastern rural lands.

As highlighted earlier, strong policy commitment and planning for a Western Sydney Airport is now intensifying existing challenges to agricultural viability across Liverpool's rural area. This has implications for this project and this update to the Rural Land Study:

- Overall, Agriculture in peri-urban areas is impacted by demand for rural residential, and rural lifestyle housing which impacts the economic sustainability of traditional farming.
- The Western Sydney Airport is expected to emphasise this pattern even more into the future.
- Nutrient run off will increase with agricultural intensification, in the areas which do remain viable or change their business model to a more industrial, intensified approach. If this intensification becomes a broader trend, there may be implications for catchment management and water quality across the LGA. This should be further considered in light of the agribusiness precinct and widescale protected agriculture which could arise in the proposed Aerotropolis Agribusiness precinct.
- Further information may be required to understand the water scarcity challenges and catchment management issues that could arise from emerging intensive agriculture practices in future.
- Agricultural lands should be recognised for their economic value, as well as their intrinsic and landscape values.

4. LIVERPOOL CONTEXT

This section presents a summary of current conditions in the Liverpool LGA, highlighting the current demographic and economic profile of the rural area.

4.1 Demographic context

Introduction

There are currently 211,502 people living in the Liverpool LGA (at the 2016 Census). By 2041, the forecast population will be 357,644, a 70 per cent change over the period 2019-2041.⁵ The greatest amount of population growth is forecast to occur in growth area suburbs, Austral, the Liverpool CBD and surrounds, and Edmondson Park. Due to planning for the Western Sydney Airport and the South West Growth area, substantial growth is also forecast in the Metropolitan Rural Area, around +3,000 people by 2040. Within the Liverpool Rural Area, this growth is likely to be concentrated within the Western Sydney priority growth area, north of Leppington.

Figure 17 depicts the distribution of population growth expected in the Liverpool LGA. It shows that the 'growth' suburbs (including Greendale, Badgerys Creek, Bringelly, Cecil Park, Kemps Creek, Luddenham, Rossmore, Silverdale, and Wallacia) are projected to grow by approximately +29,000 people, while Austral is expected to grow by +23,300 people. Comparatively, established areas (e.g. the Liverpool CBD and surrounds) are expected to grow by +17,000 people, as well as host up to 15,000 tertiary students.⁶

Housing profile

There are approximately 65,000 homes within the Liverpool LGA. By 2041, this number is projected to grow to 123,000 homes, a 90 per cent change over the period 2016-41.⁷ The greatest household growth is forecast to occur in the growth suburbs (+11,000), Austral (+9,000), the Liverpool CBD and surrounds (+8,500) and Edmondson Park (+6,300).

Figure 18 depicts the distribution of household growth expected in the Liverpool LGA. It shows that some parts of Liverpool's rural area are projected to grow significantly.

Dwelling types

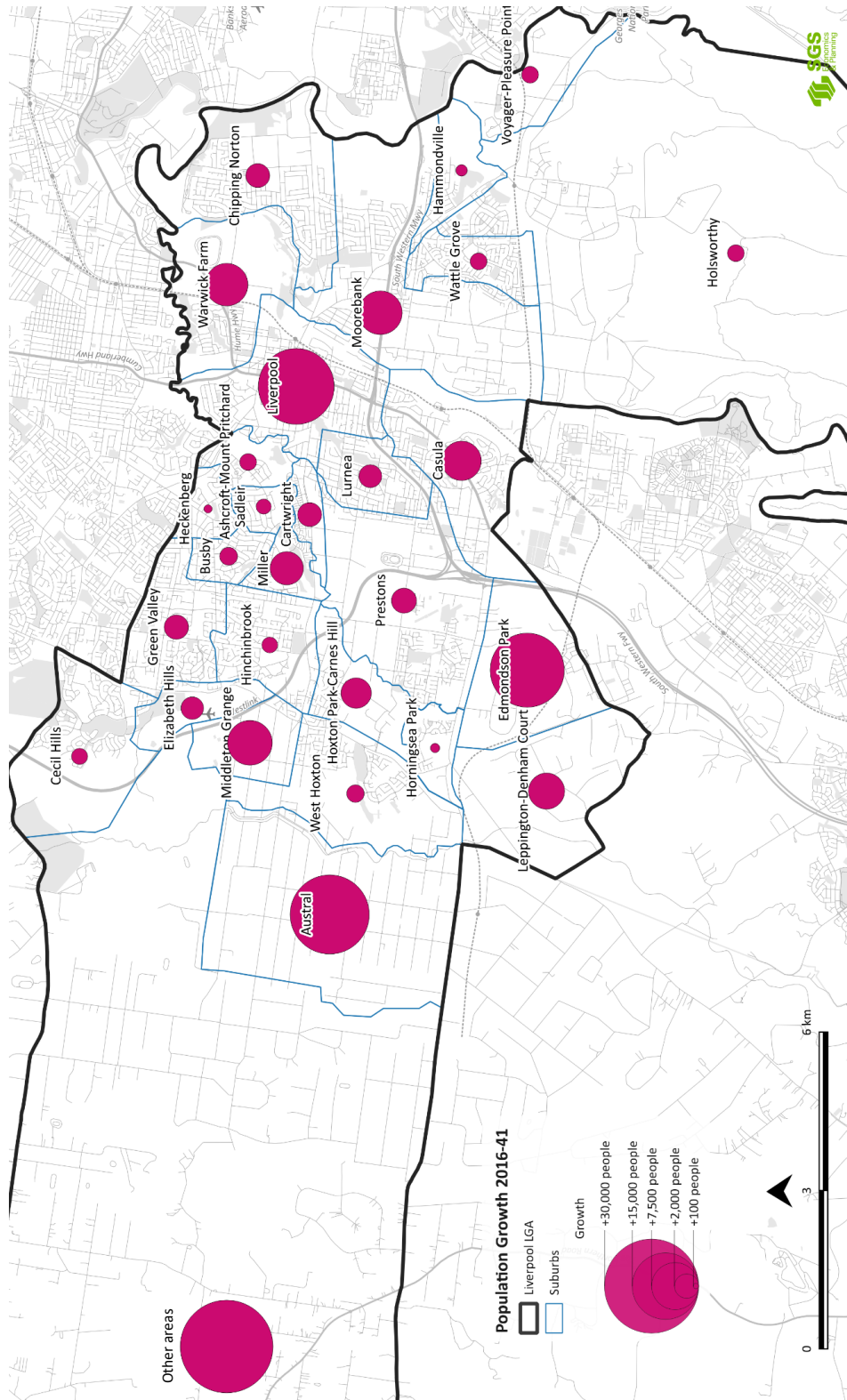
Figure 19 depicts the current dwelling types and size across the Liverpool LGA. When viewed with Figure 18, it shows that most of the growth is expected to occur in parts of the LGA that are currently rural or semi-rural; there are currently fewer homes in those locations compared to the eastern side of the Liverpool LGA.

⁵ Travel Zone Projections, TZP 2016 v1.51

⁶ Greater Sydney Commission, *Liverpool Collaboration Area Place Strategy*, December 2018.

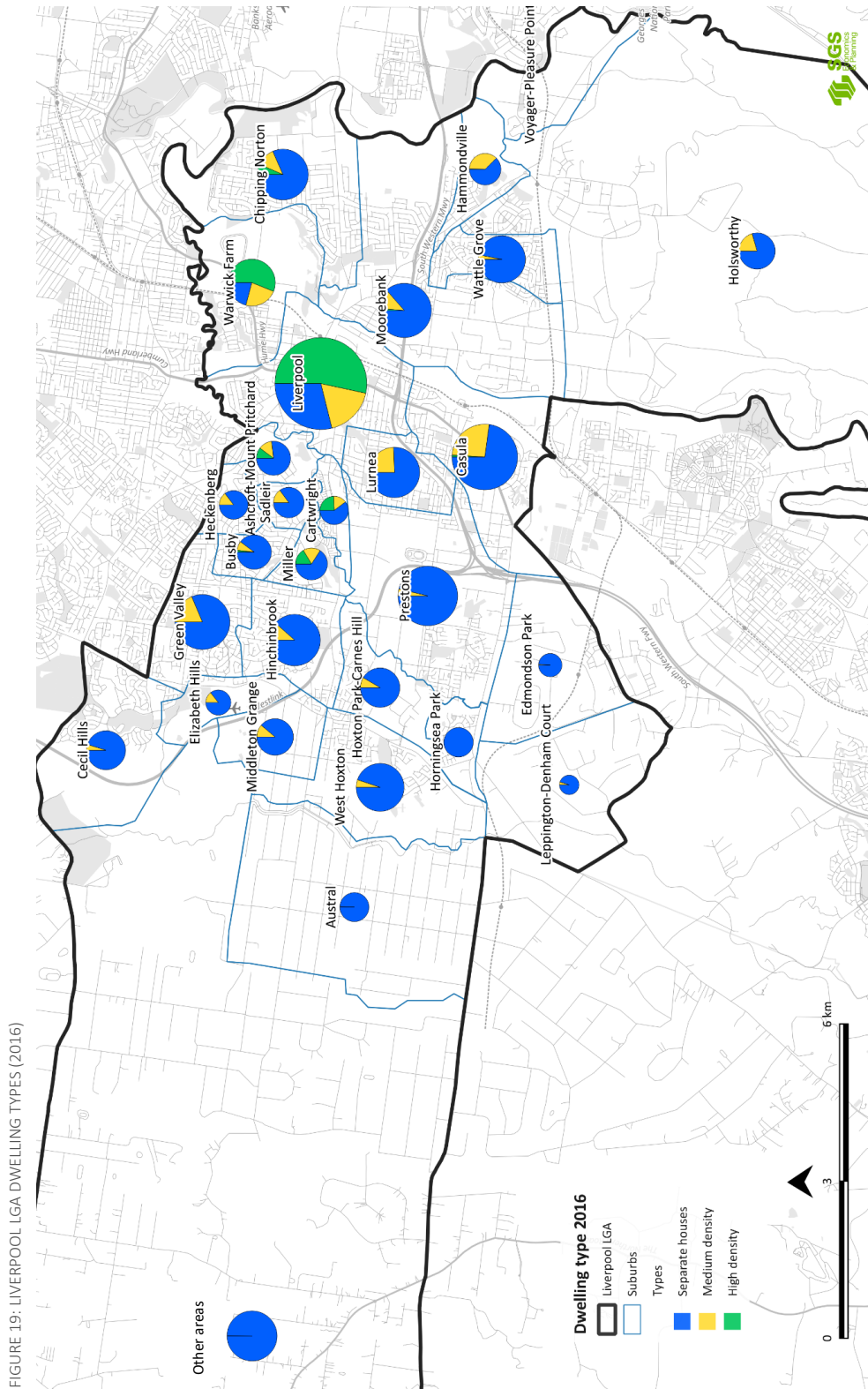
⁷ Travel Zone Projections, TZP 2016 v1.51

FIGURE 17: LIVERPOOL LGA POPULATION GROWTH 2019-41



Source: SGS Economics and Planning, based on data from Travel Zone Projections TZP 2016 v1.51





Source: SGS Economics and Planning, based on data from Profile.id, 2016.

4.2 Economic and employment profile

Economic profile

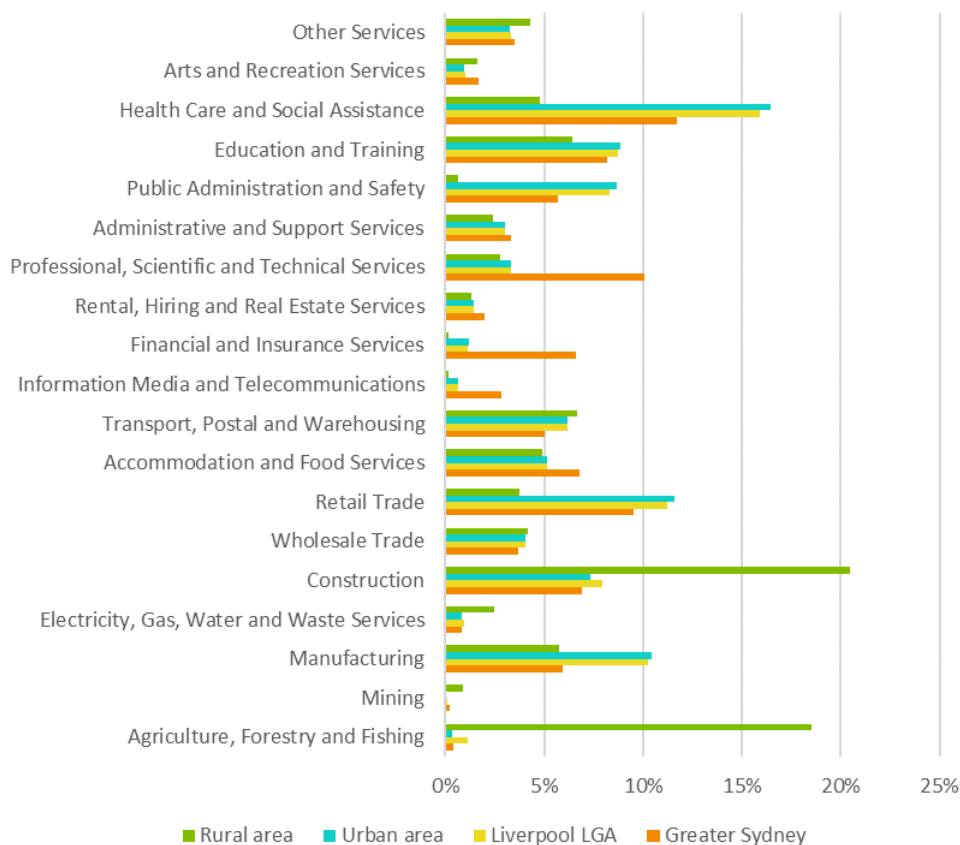
Industry Analysis

There were 68,923 jobs in the Liverpool LGA as of 2016, of which 96 per cent are located in the urban areas (65,835 jobs) and 4 per cent (3,088 jobs) in the rural areas.

Liverpool's largest economic strength is Health Care and Social Assistance, making up 16 per cent of jobs in the LGA. This is followed by Retail Trade (11 per cent) and Manufacturing (10 per cent). However, the employment dynamics between the urban and rural areas of Liverpool are different. Comparatively speaking, Health Care and Social Assistance only makes up 5 per cent of jobs in the rural area.

As noted previously, there are approximately 3,088 jobs in rural Liverpool. Construction is the largest 1 digit ANZSIC Industry of Employment in the rural area, making up 20 per cent of rural jobs. **Agriculture, Forestry and Fishing makes up 19 per cent of rural jobs**, while the other larger industries in the rural area have a significantly lower share of jobs; Transport, Postal and Warehousing (7 per cent), Manufacturing (6 per cent) and Education and Training (6 per cent).

FIGURE 20: EMPLOYMENT INDUSTRIES (2016)



Source: ABS Census Table Builder (2016)

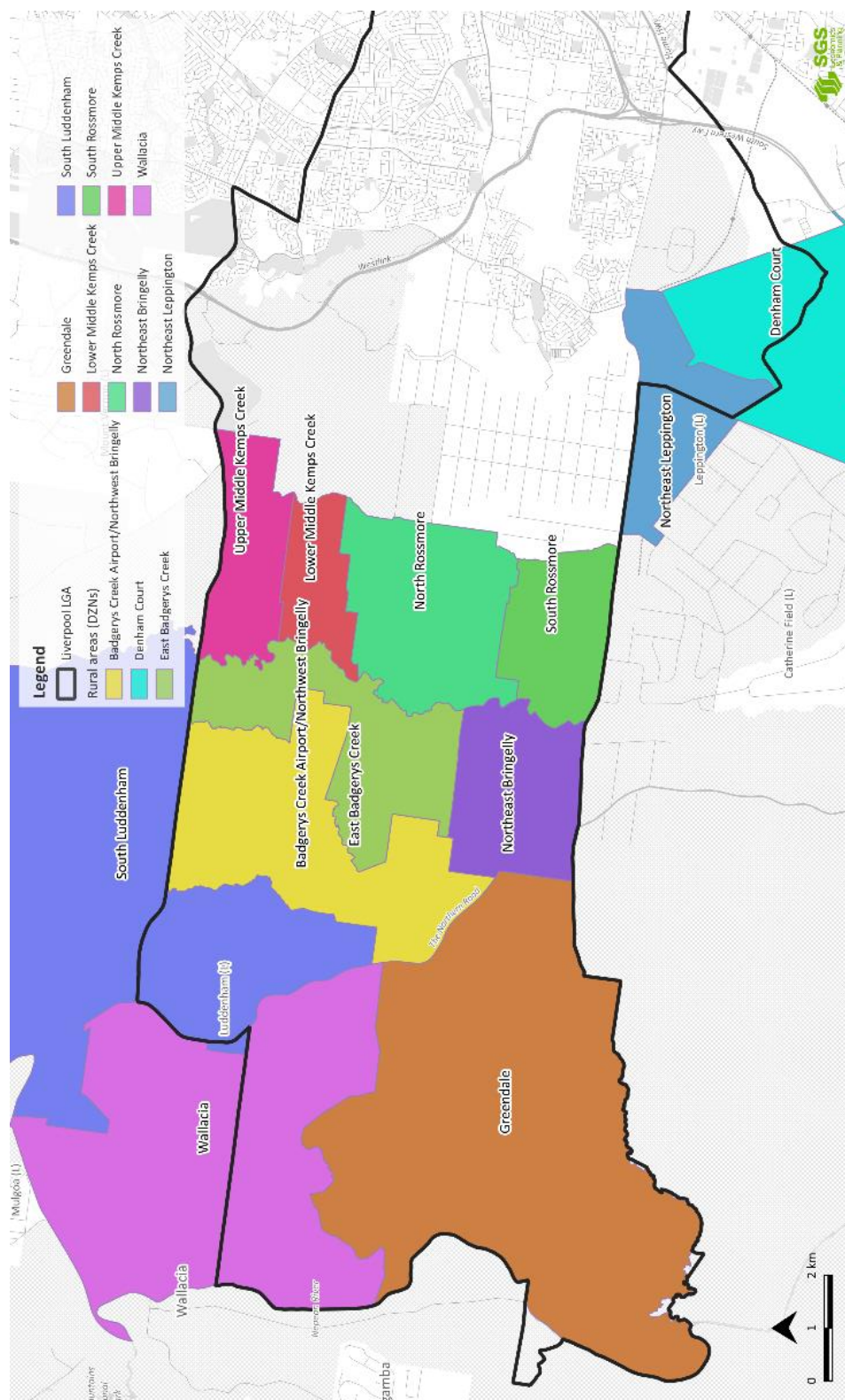
ANZSIC Industries of Employment is a standardised system used in Australia and New Zealand, to classify the industries in which people work. At a 1-digit level (broad industry categories like 'manufacturing' in the previous table), the information is not detailed or targeted enough to understand the different characteristics across the rural areas and between the rural and urban areas of Liverpool. As such, they have been used sparingly throughout this section. SGS has included tables and analysis where relevant in order to avoid an excessive overload of information.

Economic strengths in the rural area

To understand economic strengths across different locations in Liverpool's rural area, small area analysis was undertaken using 'destination zones' (DZN) (an ABS spatial unit). Those zones are used by the ABS based on employment patterns across Australia.

Figure 21 shows the DZNs in Liverpool's rural areas. Throughout this section, the DZNs have been combined to provide more meaningful data, such as Badgerys Creek Airport/Northwest Bringelly. Where there is a distinctive economic strength in a single zone, it is kept separate.

FIGURE 21: RURAL DESTINATION ZONES (DZNS) IN LIVERPOOL



Source: SGS 2019

For Liverpool, the economic strengths of the rural areas vary across the different Destination Zones.

Table 3 shows the total number of jobs in each of the rural Destination Zones. It shows that South Luddenham has grown the most in the five years between 2011-16 (+195 jobs) followed by North Rossmore (+166), and Greendale (+126). Greendale and South Luddenham fall within areas that have been identified for longer-term agricultural use in the State government's plans for the Western Sydney Aerotropolis (see Chapters 2 and 4).

Areas that have been identified for greater change under the Aerotropolis plans have also declined the most in terms of jobs: Northeast Leppington has declined the most (-37 jobs) as well as Badgerys Creek Airport/Northwest Bringelly (-16 jobs).

TABLE 3: RURAL DESTINATION ZONE EMPLOYMENT 2011-16

Rural Destination Zone	2011	2016	Change 2011-16	% Change 2011-16
Denham Court	121	178	57	47%
South Luddenham	214	409	195	91%
Wallacia	319	342	23	7%
Greendale	209	335	126	60%
South Rossmore	160	242	82	51%
Northeast Bringelly	146	199	53	36%
North Rossmore	260	426	166	64%
East Badgerys Creek	113	167	54	48%
Lower Middle Kemps Creek	115	154	39	34%
Upper Middle Kemps Creek	239	318	79	33%
Northeast Leppington	153	116	-37	-24%
Badgerys Creek Airport/Northwest Bringelly	218	202	-16	-7%
<i>Total</i>	<i>2,267</i>	<i>3,088</i>	<i>821</i>	<i>36%</i>

Source: ABS Census TableBuilder 2016

As noted previously, Construction (632 jobs) is the largest industry of employment in rural Liverpool. *Northwest Bringelly* contains more of these jobs than any other rural area (92 jobs in total), mostly in Site Preparation Services (38), Concreting Services (16) and Road and Bridge Construction (10).

North Rossmore (87 jobs in total) also has a relatively high number of Construction jobs, mostly in Electrical Services (20) and Plumbing Services (14). It is noted that as construction is often a footloose industry (meaning that a person in construction can work across the city), construction jobs as per Census data should be considered in light of this. They may not be representative of the type of industry permanently in a particular part of the rural Liverpool area.

Agriculture, Forestry and Fishing (572 jobs) is also an economic strength of the rural area and the industry most reflective of the region's character. These figures are shown in Table 4: Agriculture, Forestry and Fishing subset industries in rural Liverpool, below.

North Rossmore has a significantly higher number of these jobs (193 jobs) relative to the other rural regions, mostly in Mushroom and Vegetable Growing (155 jobs). *Greendale* also has a relatively high number of Agriculture, Forestry and Fishing jobs (130 in total). This is mostly in Dairy Cattle Farming (65), Poultry Farming (28), and Mushroom and Vegetable Growing (15).

While Mushroom and Vegetable Growing is the largest 3-digit subset of Agriculture, Forestry and Fishing in rural Liverpool (308 jobs), at a 4-digit level, Vegetable Growing (Outdoors) has a significantly higher number of jobs than Mushroom Growing (198 compared to 87 jobs). Apart from North Rossmore and Greendale, *South Rossmore* (43 jobs) and *East Badgerys Creek* (21 jobs) also have a relatively strong number of Vegetable Growing jobs.

There are only 15 jobs in Nursery and Floriculture Production in rural Liverpool, where the larger majority are in *Northeast Leppington* (8 jobs).

TABLE 4: AGRICULTURE, FORESTRY AND FISHING SUBSET INDUSTRIES IN RURAL LIVERPOOL

Industry of Employment	Wallacia-Greendale	South Luddenham	Badgerys Creek Airport/ Northwest Bringelly/ East Badgerys Creek	Northeast Bringelly	Rossmore	Kemps Creek	Denham Court/ Northeast Leppington	Total
Agriculture, Forestry and Fishing, nfd	-	-	-	-	-	-	-	4
Agriculture, nfd	10	-	-	-	16	5	5	37
Nursery and Floriculture Production	-	-	-	-	3	4	8	15
Mushroom and Vegetable Growing	24	5	34	8	202	30	5	303
Fruit and Tree Nut Growing	7	-	-	-	5	-	-	7
Sheep, Beef Cattle and Grain Farming	12	8	-	-	3	4	-	23
Dairy Cattle Farming	65	-	-	-	-	-	-	72
Poultry Farming	45	9	16	-	12	3	-	86
Other Livestock Farming	4	-	-	-	-	-	4	9
Agriculture and Fishing Support Services	-	-	3	5	6	-	-	14

Source: ABS Census TableBuilder (2016)

In terms of **Transport, Postal and Warehousing** (205 jobs in total), the majority of them are in the Road Freight Transport industry (160 jobs). They are dispersed widely across rural Liverpool, but mostly in *Lower Middle Kemps Creek* (31), *Greendale* (23) and *Northwest Bringelly* (22).

TABLE 5: TRANSPORT, POSTAL AND WAREHOUSING SUBSET INDUSTRIES IN RURAL LIVERPOOL

Industry of Employment	Wallacia-Greendale	South Luddenham	Badgerys Creek Airport/ Northwest Bringelly/ East Badgerys Creek	Northeast Bringelly	Rossmore	Kemps Creek	Denham Court/ Northeast Leppington	Total
Transport, Postal and Warehousing, nfd	4	-	6	-	-	-	-	13
Road Freight Transport	37	9	25	11	25	46	6	155
Road Passenger Transport, nfd	-	-	-	-	-	5	-	5
Scenic and Sightseeing Transport	-	-	-	3	-	-	-	3
Postal Services	3	-	-	-	3	-	-	11
Courier Pick-up and Delivery Services	4	-	-	-	-	-	-	14
Other Warehousing and Storage Services	-	-	-	-	-	3	-	4

Source: ABS Census TableBuilder (2016)

There are interesting trends in the **Manufacturing** sector of rural Liverpool (157 jobs in total). While they are widely spread, there are relatively more jobs in *Upper Middle Kemps Creek* (40) and *East Badgerys Creek* (39) (Table 6).

In Upper Middle Kemps Creek, over half of the Manufacturing jobs are in Primary Metal and Metal Product Manufacturing (21). In East Badgerys Creek, all the Manufacturing jobs are in Poultry Processing (39). This strong alignment with food production indicates the existence of localised value chains between producers and food manufacturers.

In the **Education and Training** sector in rural Liverpool (198 jobs in total), most of the jobs are in School Education (172), particularly in *Upper Middle Kemps Creek* (65), *South Rossmore* (43) and *Wallacia* (38).

TABLE 6: MANUFACTURING SUBSET INDUSTRIES IN RURAL LIVERPOOL

Industry of Employment	Wallacia-Greendale	South Luddenham	Badgerys Creek Airport/ Northwest Bringelly/ East Badgerys Creek	Northeast Bringelly	Rossmore	Kemps Creek	Denham Court/ Northeast Leppington	Total
Food Product Manufacturing	4	5	39	-	5	-	-	55
Manufacturing, nfd	-	4	3	-	-	7	-	22
Textile, Leather, Clothing and Footwear Manufacturing	4	-	-	-	-	-	-	6
Wood Product Manufacturing	-	-	5	3	-	-	-	13
Basic Chemical and Chemical Product Manufacturing	5	-	-	-	-	4	-	6
Non-Metallic Mineral Product Manufacturing	-	-	-	7	-	-	-	12
Primary Metal and Metal Product Manufacturing	-	-	-	3	-	21	-	24
Fabricated Metal Product Manufacturing	4	4	-	-	-	3	-	12
Transport Equipment Manufacturing	-	-	-	-	13	5	-	17
Machinery and Equipment Manufacturing	3	-	-	-	-	-	-	5
Furniture and Other Manufacturing	-	-	6	-	-	-	-	4

Source: ABS Census TableBuilder (2016)

Tourism

Western Sydney currently delivers \$4.2 billion in visitor expenditure.⁸ to the NSW Visitor Economy. u According to the *Western Sydney Visitor Economy Strategy* (2017/18-2019/20), almost half of the domestic and international visitors to Western Sydney are there to visit family and friends.

Around 62 per cent of visitor nights spent in Western Sydney were international visitors, with the remaining 38 per cent domestic stays. For international visitors, most (45 per cent) were visiting family, or on holiday (41 per cent). For domestic visitors, 47 per cent were visiting family, 29 per cent holidaying and 18 per cent travelling for businesses.⁹

Total expenditure across Western Sydney (including the Liverpool LGA) was \$4.2 billion million in 2016, with 44 per cent coming from domestic overnight visitors, 34 per cent from international overnight visitors, and 22 per cent from daytrips.

Tourism Australia collects LGA-based data for tourism activity with minimum threshold for international and domestic figures; however, this data is not currently available for Liverpool as an individual LGA.¹⁰ Based on issues and opportunities highlighted in the Western Sydney Visitor Economy Strategy, and other technical work in this Study, recommendations for Liverpool's tourism market are included in Section 7 on page 109.

Land use analysis

In Appendix 1, Figure 70: Land zones in Liverpool shows where land zones apply across Liverpool's rural area. It shows that Upper Middle Kemps Creek, Lower Middle Kemps Creek, North and South Rossmore, and Northeast Bringelly are predominantly zoned for *Primary Production Small Lots*. South Luddenham, Badgerys Creek Airport/Northwest Bringelly, East Badgerys Creek, Wallacia and Greendale are mostly *Primary Production*. Denham Court is mostly *Large Lot Residential* and Northeast Leppington are a mix of *Low Density* and *Medium Density Residential*.

The following chart shows the industries that are most strongly represented in each of the rural zones in Liverpool. It shows:

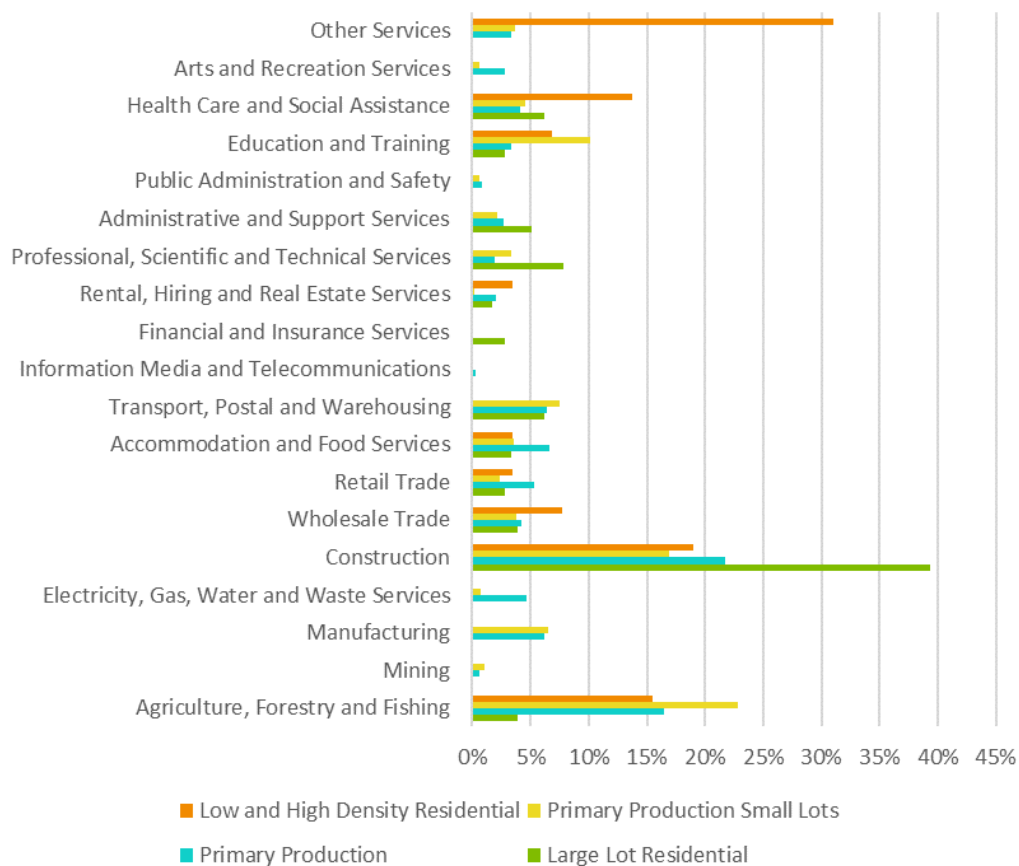
- In the Large Lot Residential Zone (Denham Court), the majority of jobs are in Construction (39 per cent).
- In the Primary Production Small Lots zone, most jobs are in Agriculture, Forestry and Fishing (23 per cent) and Construction (17 per cent).
- This is similar for Primary Production zones, however, there is a greater share of jobs in Construction (22 per cent) compared to Agriculture, Forestry and Fishing (16 per cent).

⁸ Destination NSW, *Western Sydney Visitor Economy Strategy*, 2017/18-2019/20.

⁹ Based on Destination NSW data.

¹⁰ For further information: <https://www.tra.gov.au/Regional/Local-Government-Area-Profiles/local-government-area-profiles>.

FIGURE 22: ANZSIC EMPLOYMENT BY LAND ZONE



Source: SGS Economics and Planning, based on ABS Census Table Builder (2016).

Historical change

While Agriculture, Forestry and Fishing and Manufacturing are two of the largest industries in rural Liverpool, they have declined the most in the five years between 2011-16 (-2 per cent and -8 per cent respectively). Construction, however, has grown by +4 per cent. Overall, employment in Liverpool's rural areas has grown by over 800+ jobs in the five years (between 2011-16, based on available ABS data).

Figure 23 shows that Construction has grown the most in rural Liverpool (+270 jobs), followed by Agriculture, Forestry and Fishing (+109) and Education and Training (+69). Manufacturing has declined the most (-123 jobs). Construction should be considered in context, as it may also represent an increase in construction activity in the region, rather than simply more construction companies locating in the area.

FIGURE 23: PROPORTIONAL CHANGE OF EMPLOYMENT (2011-16)



Source: SGS Economics and Planning, 2019, based on ABS Census Table Builder (2011-16).

Looking across the precincts (see Table 7 on page 52), most of the job growth over the five years between 2011-16 has been in *North Rossmore* (+125 jobs). The growth has been concentrated in Agriculture, Forestry and Fishing (+61) and Construction (+52).

Electricity, Gas and Water and Waste Services has grown significantly in *South Luddenham* (+55 jobs), while Construction has grown by +53 jobs in Badgerys Creek Airport/Northwest Bringelly; higher than any other rural Destination Zone. However, Manufacturing has declined significantly in this area (-87 jobs).

TABLE 7: HISTORICAL EMPLOYMENT INDUSTRY CHANGE IN LIVERPOOL RURAL DESTINATION ZONES (2011-16)

Industry of Employment	Badgerys Creek Airport/Northwest Bringelly	Denham Court	East Badgerys Creek	Greendale	Lower Middle Kemps Creek	North Rossmore
Agriculture, Forestry and Fishing	-13	4	7	45	1	61
Mining	2	-	-	-	-	-
Manufacturing	-87	-9	21	2	-21	-1
Electricity, Gas, Water and Waste Services	-	-	-	-	-	-
Construction	53	36	8	32	-8	52
Wholesale Trade	-1	4	-2	-	18	-1
Retail Trade	-3	-5	-	-2	-6	-
Accommodation and Food Services	-	3	-	1	-	6
Transport, Postal and Warehousing	10	2	-8	12	5	8
Information Media and Telecommunications	-	-	-	-	-	-
Financial and Insurance Services	-	-3	-	-	-	-
Rental, Hiring and Real Estate Services	5	-	6	1	-	-1
Professional, Scientific and Technical Services	-1	5	3	-5	18	-5
Administrative and Support Services	-4	9	3	-3	4	6
Public Administration and Safety	-	-7	-	4	-	-
Education and Training	-	5	-3	-	3	7
Health Care and Social Assistance	13	-7	4	8	1	2
Arts and Recreation Services	0	-	-	-	-	-
Other Services	-3	-13	-	-2	11	-9
Total	-29	24	39	93	26	125
Industry of Employment	Northeast Bringelly	Northeast Leppington	South Luddenham	South Rossmore	Upper Middle Kemps Creek	Wallacia
Agriculture, Forestry and Fishing	-1	-15	-7	-2	13	16
Mining	-	-	8	-	3	-
Manufacturing	-16	-6	-3	-2	1	-2
Electricity, Gas, Water and Waste Services	-	-	55	-	-25	-
Construction	12	10	31	9	22	13
Wholesale Trade	1	-9	-3	-7	6	-10
Retail Trade	-	-26	17	1	2	-4
Accommodation and Food Services	-3	-26	21	5	29	-12
Transport, Postal and Warehousing	3	-11	-4	2	10	10
Information Media and Telecommunications	-	-3	4	-	-	-
Financial and Insurance Services	-	-	-	-	-	-
Rental, Hiring and Real Estate Services	-	4	-	-	-	-1
Professional, Scientific and Technical Services	5	-	4	-3	-1	-3
Administrative and Support Services	-3	-4	12	3	6	10
Public Administration and Safety	-	-	-3	8	-	4
Education and Training	7	4	3	27	12	4
Health Care and Social Assistance	4	6	1	20	0	-13
Arts and Recreation Services	3	-	17	-3	-14	-2
Other Services	8	36	13	7	1	11
Total	20	-18	166	65	65	21

Source: ABS Census TableBuilder (2011 and 2016)

Employment profile

Economic contribution

Agriculture, Forestry and Fishing is a \$204 million industry in Liverpool in terms of its regional output in the wider economy. However, compared to the other industries within Liverpool, it is second from last in terms of value. It has strong supply chains links within the industry itself (\$18 million), as well as with Manufacturing (\$10 million) and Wholesale Trade (\$8 million) amongst others.

At a fine grain level, 'Other Agriculture' (outside of poultry, livestock, sheep, grains, beef and dairy cattle) in Liverpool has strong supply chain links, whether that be within or outside the Liverpool LGA, with Agriculture support services (\$6 million), Wholesale Trade (\$5 million), Water Supply, Sewerage and Drainage Services (\$3 million), Printing (\$2 million), Petroleum and Coal Product Manufacturing (\$2 million) and Professional, Scientific and Technical Services (\$2 million).

Poultry and Other Livestock relies upon Other Agriculture (\$1.83 million), Road Transport (\$1 million), Wholesale Trade (\$1 million), Water Supply, Sewerage and Drainage Services (\$1 million), and Other Food Product Manufacturing (\$1 million).

The economic geography of supply chain links remains unclear given the ABS publishes industry to industry links without geographies.

Table 8 highlights the supply chain links from highest to lowest in terms of \$ value of regional output. 'Upstream' refers to the material inputs needed for production, while 'downstream' (Table 9) is the opposite end, where products are produced and distributed.

TABLE 8: UPSTREAM INDUSTRIES OF AGRICULTURE, FORESTRY AND FISHING IN LIVERPOOL (1 DP)

'From Industry'	Output (\$ million)
Agriculture, Forestry and Fishing	17.5
Manufacturing	10.2
Wholesale Trade	8.3
Construction	6.1
Electricity, Gas, Water and Waste Services	5.7
Transport, Postal and Warehousing	4.7
Professional, Scientific and Technical Services	3.6
Financial and Insurance Services	2.8
Rental, Hiring and Real Estate Services	2.1
Retail Trade	2.1
Other Services	1.8
Administrative and Support Services	1.4
Accommodation and Food Services	0.5
Information Media and Telecommunications	0.2
Public Administration and Safety	0.2
Mining	0.1
Arts and Recreation Services	0.1
Education and Training	0.0
Health Care and Social Assistance	0.0

Source: SGS 2019 using ABS National Accounts 2015-16

Table 9 depicts the downstream industries which receive value from the outputs produced in the Agriculture, Forestry and Fishing industry in Liverpool. It shows that the majority goes to exports (\$58 million), Manufacturing (\$49 million) and households (\$48 million).

TABLE 9: DOWNSTREAM INDUSTRIES FROM AGRICULTURE, FORESTRY AND FISHING IN LIVERPOOL (1 DP)

'From Use'	Output (\$ million)
Exports	58.3
Manufacturing	49.1
Households	47.5
Agriculture, Forestry and Fishing	17.5
Retail Trade	7.0
Private (Gross Fixed Capital Formation)	6.6
Accommodation and Food Services	4.6
Wholesale Trade	2.4
Government (Gross Fixed Capital Formation)	2.3
Rental, Hiring and Real Estate Services	2.2
Construction	1.6
Health Care and Social Assistance	1.4
Arts and Recreation Services	0.8
Transport, Postal and Warehousing	0.7
General Government (Gross Fixed Capital Formation)	0.6
Public Administration and Safety	0.4
Other Services	0.4
Total	... 203.9

Source: SGS 2019 using ABS National Accounts 2015-16

Overleaf, Table 10 identifies output by industry production, consumption, capital expenditure and regional exports. It incorporates the information contained in Table 8 and Table 9 specific to Agriculture, Forestry and Fishing in the Liverpool LGA as well as other industries.

The breakdown of these categories by industry assists in identifying where local businesses expend capital and links that expenditure to increases in productivity. For Table 10, it should be noted that:

- **Total demand** (\$ million) is the sum of supply chain, final consumption expenditure (households and government), and gross fixed capital formation (private, public enterprise, and general government) (these columns are presented in an expanded table at Appendix 3).
- **Exports** is the value (\$ million) of goods/services produced in the Liverpool LGA that are sold outside the region (domestic and international).
- **Total supply** (\$ million) is the sum of total demand and exports.

By value, the largest industry in the Liverpool LGA is Rental, Hiring & Real Estate Services with a total supply of \$4,340M, however, it has comparatively lower demand at \$1,803M with the remaining \$2,537M being exported.

The industry with the lowest supply was identified as Arts and Recreation Services with approximately \$34M in exports from a total supply of \$174M, meaning most of the production was absorbed in the Liverpool LGA. Construction has a similar scenario, where almost all of its expenditure and capital is absorbed locally (\$1,950M).

Agriculture, Forestry and Fishing had a total supply of \$204M with an export value of \$58M. A total \$146M was absorbed locally within the Liverpool LGA, suggesting local value chains are strong within the LGA. A more detailed version of this table is included in Appendix 3.

TABLE 10: LIVERPOOL LGA OUTPUT BY INDUSTRY SECTOR (\$M), 2015-16

Source	Total demand	Exports	Total supply = Total supply + exports
Agriculture, Forestry & Fishing	146	58	204
Mining	21	4	24
Manufacturing	1,203	2,054	3,257
Electricity, Gas, Water & Waste Services	435	30	464
Construction	1,950	7	1,957
Wholesale Trade	822	397	1,219
Retail Trade	818	112	930
Accommodation & Food Services	343	79	422
Transport, Postal & Warehousing	725	688	1,413
Information Media & Telecommunications	203	61	264
Financial & Insurance Services	348	172	520
Rental, Hiring & Real Estate Services	1,803	2,537	4,340
Professional, Scientific & Technical Services	562	57	619
Administrative & Support Services	486	19	505
Public Administration & Safety	844	886	1,731
Education & Training	540	155	695
Health Care & Social Assistance	1,066	245	1,312
Arts & Recreation Services	140	34	174
Other Services	329	74	403
Compensation of employees	5,443	0	5,443
Gross operating surplus & mixed income	4,247	0	4,247
Taxes less subsidies (products)	271	0	272
Taxes less subsidies (production)	371	0	371
Imports	10,976	280	11,256
Total Production	34,094	7,948	42,043

Source: ABS Census TableBuilder (2016) and ABS National Accounts (2015-16).

Note: Industries shown are ANZSIC 1-digit.

Cross-industry linkages

Figure 24 maps the cross-industry linkages in the Liverpool LGA. It weights higher output values with the thickness of the links above a threshold value (in this case, \$15 million and above) to identify significant regional industry flows.

The data in the figure below shows that there are strong connections between Construction and Rental Hiring and Real Estate Services, as well as Manufacturing. This is reflected Table 10, which shows that most capital investment is captured within the industry flows (demand).

Agriculture, Forestry and Fishing has strong links within its own industry, and Manufacturing.

Other connections of note include multiple flows from and to the Wholesale Trade industry and many flows towards Professional, Scientific and Technical Services.

FIGURE 24: VALUE ADDED WEIGHTED SUPPLY CHAIN BY INDUSTRY, 2015-16 VALUES (LIVERPOOL LGA)



Source: SGS 2019 using ABS National Accounts 2015-16

Industry linkages in the local economy

The Input-Output (I-O) Model is a tool which quantifies the linkages of all sectors in a given economy, measuring the relationships and inter-dependence between industries in the economy. It was the model used to generate Table 8. The model also identifies buyer and supplier linkages in the local economy, highlighting those industries with the greatest economic 'multipliers'.

The I-O Model measures the effects of additional development in a particular industry. For every dollar or unit of output from one industry there are flow-on effects to other industries in the form of goods and services required. The focus of this analysis is on the local 'multiplier' effects associated with an increase in production in a particular industry.

Multipliers are measures of the total impact on all industries in an economy arising from changes in the output of a particular industry. For example, an increase in output of the Construction industry (i.e. more houses) would have a flow-on effect to industries related to construction. The I-O model framework enables identification of those industries that have the biggest 'bang for the buck,' in terms of value-add and employment per additional unit of output. Multipliers derived from the model estimate three key measures:

- Output (or income);
- Value-added Gross Regional Product (GRP); and
- Full time equivalent (FTE) jobs.

Below, Table 11 shows the input-output multipliers for industries within the Liverpool LGA at across different industries (1-digit ANZSIC) level. The table highlights the industries that have the largest effects on the overall economy of Liverpool (green being the highest, red being the lowest) for each multiplier. *Unfortunately, the I-O Model can only be aggregated at an LGA level and is not able to separate urban and rural Liverpool economies.*

The multipliers can be interpreted in the following ways:

- **Output Multipliers:** For every additional dollar earned in Construction, the level of regional output increases by \$1.95.
- **Employment Multipliers:** At present each \$1 million increase in the output in Retail Trade, 10 jobs will be generated.
- **Value Added Multipliers:** For every extra dollar of output generated in the Administrative and Support Services industry, total regional income and gross operating surplus will increase by \$1.03.

For Agriculture, Forestry and Fishing, each \$1 million increase in its regional output generates 4 jobs.

Economic contribution is one measure of importance. While other industries in the Liverpool LGA have greater economic contribution through these measures, not all parts of an LGA can (or should) accommodate the highest value uses. This is partially because there is not the demand; but also, in acknowledgement that cities and regions require a diversity of land uses to support the ongoing sustainability of populations and economies.

TABLE 11: MULTIPLIER EFFECT (ECONOMIC VALUE CREATED BY JOBS) LIVERPOOL LGA (2016)

Industry of Employment	Output Multiplier	Employment Multiplier	Value Added Multipliers
Agriculture, Forestry and Fishing	1.66	4	0.68
Mining	1.63	3	0.63
Manufacturing	1.54	3	0.45
Electricity, Gas, Water and Waste Services	1.87	3	0.75
Construction	1.95	4	0.58
Wholesale Trade	1.79	4	0.81
Retail Trade	1.83	10	0.99
Accommodation and Food Services	1.79	10	0.79
Transport, Postal and Warehousing	1.86	5	0.81
Information Media and Telecommunications	1.70	3	0.67
Financial and Insurance Services	1.69	4	0.99
Rental, Hiring and Real Estate Services	1.41	1	0.86
Professional, Scientific and Technical Services	1.88	6	0.93
Administrative and Support Services	1.88	6	1.03
Public Administration and Safety	1.76	7	0.92
Education and Training	1.71	4	1.01
Health Care and Social Assistance	1.70	10	0.94
Arts and Recreation Services	1.57	6	0.49
Other Services	1.53	7	0.56

Source: SGS Economics and Planning 2019.

Note: Conditional formatting (colour scales) has been applied for each column and not collectively across the whole table, in order to allow for distinctions to be made within each multiplier instead.

Agriculture and the Liverpool economy

SGS conducted a wider literature review to provide further validation of the value or significance of Liverpool's agricultural lands in the local or wider economy, and observe trends. This analysis is further expanded and updated by RMCG within the Agricultural Lands review in Chapter 5.

The review found that Liverpool supplies poultry and eggs, vegetables, flowers and dairy to the Sydney market and beyond. Specifically, Hoxton Park as a market gardening area as well as a major transportation base, supplies 5 per cent of the tomatoes at the Sydney Markets in Flemington annually (based on 2013 data).¹¹ This is significant given there are other major tomato producing regions in regional Australia such as Guyra. Austral-Leppington provides 1.1 per cent of leafy or stem vegetables (including asparagus, cabbages, cauliflowers, broccoli, lettuce, spinach and artichokes), and 12.5 per cent of mushrooms and truffles. Furthermore, Liverpool farmers want to be at the forefront of a nationwide push into advanced food manufacturing, with the development of a 'high tech agri-food precinct' within the Liverpool LGA, supported by the Future Food Systems Cooperative Research Centre (CRC). The CRC is a Commonwealth initiative, with research and capability programs which aim to support participants in taking new products to market and creating supply chains between farm and consumer.

Intensive horticulture under greenhouse production is prevalent in the rural areas but on a relatively small and dispersed scale, aside from one major dairy operator (Leppington Pastoral Company Dairy).¹² Further development of the agricultural industry in rural Liverpool is threatened by the lack of secure and suitable water resources.

There may be potential for greater food-related economic opportunities given rural Liverpool's close proximity to the Western Sydney Aerotropolis. This includes food markets, agribusiness education, food related research and development and food related tourism. Indeed, since the WSAP update in December 2019 these concepts underpin the vision for the Agriculture and Agribusiness precinct to the Airport's immediate west.

Liverpool is also one of more than 70 partners in the newly formed *Future Food Systems Cooperative Research Centre*. This attempts to future-proof the agriculture industry and create jobs by improving efficiency of energy resources, reducing costs to make agriculture profitable and competitive into the future, and becoming a food hub of researchers, growers and manufacturers.

Land capability and soil fertility

Figure 25 shows the level of land capability in rural Liverpool; this is further explored by RMCG's work in Section 5.5. *Land capability* is the inherent physical capacity of the land to sustain a range of land uses and management practices in the long term without degradation to soil, land, air and water resources. Failure to manage land in accordance with its capability risks degradation of resources both on- and off-site, leading to a decline in natural ecosystem values, agricultural productivity and infrastructure functionality.

The dataset uses an assessment of soil against eight key soil and landscape hazards:

- Water erosion
- Topsoil acidification
- Waterlogging
- Wind erosion
- Shallow soils/rockiness
- Mass movement.
- Salinity
- Soil structure decline

Each hazard is given a rating between 1 (best, highest capability land) and 8 (worst, lowest capability land). The final capability class is then based on the most limiting hazard. More

¹¹ http://www.uws.edu.au/_data/assets/pdf_file/0010/482518/Sydney_Markets_Report.pdf

¹² <https://www.nswfarmers.org.au/UploadedFiles/NSWFA/Poilycy%20Industry/NSWFAFoodEconomy.pdf>

detail on the use of the land capability dataset is available on the Department of Planning, Industry and Environment's website.¹³

Liverpool has a mix of Class 2 to Class 8 land. Class 2 (i.e. slight but significant limitations) is capable of a wide range of land uses and land management practices. Included in Class 2 is very good cropping land (i.e. cereals, oilseeds and pulses) and viable agricultural uses that involve cultivation, such as vegetable and horticultural production.

At the other extreme, Classes 7-8 (i.e. extremely severe and severe limitations) are generally unsuitable for any type of cropping or grazing because of its limitations. It may be too steep, rocky, swampy or fragile for grazing. More detail on descriptions and land management considerations for each class can be found in Appendix 4.

Over the following pages, Figure 25 shows that there are some very severe and extremely severe limitations in parts of Greendale and Wallacia, while the eastern parts of rural Liverpool contain fewer constraints (East Badgerys Creek and Northeast Bringelly). Land in the precinct identified for Agribusiness and Agriculture (WSAP, 2019) is subject to very severe (Class 6) limitations in the north, with slight but significant limitations (Class 2) in the south.

Figure 26 indicates estimated inherent soil fertility in rural Liverpool. *Inherent fertility* is a relative indicator of the soil's capacity to retain and release nutrients for uptake by plants, and is associated with clay and organic matter content. It was derived from a lookup table system linking a fertility class to a particular soil type (Great Soil Group), which was then attributed for each soil map unit. The lookup table can be found in Appendix 5.

It shows that Wallacia, Greendale and South Luddenham have high soil types with high fertility, while the eastern end of rural Liverpool is comparatively lower.

There is a conflict between land capability and soil fertility in parts of rural Liverpool. This is because land capability essentially measures the resilience of a parcel of land relative to a number of hazards, while inherent soil fertility only looks at the type of soil on the parcel of land. It is possible to have fertile soil sitting in unsuitable land formations, such as steeply sloped land or in areas highly subject to land and wind erosion. This is the case in parts of Wallacia and Greendale in rural Liverpool when comparing Figure 25 and Figure 26.

SGS has created several maps that outline how land in rural Liverpool is being used for food production, forestry, nature conservation, infrastructure and urban development. These are provided in the Appendix 1. The maps indicate that most land in rural Liverpool is residential and farm infrastructure or grazing native vegetation. In the eastern end of rural Liverpool (Rossmore and Kemps Creek), there is much more intensive, irrigated perennial and irrigated seasonal horticultural uses. In the western end of rural Liverpool, there are pockets of reservoir/dams scattered throughout the region.

The future of agriculture based on structural market changes, the impact of the Western Sydney Aerotropolis Plan, and underlying soil and land capability, is further explored in analysis conducted by RMCG; see Chapter 5: Agricultural context.

Forecast change in employment

The Western Sydney Aerotropolis covers a significant portion of Liverpool's rural areas, to the west of existing residential growth areas. As outlined in Chapter 2: Overview of the Western Sydney Aerotropolis, plans for this area have the potential to change the employment landscape of rural Liverpool significantly by 2036. Figure 27 indicates how the Aerotropolis fits within rural Liverpool's rural areas.

TPA (within Transport for NSW)¹⁴ provides employment projections based on the best available data, trends and an understanding of policy/structural changes. It shows that rural Liverpool will grow by +31,903 jobs in the 20 years between 2016 and 2036. This represents

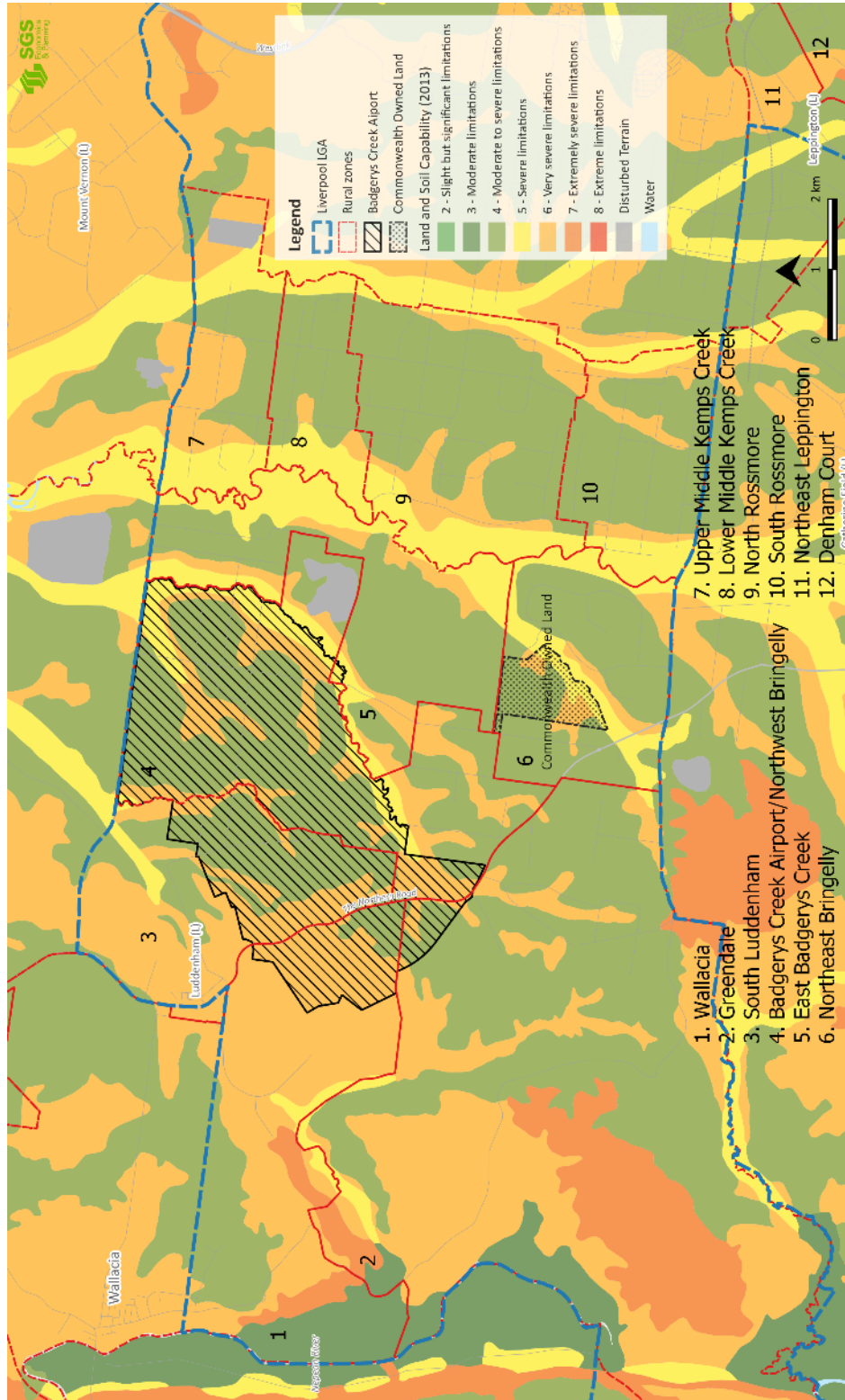
¹³ <https://data.nsw.gov.au/data/dataset/land-and-soil-capability-mapping-for-nsw4bc12>

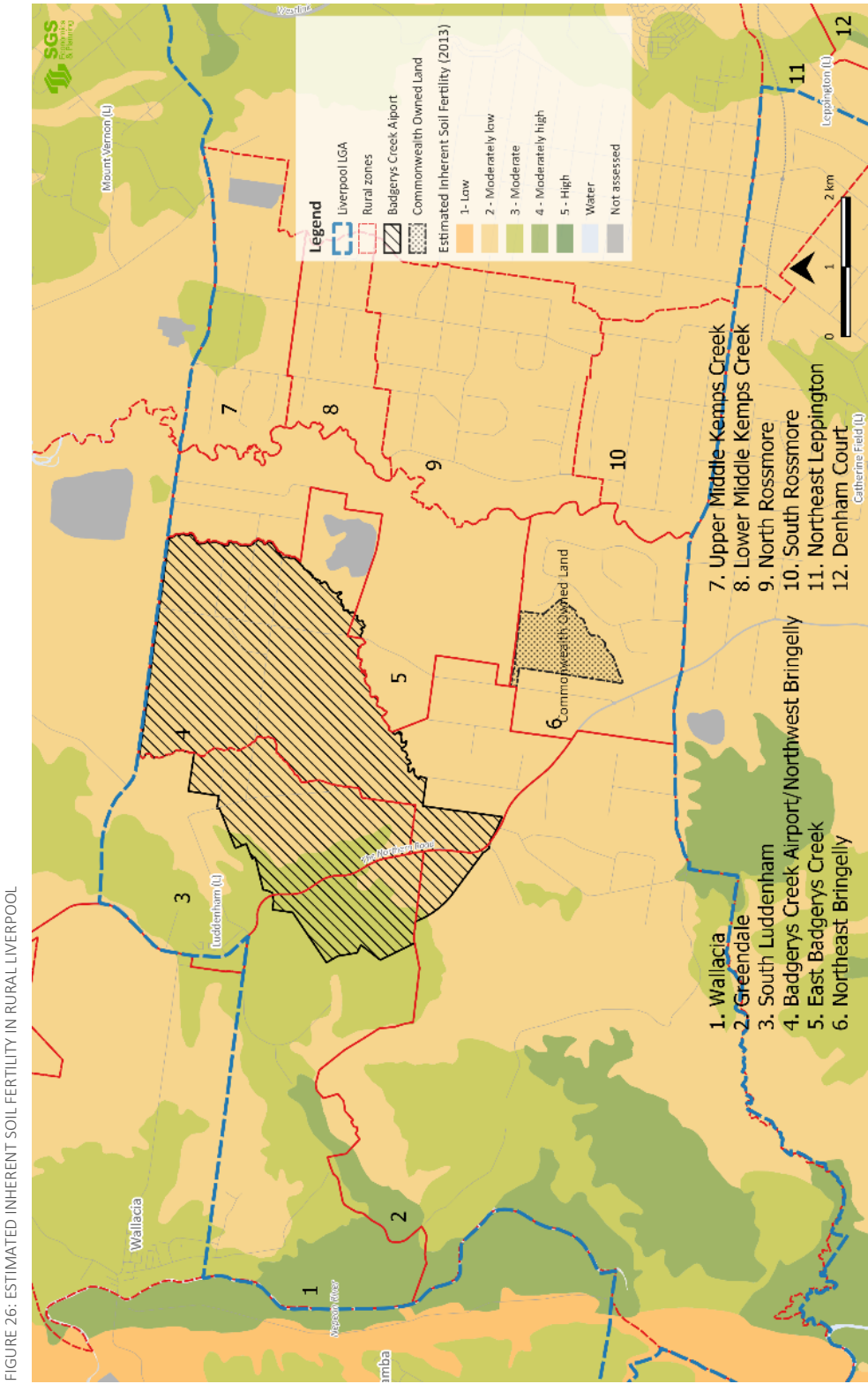
¹⁴ Transport for NSW, *Forecasts and Projections (Travel, population, workforce and employment projections)* (2016), <https://opendata.transport.nsw.gov.au/dataset/employment-projections>.

an increase of +783 per cent. Comparatively speaking, urban Liverpool is expecting +20,098 jobs, representing a +110 per cent increase on current levels. The Greater Sydney average growth rate from 2016-36 is expected to be +36 per cent.

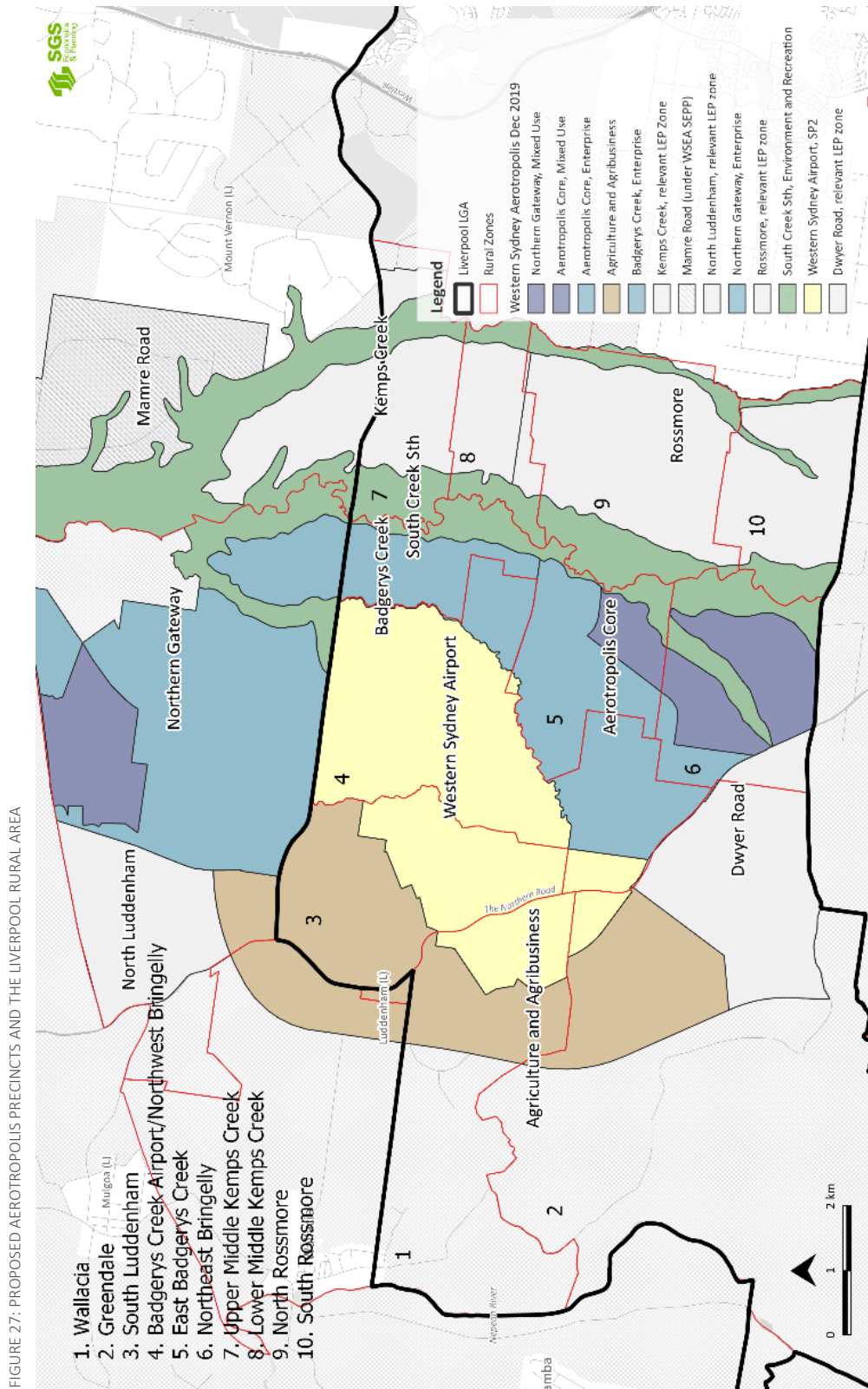
Table 12 depicts forecasted industry changes from 2016-36. It shows that Professional, Scientific and Technical Services is expecting to see the highest job growth compared to any other industry in rural Liverpool (+4,446) followed by Transport, Postal and Warehousing (+4,446) and Retail Trade (+4,322).

FIGURE 25: LAND CAPABILITY IN RURAL LIVERPOOL





Source: Department of Planning, Industry and Environment 2017



Source: SGS Economics and Planning, based on the WSAP, 2019.

TABLE 12: FORECAST EMPLOYMENT INDUSTRY CHANGE (2016-36)

Industry of Employment	Rural area	Urban area	Liverpool LGA	Greater Sydney
Agriculture, Forestry and Fishing	-93	31	-62	-1,630
Mining	22	-	22	1,127
Manufacturing	514	-119	395	5,184
Electricity, Gas, Water and Waste Services	195	163	358	9,638
Construction	2,139	1,997	4,136	55,955
Wholesale Trade	2,113	411	2,524	25,507
Retail Trade	4,322	2,689	7,011	75,741
Accommodation and Food Services	2,795	1,691	4,486	59,113
Transport, Postal and Warehousing	4,446	1,230	5,676	34,792
Information Media and Telecommunications	445	417	862	12,340
Financial and Insurance Services	1,421	393	1,814	66,869
Rental, Hiring and Real Estate Services	1,246	522	1,768	18,431
Professional, Scientific and Technical Services	4,463	1,881	6,344	182,453
Administrative and Support Services	1,309	353	1,662	16,198
Public Administration and Safety	547	323	870	64,486
Education and Training	1,567	3,362	4,929	97,554
Health Care and Social Assistance	1,588	3,857	5,445	113,114
Arts and Recreation Services	545	279	824	21,201
Other Services	2,319	618	2,937	39,537
Total	31,903	20,098	52,001	897,610

Source: ABS Census TableBuilder (2016), TZP2016 v1.51

The industries expecting the largest job increases in rural Liverpool are Professional, Scientific and Technical Services (+4,463 jobs), Transport, Postal and Warehousing (+4,446) and Retail Trade (+4,322). In each of these three industries, the area expected to experience most the growth is *South Luddenham*, followed by *Northeast Leppington* (in terms of Professional, Scientific and Technical Services and Retail Trade).

Agriculture, Forestry and Fishing is expected to have a net decline of -93 jobs. Upon closer examination, the declines are expected to be greatest in North Rossmore (-134), Greendale (-87) and South Rossmore (-36). *South Luddenham* is expected to have the highest increase of Agriculture, Forestry and Fishing jobs (+142 jobs) followed by *Badgerys Creek Airport/Northwest Bringelly* (+74) and *Denham Court* (+39).

Wholesale Trade jobs are expected to grow significantly in *South Luddenham* (+1,174 jobs). However, job growth in this industry will be dispersed across the rural regions at a lesser scale, with increases in *Greendale* (+362), *Badgerys Creek Airport/Northwest Bringelly* (+247), *Northeast Leppington* (+129), and *East Badgerys Creek* (+79) notable. Wholesale Trade are not projected to decline in any area.

Of all the rural Destination Zones, *South Luddenham* is forecasted for a significantly higher increase of jobs over the 20 years between 2016-36 (+17,669) compared to any other rural Destination Zone. *Northeast Leppington* comes closest (+5,042 jobs), followed by *Greendale* (+3,565) and *Badgerys Creek Airport/Northwest Bringelly* (+3,042).

Within *South Luddenham*, the job growth is expected to be in Retail Trade (+2,845), Transport, Postal and Warehousing (+2,468), Professional Scientific and Technical Services (+1,995) and Other Services (+1,864). Further detail can be found in Table 13.

TABLE 13: FORECAST EMPLOYMENT INDUSTRY CHANGE IN LIVERPOOL RURAL DESTINATION ZONES (2016-36)

Industry of Employment	Badgerys Creek Airport/Northwest Bringelly	Denham Court	East Badgerys Creek	Greendale	Lower Middle Kemps Creek	North Rossmore
Agriculture, Forestry and Fishing	74	39	-17	-87	-14	-134
Mining	5	2	-	-	-	-
Manufacturing	298	2	38	7	-	7
Electricity, Gas, Water and Waste Services	-	2	-	148	-	-
Construction	333	59	28	401	40	150
Wholesale Trade	247	8	79	362	60	37
Retail Trade	175	219	-	200	-	4
Accommodation and Food Services	107	145	-	189	-	11
Transport, Postal and Warehousing	1,099	4	7	562	42	29
Information Media and Telecommunications	-	14	-	132	-	-
Financial and Insurance Services	128	41	-	172	-	-
Rental, Hiring and Real Estate Services	11	45	6	116	-	7
Professional, Scientific and Technical Services	308	174	10	590	100	24
Administrative and Support Services	37	42	1	175	6	4
Public Administration and Safety	55	23	-	80	-	-
Education and Training	-	98	-	88	3	7
Health Care and Social Assistance	27	94	9	182	26	70
Arts and Recreation Services	-	45	-	126	-	-
Other Services	138	50	-	122	4	7
Total	3,042	1,106	161	3,565	267	223
Industry of Employment	Northeast Bringelly	Northeast Leppington	South Luddenham	South Rossmore	Upper Middle Kemps Creek	Wallacia
Agriculture, Forestry and Fishing	-10	-4	142	-36	-21	-25
Mining	-	-	27	-	-12	-
Manufacturing	11	1	134	1	17	-2
Electricity, Gas, Water and Waste Services	-	3	36	-	6	-
Construction	149	111	733	46	70	19
Wholesale Trade	-	129	1,174	6	11	-
Retail Trade	2	865	2,845	6	3	3
Accommodation and Food Services	-	495	1,788	6	41	13
Transport, Postal and Warehousing	28	130	2,468	16	35	26
Information Media and Telecommunications	-	234	65	-	-	-
Financial and Insurance Services	-	246	834	-	-	-
Rental, Hiring and Real Estate Services	-	248	811	-	-	2
Professional, Scientific and Technical Services	53	1,191	1,995	2	13	3
Administrative and Support Services	3	249	778	7	3	4
Public Administration and Safety	-	227	156	4	-	2
Education and Training	25	316	879	50	85	16
Health Care and Social Assistance	24	401	672	80	-	3
Arts and Recreation Services	-	93	268	1	11	1
Other Services	7	107	1,864	7	2	11
Total	292	5,042	17,669	196	264	76

Source: ABS Census TableBuilder (2016), TZP2016 v1.51

Key findings: Liverpool economic and employment profile

Liverpool has an important agricultural sector that significantly contributes to the Sydney Basin food industry. Poultry, mushrooms, nursery, tomatoes, cut flowers, lettuces and strawberries from Liverpool make a significant contribution to overall supply.

Alongside agriculture, the rural area of Liverpool also has a large construction industry, although this is likely driven in part by actual construction (meaning the presence of various jobs during the Census collection may reflect construction work going on rather than a local industry strength), rather than being solely driven by construction businesses setting up operations. Conversely, the urban area of Liverpool's economic strength lies within its existing population serving industries, health care and social assistance and retail.

- **Agriculture is one of rural Liverpool's strengths.** There is a high number of Mushroom and Vegetable Growing jobs in Rossmore. Greendale has a mix of agricultural activities including Dairy Cattle Farming, Poultry Farming and Mushroom and Vegetable Farming. There is also a high presence of Poultry Processing jobs in East Badgerys Creek. These two industries are also projected to grow.
- **Land zones influences present activity.** Most of the Construction jobs (40 per cent) currently take place in Large Lot Residential, while most of the Agriculture, Forestry and Fishing jobs (23 per cent) take place in Primary Production Small Lots.
- **Agriculture has flow-on effects to other industry sectors.** While most of the output is exported, it also has strong links with Manufacturing, Retail Trade, Accommodation and Food Services and Wholesale Trade.
- **Kemps Creek, Rossmore and East Badgerys Creek have the greatest soil capability.** Wallacia and Greendale have more extreme limitations.
- **Wallacia and Greendale have the greatest soil fertility.** The eastern and central strips of rural Liverpool have moderately low soil fertility. However, parts of Wallacia and Greendale also have constrained land capability. Low fertility is associated with a sandier soil, making it more suited to horticultural crops that don't thrive in clay soils. In these locations, growers can make up for a nutrient shortfall by using fertiliser and frequent watering for soil moisture. Clay soils tend to have higher fertility and better water holding capacity.
- **The eastern strip of rural Liverpool is more 'agriculturally intensive'.** Residential and farm infrastructure or grazing native vegetation makes up the majority of land. The eastern end (Rossmore and Kemps Creek) have more intensive irrigated perennial and irrigated horticultural uses, whereas the western side has more pockets of reservoirs/dams.
- **The Aerotropolis is expecting high and diverse job growth.** Industries such as Retail Trade, Transport, Postal and Warehousing, Professional, Scientific and Technical Services and Accommodation and Food Services are projected to grow in South Luddenham and Greendale significantly, while eastern rural Liverpool will see continued growth primarily in Construction and Agriculture, Forestry and Fishing.

5. AGRICULTURAL CONTEXT

This section provides detailed information about the size and value of agricultural activity across Liverpool's rural lands. It expands on the employment and economic analysis presented in Section 4.2 of this report.

In this section, RMCG has prepared its input to address the following questions:

- What is the current status of agriculture in Liverpool and what contribution does it make to the Sydney Food Bowl?
- What is the likely impact of the Western Sydney Airport/agribusiness precinct on surrounding ag land?
- What is the likely development/role of the agribusiness precinct?

5.1 Overview

Agriculture in the Liverpool LGA is part of a significant fresh food industry in the Sydney Basin (Table 14). In 2015-16 the Sydney Basin produced 34 per cent of NSW vegetables, 25 per cent of NSW poultry and 63 per cent of NSW strawberries of which, Liverpool contributed:

- 15 per cent of vegetables including mushrooms, lettuces and tomatoes
- 23 per cent of poultry
- 19 per cent of strawberries.

Liverpool's top commodities by gross value of agricultural production (GVAP) include poultry, mushrooms, nursery, tomatoes, cut flowers, lettuces and strawberries (Figure 28). Milk is also another important commodity in Liverpool (7.1 million in 2016), however, this is insignificant at the regional or state level.

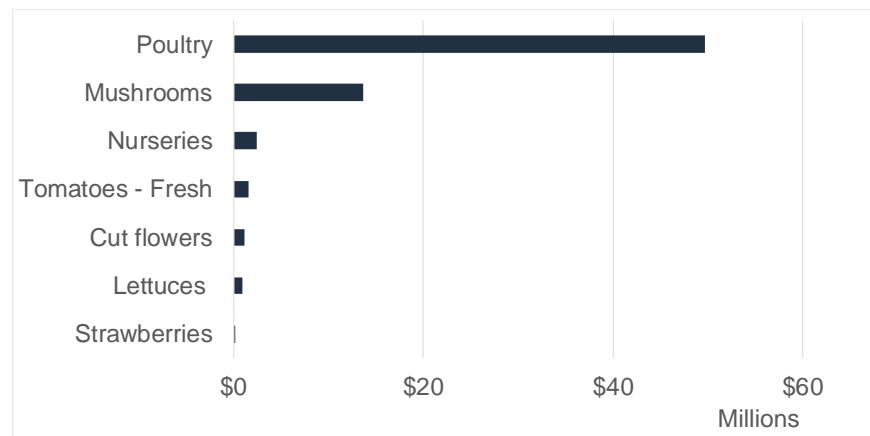
The diversity of agricultural products has reduced over time as production has moved from largely soil-based to protected cropping or 'indoor' farming. Commodities that are no longer produced or largely disappeared from the City include: orchard fruit such as nectarines and peaches; livestock such as pig and sheep; vegetables including artichokes, beetroot, butter beans, cabbages, cauliflowers, Chinese cabbage (bok choy and wombok), cucumbers, green peas, onions, parsnips, potatoes, pumpkins, radish, silverbeet, spinach, snow peas, spring onions, swedes, sweet corn, zucchinis, eggplant, leeks and parsley.

TABLE 14. GROSS VALUE OF AGRICULTURAL PRODUCTION IN THE SYDNEY BASIN AND LIVERPOOL

Commodity	Sydney basin as a per centage of NSW GVAP	Liverpool as a per centage of Sydney basin GVAP
Mushrooms	94%	18%
Lettuces	64%	18%
Strawberries	63%	19%
Poultry	25%	23%
Fresh tomatoes	17%	29%
Nurseries	29%	6%
Cut flowers	48%	3%

Source: Australian Bureau of Statistics: Catalogue 75030DO006_201516, Value of Agricultural Commodities Produced, Australia-2015-16

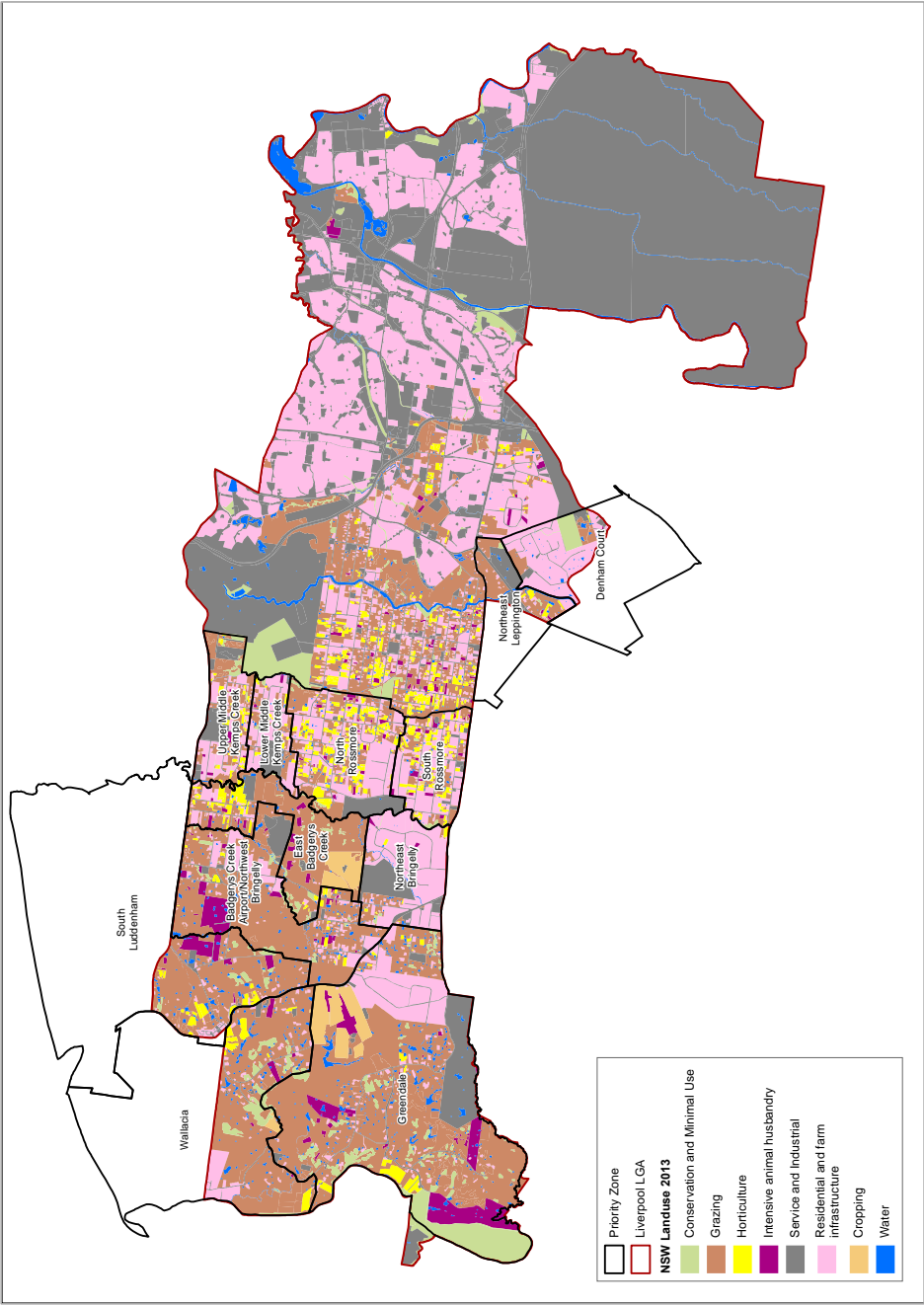
FIGURE 28: GROSS VALUE OF TOP COMMODITIES PRODUCED IN LIVERPOOL



Source: Australian Bureau of Statistics: Catalogue 75030DO006_201516, Value of Agricultural Commodities Produced, Australia–2015-16

Horticulture is focused in the Austral, Rossmore and Kemps Creek areas. Leppington Pastoral Company is located in Greendale and intensive animal husbandry is scattered across the rural areas (Figure 29 on page 70, and Appendix 3).

FIGURE 29: LAND USE



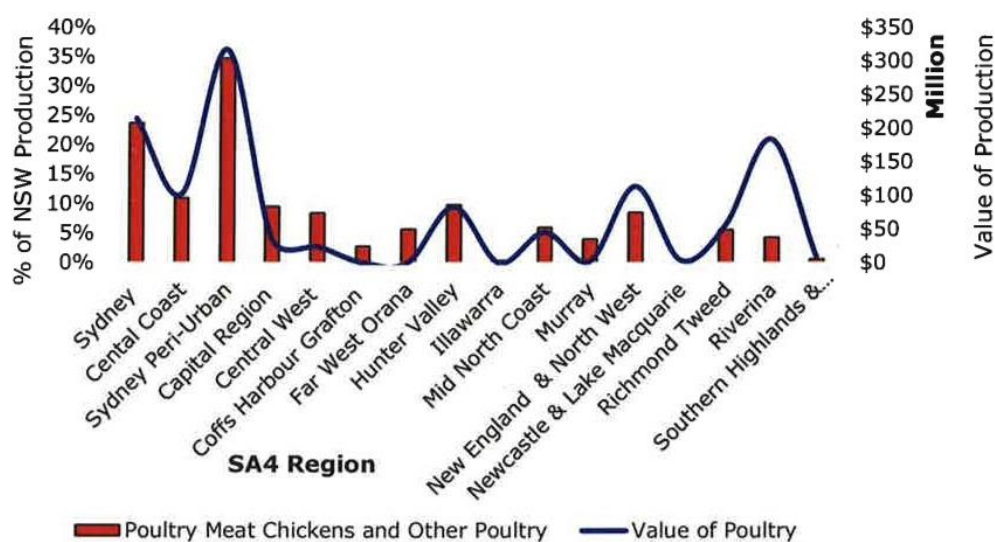
Source: NSW Government Land use dataset, 2013.

5.2 Poultry

The poultry meat industry is the largest agricultural commodity sector in the Sydney basin and is also currently, the largest poultry meat cluster in NSW (Figure 30), producing around 25 per cent of the total value of production of poultry meat in NSW. In 2015-16 the Sydney basin produced poultry meat with a farm gate value of \$215 million, of which Liverpool contributed 23 per cent, or just under \$50 million. Poultry meat farms are clustered around Liverpool, Picton and Marsden Park (Figure 33).

The poultry meat industry has increased five-fold in value over the last twenty years, while bird numbers have increased three-fold and property numbers have remained relatively steady (data should be considered carefully due to small sample size). As the price for chicken meat has remained relatively static over the same time period, industry growth is most likely attributed to increase in business scale as well as improvements in productivity and operational efficiency.

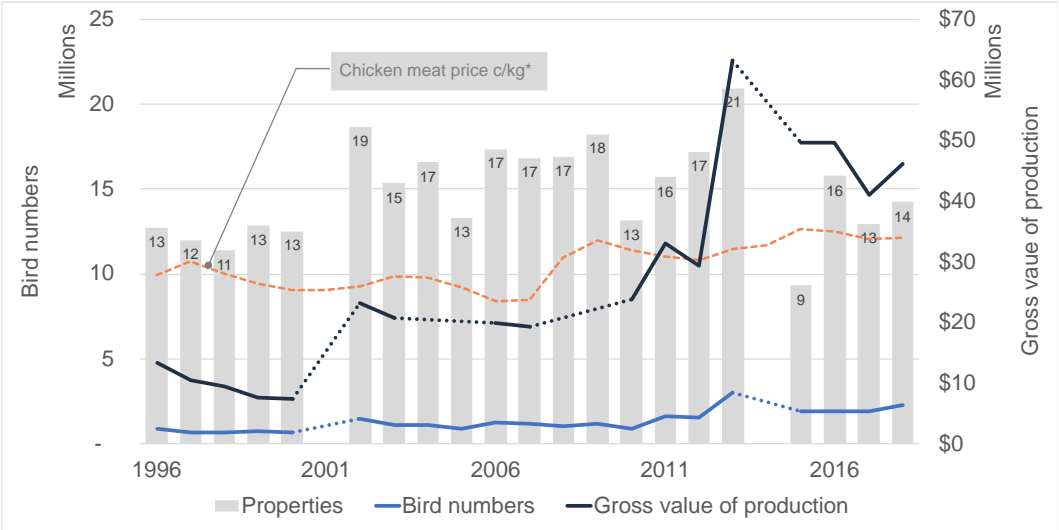
FIGURE 30: NSW POULTRY PRODUCTION BY SA4 REGION



Based on Number of Meat Chickens
Source: ABS 7121.0, Agriculture Commodities 2015-16

Source: ABARES Agricultural Commodity Statistics, December 2017. Price estimates are formed by indexing from the December quarter 2007 price for fresh whole chickens. Note price data has been scaled to fit graph and ranges from 99c/kg up to 126c/kg.

FIGURE 31: LIVERPOOL POULTRY MEAT INDUSTRY



Source: ABARES Agricultural Commodity Statistics, December 2017. Price estimates are formed by indexing from the December quarter 2007 price for fresh whole chickens. Note price data has been scaled to fit graph and ranges from 99c/kg up to 126c/kg.

FIGURE 32: POULTRY (PROBABLY DUCKS) SHEDS



Source: RMCG, 2019.

The map displays the Sydney basin, including areas like Camden, Liverpool, and the Blue Mountains. Red shaded regions indicate proposed urban land release areas, while blue dots represent poultry meat farms. A legend in the bottom right corner, titled "Poultry meat farms in the Sydney basin", defines these symbols. A green arrow points from the text "Liverpool City" to a specific location in the Liverpool area.

Poultry meat farms in the Sydney basin

- Proposed urban land release areas
- Poultry meat farms



5.3 Fruit and vegetables

The Sydney Basin also hosts a significant fresh produce sector. In 2015-16 the Sydney basin produced 34 per cent of NSW vegetables, of which Liverpool City contributed 15 per cent (of the 34 per cent). Vegetables and fruit produced in the Sydney basin, including Liverpool are primarily perishable, high value products sold into wholesale markets. In 2015-16 the main fruit and vegetables produced in Liverpool by value of production were mushrooms (\$13.7 million), tomatoes (\$1.6 million), lettuces (\$0.9 million) and strawberries (0.1 million).

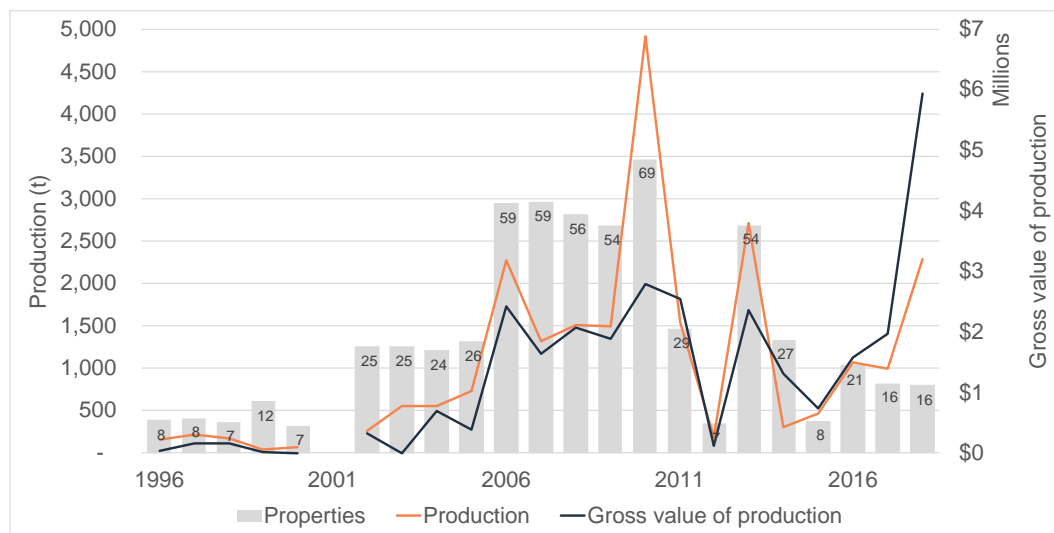
Production of tomatoes (Figure 34), lettuces (Figure 36) and strawberries (Figure 35) is highly seasonal and a mix of soil based and hydroponic growth mediums and protected (mainly plastic tunnels) and unprotected cropping.

Mushroom production is a relatively new industry to the City and has grown substantially over the last 8 years to become Liverpool's highest value vegetable commodity (Figure 37). In 2015-16 the industry produced 17 per cent of the value of NSW mushrooms. Mushrooms are grown in controlled, fully enclosed environments.

The main fruit and vegetables produced in Liverpool by value of production are mushrooms, tomatoes, lettuces and strawberries. As shown in the figures below, production of tomatoes, lettuces and strawberries is highly seasonal.

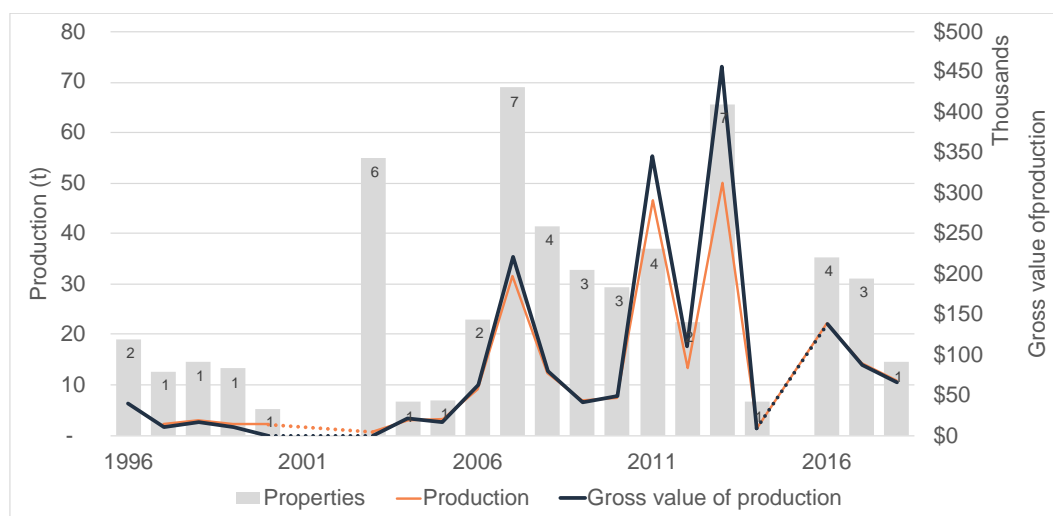
As shown below, the mushroom industry is a relatively new industry to the City and has grown substantially over the last eight years to become Liverpool's highest value vegetable commodity.

FIGURE 34: LIVERPOOL TOMATO INDUSTRY



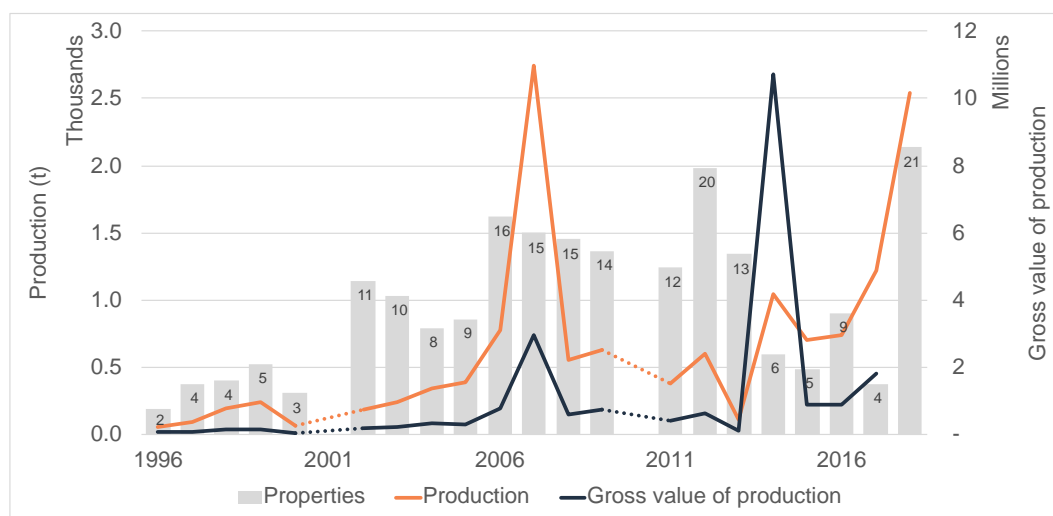
Source: RMCG, 2019.

FIGURE 35: LIVERPOOL STRAWBERRY INDUSTRY



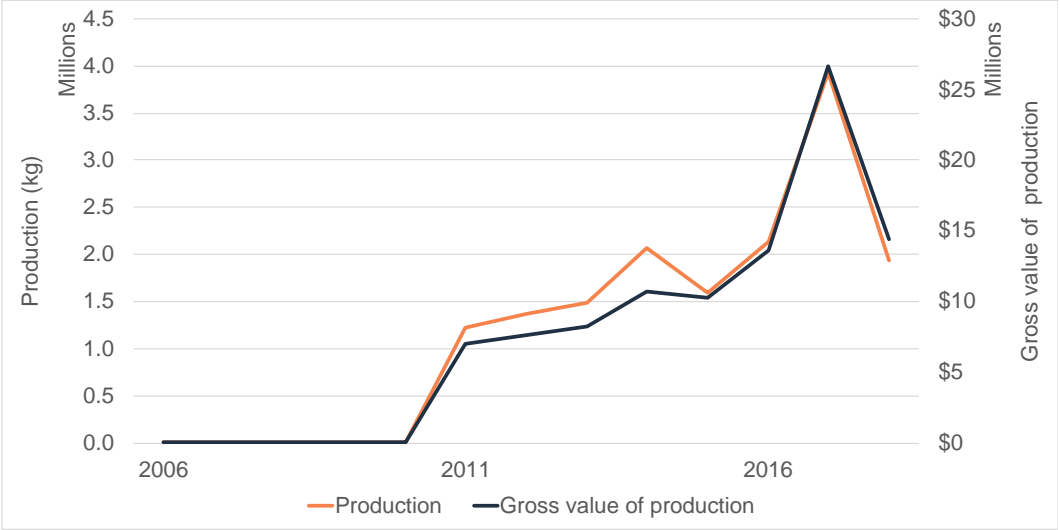
Source: RMCG, 2019.

FIGURE 36: LIVERPOOL LETTUCE INDUSTRY



Source: RMCG, 2019.

FIGURE 37: LIVERPOOL MUSHROOM INDUSTRY



Source: RMCG, 2019.

FIGURE 38: HYDROPONIC LETTUCE UNDER PLASTIC WEATHER PROTECTION



Source: RMCG, 2019.

FIGURE 39: HYDROPONIC SALAD ONIONS



Source: RMCG, 2019.

FIGURE 40: KALE IN SOIL BEDS



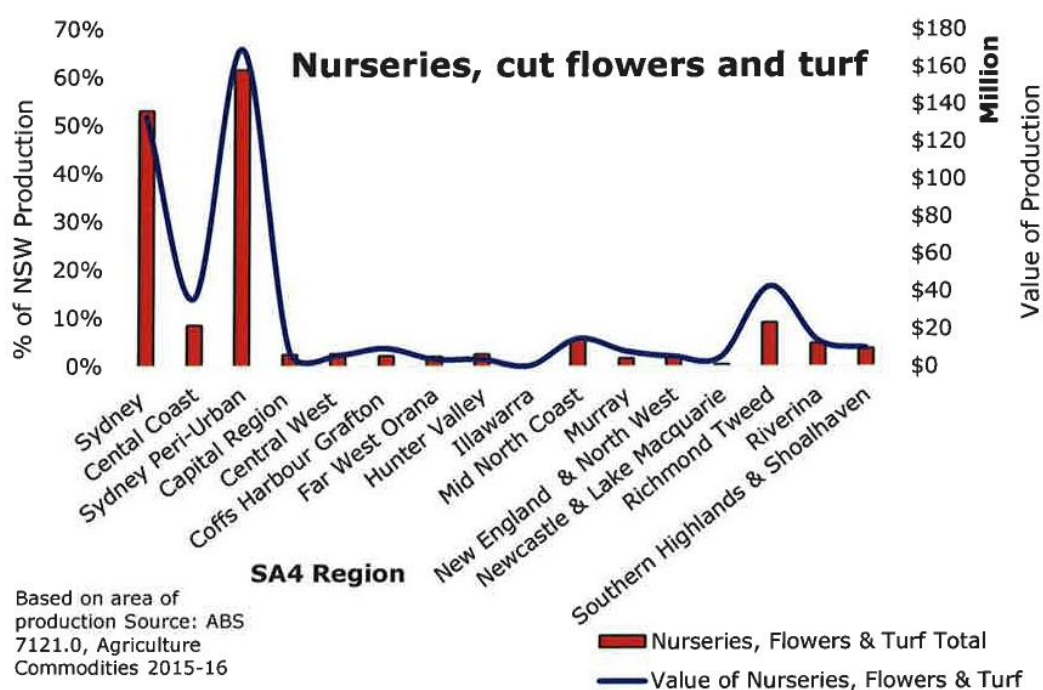
Source: RMCG, 2019.

5.4 Ornamental Horticulture

The ornamental horticulture sector in the Sydney basin, including nursery and cut flower production, is an important contributor (around 44 per cent) to the gross value of the NSW ornamental horticulture (Table 14, Figure 41). The Sydney Basin produced 29 per cent of the value of NSW nursery plants and 48 per cent of the value of NSW cut flowers in 2015-16. Liverpool produced 6 per cent of the value of Sydney Basin nursery plants and 3 per cent of the value of NSW cut flowers in 2015-16

In Liverpool, cut flower production peaked between 2006 and 2011, but production levels and the number of cut flower growers have since reduced (Figure 42). By contrast, the area of production and gross value of nursery production has shown, small but steady growth over the last 20 years (Figure 43).

FIGURE 41: NSW ORNAMENTAL HORTICULTURE PRODUCTION BY SA4 REGION

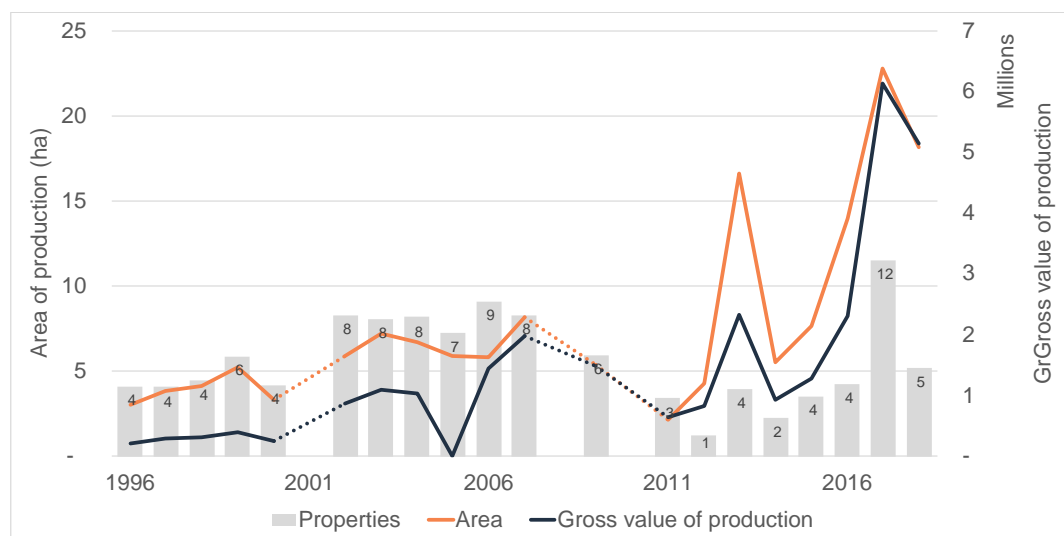


Source: ABS, 2015-16.

FIGURE 42: LIVERPOOL CUT FLOWER INDUSTRY



FIGURE 43: LIVERPOOL NURSERY INDUSTRY



Source: RMCG, 2019.

5.5 Land capability

An assessment of agricultural capability of land within Liverpool was undertaken, using State-wide land capability data and land ownership data (de-identified).

State-wide mapping of land and soil capability (LSC)¹⁵ classifies land into eight classes (Table 15) based on a range of agricultural practices that can be sustained, ease of management and risk of degradation. The limitations to agricultural use are determined by factors including, but not limited to soil properties and climate. The more limitations for agricultural practices, the higher the classification and the lower the agricultural versatility or value.

The land capability of land in Liverpool reflects the underlying topography comprising a north-south pattern of streams and riparian areas with Class 5 to Class 6, moderate-low to low land capability, interspersed with more elevated land that is mainly Class 4 moderate land capability (Figure 44). Land in the RU1 Zone to the west, is less fragmented but the land capability is mainly low to very low agricultural capability. Land in the RU4 Zone is highly fragmented and has land capability ranging from Class 4 moderate to Class 6 low capability.

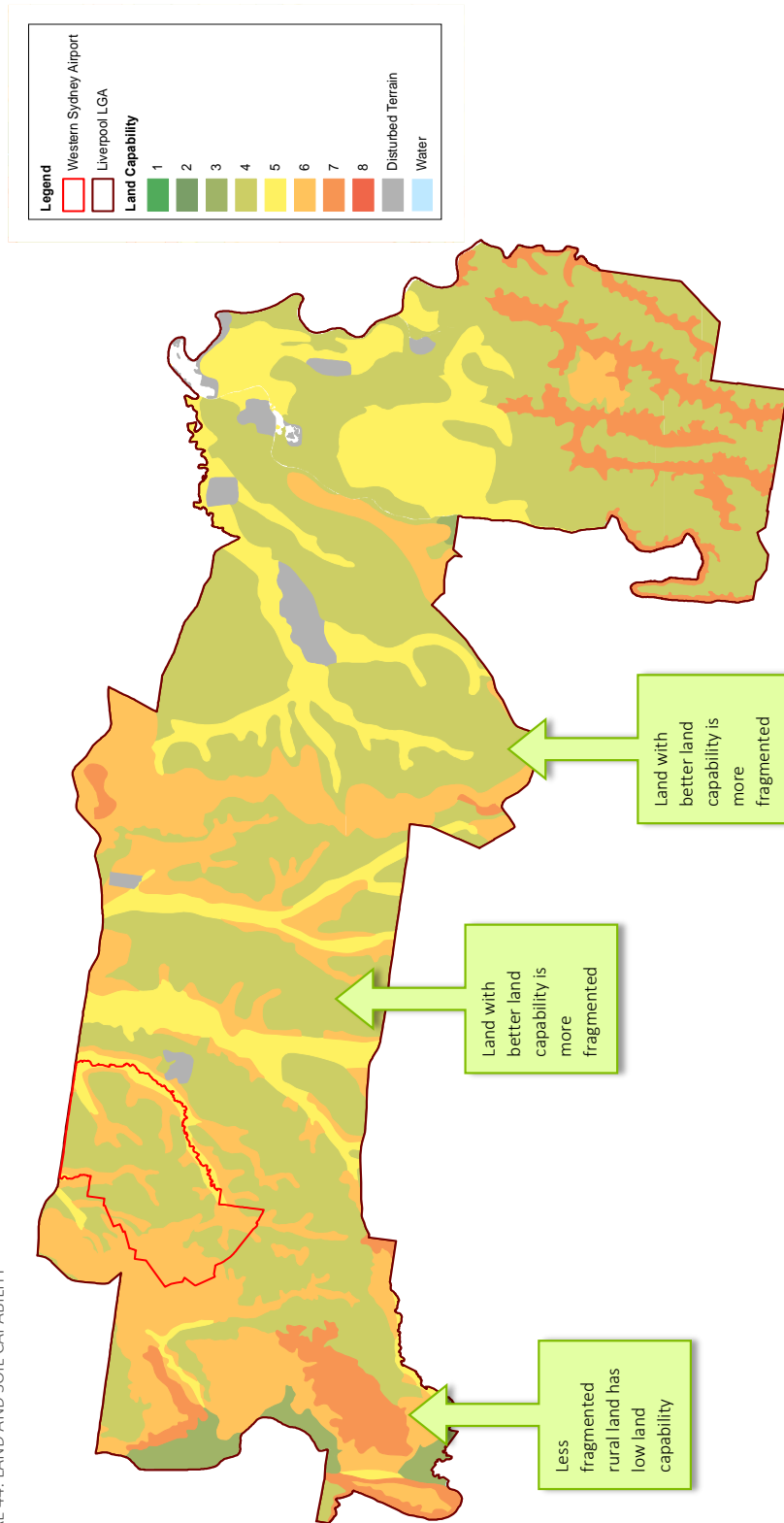
TABLE 15: LAND AND SOIL CAPABILITY CLASS DEFINITIONS

LSC class	General definition
Land capable of a wide variety of land uses (cropping, grazing, horticulture, forestry, nature conservation)	
1	Extremely high capability land: Land has no limitations. No special land management practices required. Land capable of all rural land uses and land management practices.
2	Very high capability land: Land has slight limitations. These can be managed by readily available, easily implemented management practices. Land is capable of most land uses and land management practices, including intensive cropping with cultivation.
3	High capability land: Land has moderate limitations and is capable of sustaining high-impact land uses, such as cropping with cultivation, using more intensive, readily available and widely accepted management practices. However, careful management of limitations is required for cropping and intensive grazing to avoid land and environmental degradation.
Land capable of a variety of land uses (cropping with restricted cultivation, pasture cropping, grazing, some horticulture, forestry, nature conservation)	
4	Moderate capability land: Land has moderate to high limitations for high-impact land uses. Will restrict land management options for regular high-impact land uses such as cropping, high-intensity grazing and horticulture. These limitations can only be managed by specialised management practices with a high level of knowledge, expertise, inputs, investment and technology.
5	Moderate-low capability land: Land has high limitations for high-impact land uses. Will largely restrict land use to grazing, some horticulture (orchards), forestry and nature conservation. The limitations need to be carefully managed to prevent long-term degradation.
Land capable for a limited set of land uses (grazing, forestry and nature conservation, some horticulture)	
6	Low capability land: Land has very high limitations for high-impact land uses. Land use restricted to low-impact land uses such as grazing, forestry and nature conservation. Careful management of limitations is required to prevent severe land and environmental degradation.
Land generally incapable of agricultural land use (selective forestry and nature conservation)	
7	Very low capability land: Land has severe limitations that restrict most land uses and generally cannot be overcome. On-site and off-site impacts of land management practices can be extremely severe if limitations not managed. There should be minimal disturbance of native vegetation.
8	Extremely low capability land: Limitations are so severe that the land is incapable of sustaining any land use apart from nature conservation. There should be no disturbance of native vegetation.

Source: Office of Environment and Heritage (2012), Land and soil capability assessment scheme

¹⁵ <https://www.seed.nsw.gov.au>

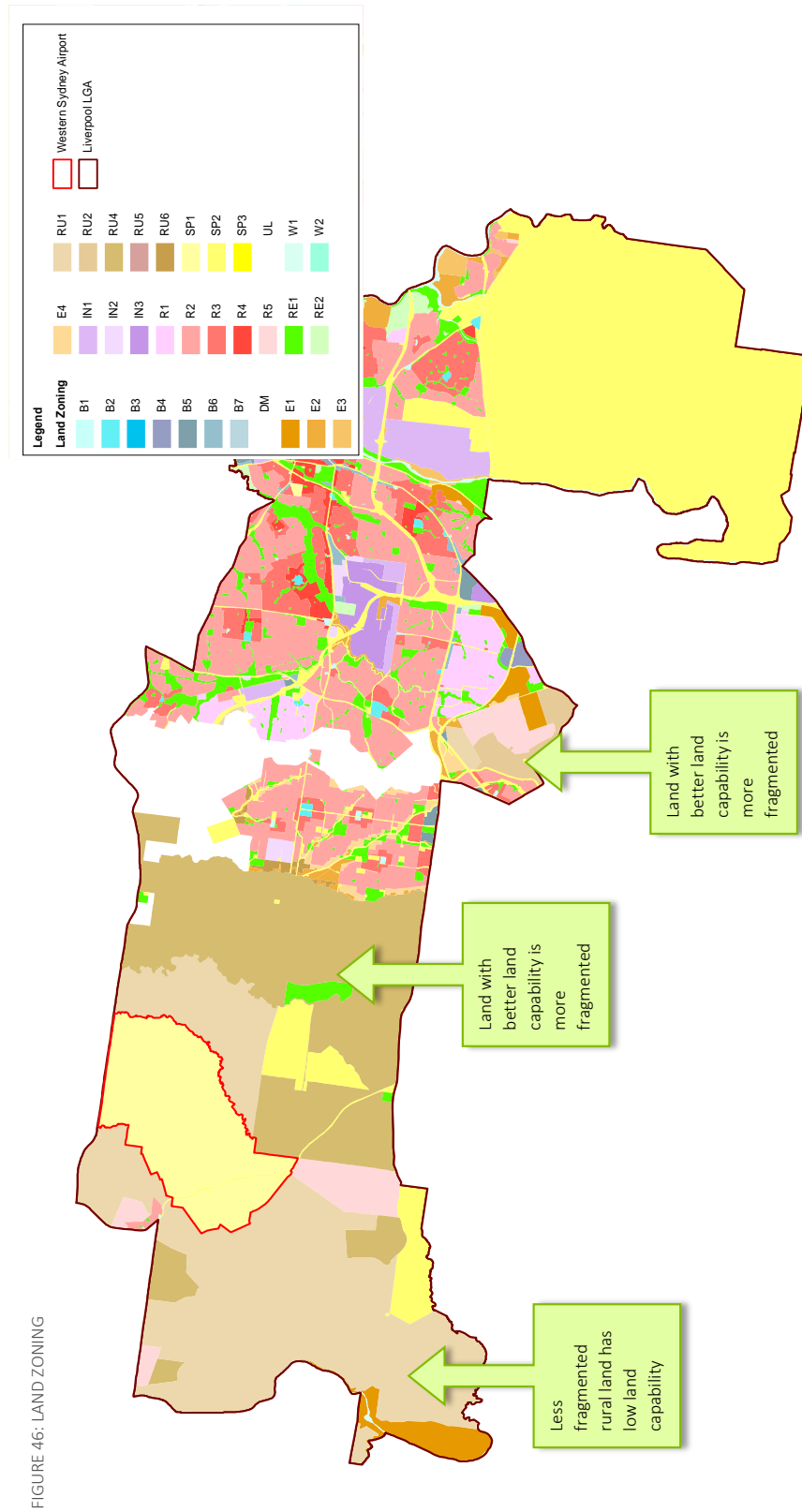
FIGURE 44: LAND AND SOIL CAPABILITY



Source: RMCG, 2019, based on various NSW Government datasets.



Source: RMCg, 2019, based on various NSW Government datasets.



Source: RMCG, 2019, based on various NSW Government datasets

5.6 Impact of the Western Sydney Airport

Overview

Western Sydney Airport will enable curfew-free, 24-hour food exports, allowing food to be delivered direct to Asia from farm to table within 36 hours. It will also significantly reduce the cost of freight and logistics for food, which is currently one of the highest cost areas of the sector.

A Pre-Feasibility Study (February 2019) for an agribusiness precinct at the Western Sydney Aerotropolis found that there was sufficient land for a world-class Intensive Integrated Production Hub (IIPH).¹⁶ The IIPH would cover 2,400 hectares. Financial analysis prepared by KPMG indicated that each 500-hectare lot could generate up to \$541m each year and create 2,500 FTE positions. Opportunities were also identified in value-added food services such as food processing, logistics services and tourism. A further 12,000 jobs could be created through a fresh food precinct at the IIPH.¹⁷

The IIPH would incorporate protected cropping horticulture, energy production systems and efficient use and reuse of water, waste, heat and CO₂. It would have a circular economy using first-mover technology for globally connected supply chains to achieve climate resilience and food waste minimisation. This would cut food production costs dramatically for businesses choosing to invest in the IIPH.

The Pre-Feasibility Study identifies significant opportunities from growing food demand, particularly from Asia and Middle East. Demand is predicted to increase between 59-98 per cent by 2050 in these regions. The ACEFI will test and confirm this assumption as part of its mandate to develop an export supply and demand matrix for NSW food producers.

The Western Sydney Aerotropolis Structure Plan

A Structure Plan for the Western Sydney Aerotropolis sets out how the vision and important policy elements will sit within the landscape and how future development at the Aerotropolis could be arranged (Figure 27 in previous section). The Structure Plan will be delivered over the next 40 years with the initial focus being on delivery of the Aerotropolis Core, Northern Gateway, Badgerys Creek, Mamre Road, Agribusiness and South Creek precincts. Construction of major infrastructure such as the airport and upgrade of road and rail infrastructure is underway.

The Structure Plan indicates that the established core agricultural production areas (Rossmore, Kemps Creek) will eventually transition to urban and employment. The Structure Plan proposes that the Agriculture and Agribusiness precinct presents an opportunity for more intensive agriculture and agri-business activities.

Transition of rural land to urban development has commenced in Austral, east of Kemps Creek and Rossmore (Figure 47).

¹⁶ NSW Government, *Western Sydney Aerotropolis Agribusiness Precinct*, 2019, Available online from: https://static1.squarespace.com/static/5bdfc609f793922ca1f84a10/t/5c6f3d13652dea1853ec36f5/1550794018022/DPI_AerotropolisAgribusiness_FeasibilityStudy.pdf.

¹⁷ KPMG, *A fresh food precinct at the heart of Western Sydney*, 2017, Available online from: <https://assets.kpmg/content/dam/kpmg/au/pdf/2017/western-sydney-fresh-food-precinct.pdf>.

FIGURE 47: RURAL LAND IN TRANSITION, AUSTRAL AND LEPPINGTON



Source: RMCG, 2019.

Current impacts

The immediate impacts on agriculture of the development proposed by the Western Sydney Aerotropolis are already evident and include:

- Abandoned enterprises
- Transition from commercial scale agriculture to sub-commercial or hobby farming
- Decline in standards of land management
- Land use conflict.

The following photos from the study area illustrate these effects.

FIGURE 48: ABANDONED PLASTIC TUNNELS FOR HORTICULTURE (LEPPINGTON)



- Agricultural enterprises are abandoned
- Lost production and contribution to the value chain
- Remnant plant material may pose a biosecurity risk
- Sub-optimal land management (poor weed control) is a risk for other producers
- Weed and rubbish build up are a fire hazard

FIGURE 49: SUB-COMMERCIAL FARMING (LEPPINGTON)



- Cattle grazing to manage pasture growth
- Hobby farming with minimal contribution to the value chain
- Good fencing is critical to prevent livestock entering local roads and posing a traffic hazard
- Poor land management; over grazing, poor weed and pest control, livestock escape



FIGURE 50: URBAN ENCROACHMENT (TWENTYEIGHTH AVENUE, AUSTRAL)



- Encroachment of sensitive uses such as housing, poses risks to residents (noise, odour, spray drift) leading to restrictions on farm operations such as timing of activities and chemical usage
- Encroachment also encourages speculative behaviour

FIGURE 51: STRANDED AGRICULTURE (ROSSMORE)



- Individual farms and businesses in the value chain become isolated from industry

FIGURE 52: LAND USE CONFLICT (EDMONDSON AVENUE, AUSTRAL)



- Urban development in adjoining areas leads to land use conflict such as rubbish dumping, loss of amenity and contamination of agricultural land

WYNYARD AVENUE, ROSSMORE



- Peri-urban areas commonly attract non-agricultural or rural uses (e.g. religious facilities) that are more appropriate in an urban location but are deterred by high land prices. These increase land use conflict risks.

FIGURE 53: LAND SPECULATION (FIFTEENTH AVENUE, ROSSMORE)



- The transition from rural to urban deters farmers from investing in their operations, and instead, speculating in their land

Source: RMCg, 2019.

Subsequent impacts

The flow on impacts on agriculture and the agricultural value chain from these initial impacts include:

- An 'impermanence syndrome' for commercial agriculture¹⁸ as:
 - The price of land increases fuelling land speculation
 - Tracts of farmland become isolated
 - Farmers are deterred from investing in their operations as they anticipate the conversion of their land out of commercial agriculture resulting in an absence or certainty in their industry.
- Loss of critical mass of commercial farms and farmers to sustain an agricultural industry and value chain as higher land prices act as an inducement to sell or commercial agriculture is substituted for sub-commercial agricultural activities. This places a strain on remaining farmers to survive and reduces opportunities for commercial farmers to expand businesses, further exacerbating conversion of agricultural land to non-agricultural uses.
- A reduced ability for farmers to generate sufficient income to sustain a standard of living or provide for retirement such that they speculate in their land rather than farm it.
- Rural land use conflict as new migrants in an agricultural landscape have an expectation of a benign rural environment.

In the peri urban region, these changes may take place over a number of decades as urban release areas are identified well ahead of urban development. Ultimately, the commercial scale agricultural enterprises will either exit the industry or area move to another, less constrained rural area. The agricultural industry value chain (e.g. machinery services, production inputs, business services) are also likely to transition out of the area.

5.7 Future industry scenarios

Poultry

The chicken meat industry in Australia is vertically integrated, where companies own or control most aspects of the supply and production chain. Large chicken meat operations such as Baiada and Inghams, may include breeder farms, hatcheries, meat chicken growing farms, primary and secondary processing plants and feed mills. In each chicken producing region, chicken meat processing companies typically locate the various parts of their operations in close proximity to each other. For example, meat chicken growing farms are generally located within 100 km of a processing plant, minimising transport stress on the chickens on the day of processing.

Poultry production requires significant capital investment. The total infrastructure required to support the production of 780,000 meat chickens per week (about 6.7 per cent of current total production capacity of the Australian chicken meat industry) is estimated to be worth in excess of \$525 million, made up of the following major components¹⁹:

- A primary processing plant capable of handling a volume of 780,000 meat chickens per week would cost in excess of \$200 million, including land and infrastructure.
- Fertile egg production facilities (breeder farms) required to produce 780,000 meat chickens per week would require an investment of the order of \$60 million, while a modern hatchery complex would cost around \$50 million, and a feedmill to produce the volume of feed necessary about \$45 million.
- Meat chicken rearing farms needed to ensure a supply of 780,000 meat chickens per week would require an investment of some \$170 million (equivalent to around 32 average farms with capacity for 240,000 chickens. A farm comprising 6 sheds housing up

¹⁸ Lennon, N (2004) The costs of hobby farming: A literature review

¹⁹ <https://www.chicken.org.au/structure-of-the-industry/>

to 240,000 meat chickens at any one time and producing a total of 1,320,000 birds a year across an average of 5.5 batches would cost somewhere between \$5 m – \$7.5 m, possibly averaging \$5.4 million.

In 2011, 95 per cent of the chicken meat grown and eaten in Australia was produced by seven privately owned Australian chicken meat processing companies. The two largest, Baiada Poultry and Inghams Enterprises, supplies more than 70 per cent of Australia's chicken meat, with the next five companies each supplying between 3–9 per cent of the market.²⁰ Baiada, Inghams, Cordina and Pepes Ducks all have facilities in the Sydney Basin with birds sourced mostly from within the basin.

The modern specialist poultry industry had its origins in the outer Sydney metropolitan area in the 1950s.²¹ Poultry processing plants have historically developed close to markets and labour sources, with many of the largest operations within 100 km of a capital city. Over the past ten years however, industry growth has occurred mainly in regional areas, for example, around Griffith and Tamworth. Baiada is withdrawing operations from the Sydney basin and focussing operations around Griffith and Tamworth. In August 2018, they announced plans to develop a 1.3 million chicken per week hatching facility (over 60 million per annum) to support its breeding farms, broiler farms, stock feed production, chicken processing and livestock processing rendering operations in Tamworth. This was following by an announcement of a \$203 million plan to expand its chicken processing operation in Tamworth.²² Currently, a million birds a week, are processed at the facility producing 160 tonnes of finished product. The expanded facilities would see that jump to three million birds a week and 240 tonnes of product.²³

Regional centres have a number of advantages over metropolitan areas including the proximity to cheap sources of protein and availability of affordable land where biosecurity and environmental risks are more manageable. Increasingly, regional centres can provide other industry requirements including guaranteed water supply and electric power, access for heavy transport for feed and live poultry, available labour and available services such as tradesmen. Improved regional transport networks into Sydney and other major distribution centres has also added to the competitive advantage of regional locations.

Australia has strict trade policies and biosecurity measures in place to ensure that the country and its domestic poultry industries are protected from diseases not usually found in Australia. Imports of chicken meat (other than from NZ, or as canned or fully retorted products) were prohibited until 1998, and remain subject to stringent conditions, resulting in very limited imports of processed chicken meat and no imports of fresh chicken meat. This means that virtually all chicken meat eaten in Australia is grown in Australia. Also, almost all chicken meat produced in Australia is consumed locally, with just under 5 per cent being exported. Low export levels are due in part to high local demand, and in part because international demand is largely met by countries which benefit from a lower cost base than Australia's chicken meat producers and are, in some cases, supported by government subsidies. The proximity of Liverpool to the airport is therefore not likely to be a strong lever to retain the poultry industry.

Fruit and vegetables

Fruit and vegetable growers in Liverpool primary focus on production of high value commodities due to the high price of land, water and small farm sizes. There is also a trend to protected cropping (a generic term to cover all horticultural systems under some form of protection, cover, shade cloth, greenhouse or glasshouse) due to the higher water use efficiency, increased production volumes, reduced production risks and consistent product

²⁰ Australian Chicken Meat Federation (2011) The Australian Chicken Meat Industry: An Industry in Profile

²¹ Henderson, S and Epps, R (2000) Urban Fringe Land Use Conflict: Two Poultry Case Studies. Rural Industries Research and Development Corporation

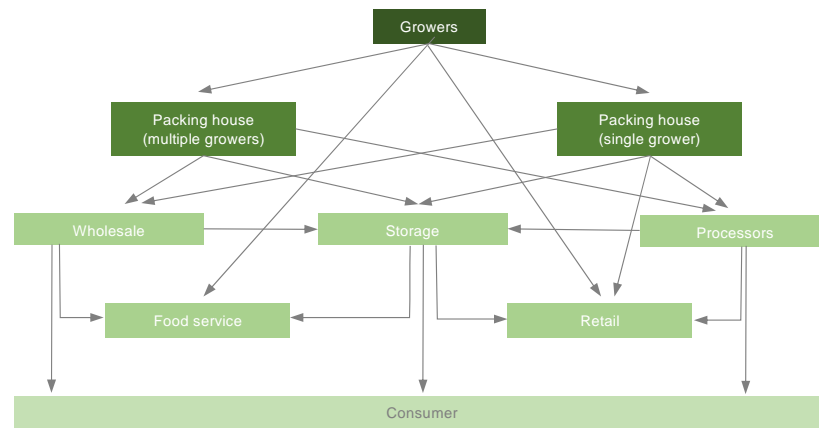
²² <https://www.chicken.org.au/structure-of-the-industry/>

²³ <https://www.northerndailyleader.com.au/story/6291403/poultry-giants-proposed-200m-upgrade-to-create-700-jobs/>

quality compared to unprotected crops. Use of hydroponic systems was also noted during the field inspection. Hydroponic production systems use less water (this is important in Liverpool where growers use the potable water supply which is very expensive compared to a rural water supply) fertiliser and other inputs compared to soil based systems. The system is more compatible with farming in urban areas than soils based farming as it has fewer environmental impacts. Mushrooms are grown in fully enclosed, highly controlled environments.

Fresh fruit and vegetables can reach the consumer in a variety of ways (Figure 54). Produce can be sold directly to consumers through farmers' markets and farm gate sales. However, the usual channels from farm to consumer are indirect. Most commonly the produce is packed on-farm or transported to a packing house off-farm that is used by multiple growers. After packing, which may involve washing, trimming and post-harvest treatments, the produce can go directly to retailers, wholesalers, food service or processors. Prior to supply and sale commodities may be stored for periods of time depending on the nature of the commodity and its perishability.

FIGURE 54: VEGETABLE FOOD CHAIN



Source: RMCG, 2019.

Vegetable produce is primarily distributed to local fresh produce wholesalers, retail chains and vegetable processors.²⁴ These distribution channels account for around 92 per cent of production, while exports make up around 7 per cent of production and 1 per cent is sold direct to consumers.²⁵ In 2016–17 nearly one-half of all vegetable growers sold their produce to a wholesale vegetable market and on average over the last five years, only 15 per cent of fruit and 32 per cent of vegetables (by weight) were diverted into processing.²⁶ Very large vegetable-growing farms were more likely to sell their produce directly to processors or retailers such as major supermarket chains, than other vegetable growers. Given the type and volume of fresh fruit and vegetables produced in Liverpool it is considered that the majority would be sold to local fresh produce wholesalers through the Sydney wholesale market.

The majority of Australian vegetable production is sold in domestic markets. Australian grown vegetables account for 85 per cent of vegetable products sold in Australia, with the remaining 15 per cent imported.²⁷ Australia is a net importer of mushrooms which indicates there is

²⁴ IBIS World, Industry Report AO113, 'Vegetable Growing in Australia', February 2011, p.18

²⁵ ABS Catalogue 5465.0, International Trade, Australia, 2011-12

²⁶ Spencer, S & Kneebone (2012) Foodmap: An analysis of the Australian food supply chain

²⁷ AUSVEG, Australian Vegetable industry Strategic Investment Plan 2012 – 2017, 2012

room in the market for local production increases.²⁸ Australia's fresh vegetable export volume is comprised mainly of carrots, potatoes and onions.²⁹ Currently Coles and Woolworths dominate fresh produce sales in Australia with a combined market share of over 60 per cent. Non-supermarket sales account for less than 20 per cent of the retail sales.³⁰

There is opportunity to grow the vegetable export industry. The factors that support the case for growth potential in vegetable export markets are:

- The growing number of middle and upper middle class consumers in Asia and the Middle East.
- The shift in shopping habits from traditional trade to modern trade driving demand for premium, packaged and convenient vegetable products.
- Demand for safe, traceable food from a reliable and sustainable source.
- Trend towards greater consumption of western style foods in food service outlets.

Australian growers have competitive advantages in quality, product integrity/safety, seasonality and location. But growers must compensate for a lack of overall price competitiveness, due to high labour, packaging, high Australian dollar relative to other currencies and energy costs.

Liverpool meets a number of the requirements for a competitive vegetable export industry:

- Suitable climate, access to water and energy, labour, services.
- Excellent transport networks and access to ports and airports

Liverpool does, however, have a number of competitive disadvantages compared to regional NSW, including:

- High cost of water and land
- High costs to manage environmental factors and avoid impacts on neighbours (noise, odour, spray drift etc)
- High risk of encroachment by non-agricultural uses
- Uncertain land use future.

The risk of encroachment of non-agricultural uses and the intention that parts of Liverpool's rural areas, particularly Kemps Creek and Rossmore, are to be developed for urban purposes are significant competitive disadvantages to the horticultural industry, both for established growers and to new investors. Growers are less likely to invest in new technology, production systems and crop types with the prospect that their land will be converted to urban use sometime in the future.

Protected cropping is capital intensive and capital costs are anywhere between \$100 and \$300 plus per square metre, (\$1 million to \$3 million/ha) depending on the sophistication of the greenhouse.³¹ The payback period can also vary, depending on the crop types and operating costs, from between 3 years for a simple poly tunnel structure to up to 10 years for a controlled environment glasshouse^{32, 33}.

To justify the high capital costs and costs of managing business risks associated with farming in Liverpool, growers require certainty that they will be able to continue to farm for at least the next 10 years. Measures that could be entertained to support agriculture and encourage landholders to continue to productively use their land include:

- Strong policy statement confirming the primacy of agriculture
- Confirm the timeframes when growers can expect the transition to urban development commence

²⁸ <https://www.ruralbank.com.au/assets/responsive/pdf/publications/hort-report-feb18.pdf>

²⁹ <https://www.foodmag.com.au/australian-vegetables-rise/>

³⁰ J Terry (2017) The Australian vegetable industry - export opportunities Strategies and models for success

³¹ http://www.protectedcroppingaustralia.com/?page_id=94

³² Collie Futures – Protected Cropping Prefeasibility Investigation (2018)

³³ Jovicich, E, Collier, A, Wittl, H and White, N (2018) Gap analysis and economic assessment for protected cropping vegetables in tropical Australia

- Introduce or retain measures that follow right to farm principles, including:
 - Allow for heavy vehicle and agricultural traffic movement on local roads
 - Community engagement programs to management expectations of rural living
 - Prevent further encroachment of non-agricultural uses that introduce land use conflict
- Provide opportunities for uses that value add to agriculture and leverage its proximity to urban development such roadside stalls, farmers markets, pick your own,
- Economic measures such as rate rebates to encourage landholders to productively use their land
- Assist growers to secure more affordable water and energy
- Fast track development applications for protected cropping structures and other agricultural improvements
- Facilitate partnerships and projects with growers and the National Vegetable Protected Cropping Centre

Agricultural opportunities for the Agribusiness precinct

For the Agribusiness precinct, the WSAP vision is to provide the “long-term retention and growth of agribusiness and intensive plant-based agriculture in the Aerotropolis.” It is envisaged that this precinct will “act as a catalyst for agricultural exports from the region and support the existing rural landscape.”

Controlled environment horticulture (CEH) is the most modern and sophisticated form of protected cropping combining high technology greenhouses with hydroponic (soil-less) growing systems. Given the other uses envisaged within the precinct, CEH would seem to be the most appropriate system of intensive plant-based agriculture as they have minimal environmental impacts on neighbours.

CEH makes it possible to consistently and reliably control or manipulate the growing environment and effectively manage nutrition, pests and diseases in crops. However, CEH is viable only for high-value crops and globally, production in these environments has been focused upon the following: tomato, capsicum, lettuce and other leafy greens, cucumbers, eggplant, herbs, and some types of cut flowers. In Australia development of large-scale CEH facilities has been predominantly confined to growing tomatoes.

An assessment of the potential for CEH in NSW, noted the following:

- Large-scale CEH is very capital intensive and the level of investment required means that it is dominated by big corporate entities
- Growth of CEH in the longer term will be dependent on exploiting the growing markets in Asia and Middle East
- The strong potential for expansion into exportable products means proximity to international airport and ports is important
- Large operations are more likely to locate closer to more urbanised areas in order to guarantee labour supply.
- Access to low cost energy is important. Co-location with affordable energy generators would be an advantage.
- Supportive policy is required to minimise the compliance costs associated with approval of new developments
- Access to metropolitan markets and supermarket distribution hubs via a well-maintained road transport network is a vital consideration for large-scale CEH.

The proposed Agribusiness precinct has the potential to meet some of these criteria. The greatest challenge to attracting investment in intensive plant-based agriculture will be the significantly higher cost of land within the Agribusiness precinct compared to regional locations. Recent large scale investment in CEH has occurred in Guyra (Costa Group) and Warragul, Victoria (Flavorite).

FIGURE 55: GLASSHOUSE (16 HA) FOR HYDROPONIC PRODUCTION OF TOMATOES AND CUCUMBERS, NEWCASTLE NSW



5.8 Key findings: agriculture assessment

- The poultry industry is dominated by vertically integrated companies that own or control most aspects of the supply and production chain. Bird production is often under contract to meat chicken growing farms. The industry therefore 'moves' with the processor as most poultry farmers are dependent on the contracting processor.
- Industry is generally clustered around a processing facility with birds grown within 100 kilometres/two hours of the facility.
- There are significant upfront capital costs to establishing a poultry farm and investors generally aim to recover debt within a 10 to 15 year time period.
- Regional centres offer significant competitive advantages over metropolitan locations and major players are withdrawing from the Sydney basin in favour of regional cities such as Tamworth and Griffith.
- Most meat is currently consumed locally, and Australia is not competitive in the export market.
- Fruit and vegetable growers in Liverpool focus on high value commodities such as perishable fruit and vegetables due to high price of land, water and small farm sizes
- Use of protected cropping achieves improved production outcomes and efficiencies as well as reduced land use conflict
- Produce is sold primarily into wholesale markets and consumed domestically.

Implications for the Rural Lands Study

Over the next 10 years it is envisaged that the poultry industry will gradually withdraw from the City. Some business owners e.g. those nearing retirement may cease or reduce production and eventually exit the industry. Others wishing to continue in the industry will look to maximise the capital with which they leave the area and transition to a less constrained rural area.

It is unlikely that there will be a poultry industry in the City in 20 to 30 years' time. New investment is unlikely as major processors are investing in regional areas of the state such as Tamworth and the proximity to the airport is not a significant enough lever for industry investment due to other significant downside factors. There may be some opportunity for freight, logistics and cold storage for distribution interstate and export in the agribusiness precinct.

For fruit and vegetables, over the next 10 years it is envisaged that the industry will gradually withdraw from the City. Some business owners e.g. those nearing retirement may cease or reduce production and eventually exit the industry. Others wishing to continue in the industry will look to maximise the capital with which they leave the area and transition to a less constrained rural area.

New investment in soil-based horticulture is unlikely due to lack of suitable land and an affordable water supply in the proposed agriculture precinct. There is some potential for new generation protected cropping in large scale glasshouses, (some new developments are up to 30 ha in size) that enable year round production of large volumes of commodities. The undulating landform within the agribusiness precinct, however, is not ideally suited to large scale greenhouse construction. The proximity to the airport is not a significant enough lever, on its own to attract new industry investment. There may be some opportunity for freight, logistics and cold storage for distribution interstate and export in the agribusiness precinct.

6. LANDSCAPE CONTEXT

A landscape area is defined by the unique interplay between several elements that make up how a place looks and feels. This is fundamental to the place-based concept of planning: identifying a place based on its look and feel, and preparing policies that support and enhance that sense of place.

Usually landscape character areas are identified based on an assessment of geology, elevation water form, tree cover, land use and built form. For this Study, the landscape character assessment provides a description of the land use and key landscape features of land units specified by Liverpool City and identified in Figure 20. Western Sydney Airport Land is not included in the landscape assessment.

The landscape descriptions draw on spatial assessment and ground survey of the following features:

- Underlying geomorphology, waterway, vegetation and landscape features
- Land use and development patterns
- Policy directions from State (including WSAP) and local plans.

6.1 Background and overview of landscape methodology

Defining 'landscape areas' is a technique used to specify the look and feel of different places, based on composite visual features, both natural and resulting from development/subdivision patterns.

The identification of landscape areas in Liverpool's rural areas will enable Council and the community to articulate what is special about different rural places, especially in the context of pressures faced from urban growth and the Aerotropolis precinct. Into the future, landscape areas could be used to inform changes (if any) that may be proposed to the planning zones and other controls in rural areas, to achieve desired outcomes that are in keeping with the vision for each landscape area.

Place-based planning

Objective 29 of the *Greater Sydney Regional Plan*, states 'place-based approaches for landscape units within the Metropolitan Rural Area will help manage its environmental, social and economic values and maximise the productive use of the land.' In addition, Action 69 from the *Northern District Plan* directs Council to 'maintain and enhance the values of the Metropolitan Rural Area using place-based planning, to deliver targeted environmental, social and economic outcomes.'

To meet this requirement, Liverpool City Council has commissioned a 'landscape area' assessment as part of the Rural Lands Study. The assessment involved identifying environmental and social values within each distinct part of the rural lands.

The landscape area assessment approach establishes how the underlying landform, geomorphology, vegetation and waterform affects the way a landscape looks and feels. This combined with a review of settlement patterns (land use, development, lot sizes), will form the basis of landscape areas (see Figure 56, overleaf).

Defining landscape areas

Identifying, documenting and capturing the different social and environmental values of landscapes across the Liverpool LGA is one way of acknowledging and protecting the environment for its intrinsic value, while also enabling current and future communities to enjoy the many wellbeing benefits that flow from contact with natural and productive landscapes alike. The diagram below (Figure 56) illustrates how landscape areas may be defined, based on cultural values and observable qualities.

A landscape area is defined by the unique interplay between several elements that make up how a place looks and feels. This is fundamental to the place-based concept of planning: identifying a place based on its look and feel, and preparing policies that support and enhance that sense of place.

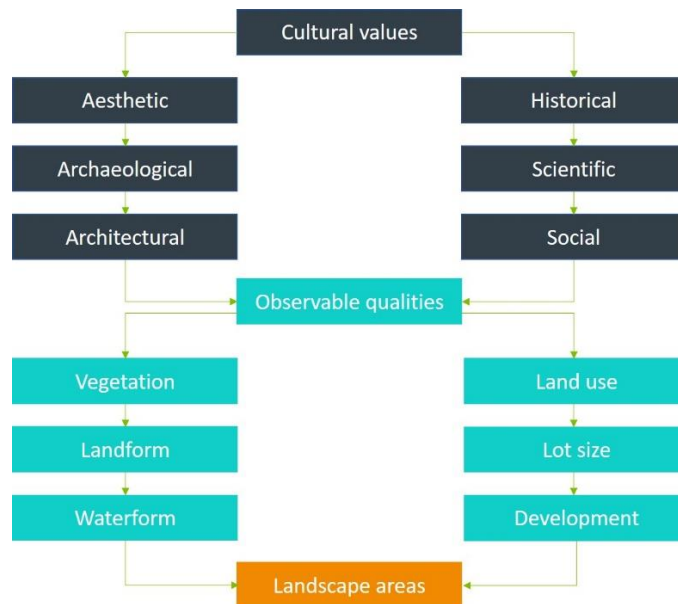
The many benefits of place-based planning and the landscape area approach include:

- conservation of biological values,
- recognition of cultural significance, and
- protection and enhancement of views and vistas that make the Hornsby LGA's rural areas the iconic places with great local and State significance within NSW and across Australia.

Some places are strongly defined by specific land uses that guarantee and sustain biological diversity. Others (for example) embody an exceptional spiritual relationship of people with nature, and are associated with the minds of the communities with powerful beliefs and artistic and traditional customs.³⁴

The cultural values of landscapes may be related to their aesthetic, archaeological, historical, scientific, social, or architectural values, any or all of which could co-exist in the one place. These values may be significant to communities at local, state, national or world (universal) levels.³⁵

FIGURE 56: DEFINING AND CHARACTERISING LANDSCAPE AREAS



Source: SGS Economics and Planning, based on various sources, 2019.

³⁴ United Nations Educational, Scientific and Cultural Organisation (UNESCO).

³⁵ Heritage Council of Victoria, *Landscape Assessment Guidelines*, 2016. See also: Australia ICOMOS, *The Burra Charter: The Australia ICOMOS Charter for the Conservation of Places of Cultural Significance*, Australia ICOMOS, Canberra, (2013 ed.).

6.2 Overview

Geology³⁶

Liverpool City lies within the Sydney Basin Bioregion and Cumberland IBRA³⁷ sub-region. Geology, landforms and typical soils of the Cumberland subregion include:

- **Triassic Wianamatta Group shales and sandstones.** A downwarped block on the coastal side of the Lapstone monocline. Intruded by a small number of volcanic vents and partly covered by Paleogene and Neogene river gravels and sands. Quaternary alluvium along the main streams.
- **Low rolling hills and wide valleys** in a rain shadow area below the Blue Mountains. At least three terrace levels evident in the gravel splays. Volcanics from low hills in the shale landscapes. Swamps and lagoons on the floodplain of the Nepean River.
- **Red and yellow texture contrast soils on slopes,** becoming harsher and sometimes affected by salt in tributary valley floors. Pedal uniform red to brown clays on volcanics. Poor uniform stony soils, often with texture contrast profiles on older gravels, high quality loams on modern floodplain alluvium.

Vegetation

The Cumberland subregion contains the Cumberland Plain, a broad shale basin in Western Sydney. The biodiversity of the shale basin is distinctly different from that of the surrounding sandstone vegetation.

Only about 25 per cent of the original vegetation cover in Liverpool remains (Figure 21), and much of this remaining vegetation is significantly degraded.³⁸ Riparian vegetation provides important ecological corridors connecting vegetation in the upper catchments through to the Nepean and Georges Rivers.

Waterways and catchments

Liverpool is located in the catchments of the Georges and Nepean Rivers. The Georges River flows north from the Dharawal and Heathcote National Parks, before it turns south east at Chipping Norton towards Botany Bay. Its catchment flows through a varied landscape from the steep heavily wooded upper reaches near Appin to the urban areas of the lower reaches in the South District.

Woronora Dam, on the upper reaches of the Woronora River, a tributary of the Georges River, is part of Greater Sydney's drinking water supply network. The Nepean River is part of the Hawkesbury–Nepean River catchment, the largest catchment in the Sydney Basin.

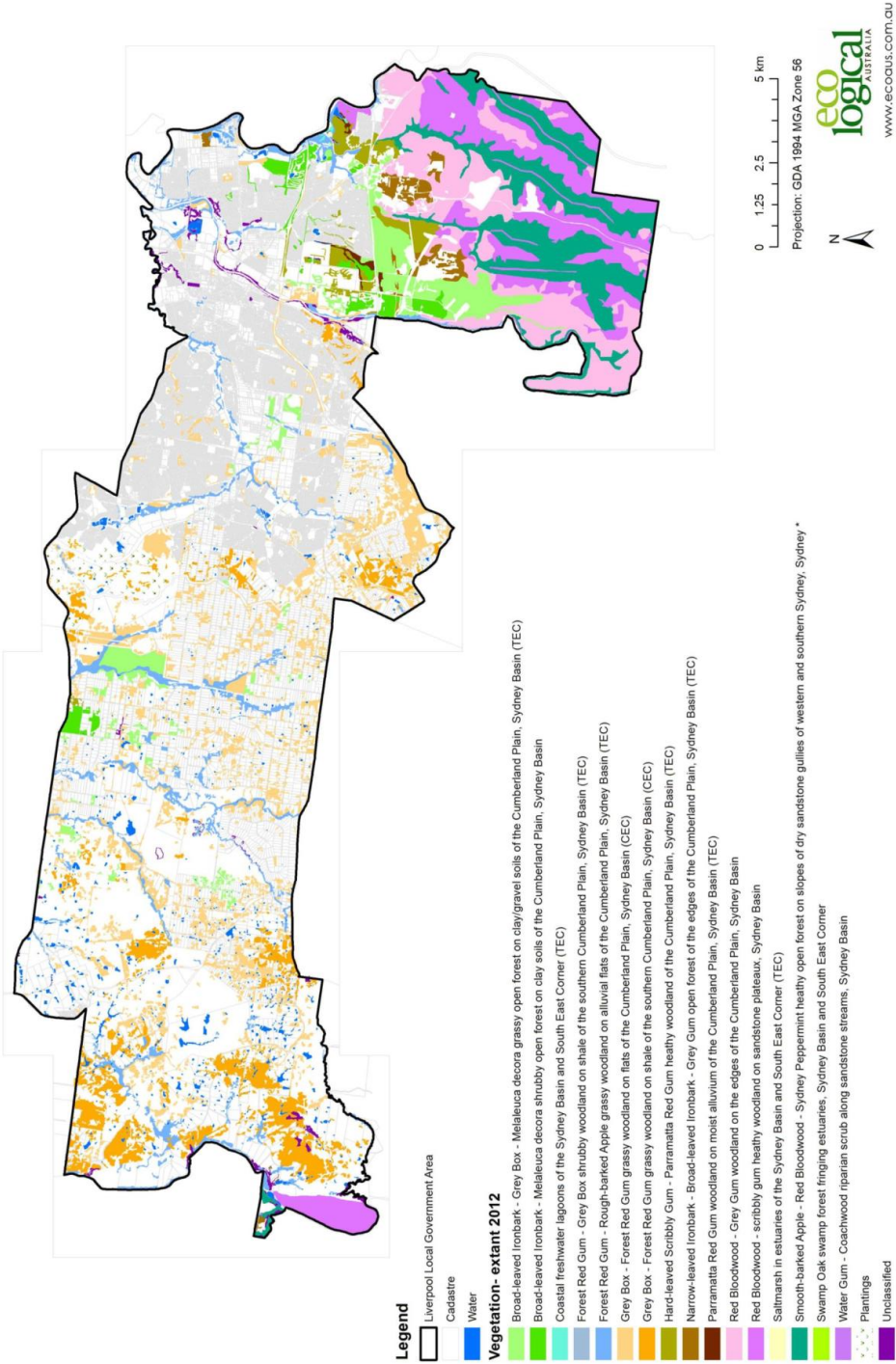
At the top of this catchment, the Wollondilly River joins with the Cocks River at Lake Burragorang and flows as the Warragamba River until the Nepean River confluence. From this point, the Nepean River flows through until its confluence with Grose River, after which it is named the Hawkesbury River. The main tributaries of the Nepean River also commence in the Dharawal and Heathcote National Parks.

³⁶ <https://www.bioregionalassessments.gov.au/assessments/11-context-statement-sydney-basin-bioregion/1121-physical-geography>

³⁷ Interim Biogeographic Regionalisation for Australia (SEWPaC, 2012)

³⁸ Liverpool Biodiversity Management Plan 2012

FIGURE 57: VEGETATION COMMUNITIES OF LIVERPOOL CITY

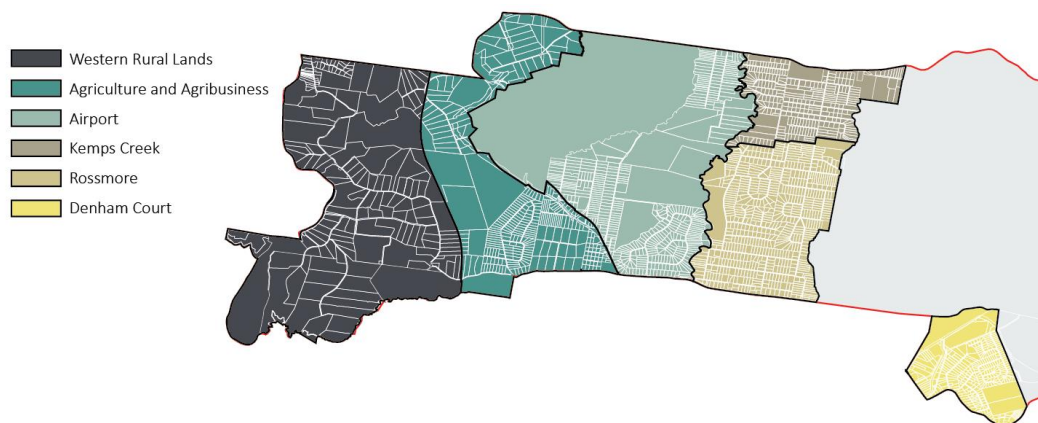


Source: Prepared by RMCG, 2020.

6.3 Rural landscape precincts

The rural precincts in Liverpool are:

FIGURE 58: RURAL PRECINCTS



Source: SGS Economics and Planning, based on Liverpool City Council, 2019.

6.4 Denham Court

Description

The Denham Court precinct is generally bounded by the Hume Motorway, Camden Valley Way, Denham Court Road and the South West Rail Link.

Rural land use is predominantly rural residential with well-established homes, significant fences and gardens planted with a mix of native and exotic plant species. Other uses include the Edmondson Regional Park, the Forest Lawn Memorial Park and a number of churches and commercial and retail services on Camden Valley Way. No agriculture was evident.

A rural residential estate in the northern part of the precinct (Cubitt Drive, Culverstone Avenue) and the Upper Canal System or Southern Railway Aqueduct – gravity water supply for parts of Sydney runs north to south through the precinct.

View lines and vistas

Long views of the Sydney CBD from properties along Huntingdale Road are afforded by the precincts elevated position. The land is gently undulating and the precinct forms the upper catchment of the Cabramatta Creek.

Land ownership and characteristics

- Rural land is zoned RU1 – Primary Production and RU2 – Rural Landscape.
- Lots in the precinct are either small, less than 2 ha or between 2 and 10 hectares.
- Land within the RU1 and RU2 zone is being used for rural residential.

Policy directions from State (including WSAP) and local plans.

- Identifies this area as having a strong scenic character, which should be protected.
- In the northern and western parts of the precinct, some land is identified as a growth area (north-west of Camden Road).
- Further land fragmentation should be discouraged, to protect scenic qualities and due to servicing constraints.

- The topography and scenic qualities across Denham Court vary, and in 2010 land zoning and minimum lot sizes were amended to reflect this; minimum lot sizes vary from 40-120 ha (Camden Road), 1-2 ha in the southern and eastern portions.

Issues and opportunities

- Mismatch in zone and land use, particularly RU1
- Continued and expanded rural residential with potential for further subdivision of larger lots.
- Land along the Nepean River and other creeklines throughout this area is identified as Environmentally Significant.

FIGURE 59: RURAL RESIDENTIAL USES DENHAM COURT



Source: RMCG, 2019.

6.5 Kemps Creek

The Kemps Creek precinct is bounded by Elizabeth Drive, Kemps Creek, South Creek and Fifteenth Avenue. The land is flat. Remnant vegetation is retained along Kemps Creek and South Creek providing linkages between small reserves and stands of remnant vegetation. Land use is a mix of annual horticulture and rural residential. Annual horticulture is mainly undertaken as protected cropping including under plastic tunnels and shade structures both as hydroponic and soil-based production systems.

Land capability is predominantly Class 4 with water for irrigation supplied from the reticulated potable water supply network.

Rural residential properties range from well-established homes, significant fences and gardens planted with a mix of native and exotic plant species to simple homes amongst unimproved pasture through to homes amongst abandoned protected cropping structures.

Land ownership and characteristics

- Rural land is zoned RU4 – Rural Small Holdings.
- Lots in the precinct are mostly between 2 and 10 hectares with some clusters of lots under 2 ha.

FIGURE 60: RURAL USES KEMPS CREEK: RURAL RESIDENTIAL, MUSHROOM FARM, PLASTIC TUNNELS (PHOTOS GOOGLE EARTH, HYDROPONIC LETTUCES)



Source: RMCG, 2019.

Policy directions from State (including WSAP) and local plans.

- Local plans identify the Kemps Creek precinct as being inside the Western Sydney Aerotropolis boundary.
- In the WSAP Structure Plan, Kemps Creek is shown as *flexible employment* land. The vision imagines Kemps Creek as a future business and mixed use employment precinct, connected to residential communities in the south, the Aerotropolis Core, the airport and other centres like Liverpool CBD. No residential uses are proposed due to potential noise impacts from the airport.
- Despite the long-term vision identified for Kemps Creek, the WSAP identifies it as a non-initial precinct for detailed planning. This means that the current suite of LEP zonings will continue to apply in at least the short- and medium-term while planning and other actions for other initial WSAP precincts commence. The current zoning will be retained until a more detailed precinct plan for Kemps Creek is developed (timeframe unknown).

- In the 2012 Rural Lands Study, strategies were to limit further fragmentation by preserving minimum lot sizes from the LEP 2008 (10-40 ha).
- This precinct is in the *Western Sydney Priority Growth Area*, but now covered by the WSAP draft structure plan.

Issues and opportunities

- Rural residential development and conflict with agriculture, particularly intensive agriculture.
- Rural residential development driving land use change and competition with agriculture.
- Fragmented land ownership patterns with predominantly 2-3 ha parcels per ownership.
- Land along creeklines throughout this area is identified as Environmentally Significant.

6.6 Rossmore

The Rossmore precinct is bounded by Fifteenth Avenue, Kemps Creek Bringelly Road and South Creek. The land is flat. Remnant vegetation is retained along Kemps Creek and South Creek providing linkages between small reserves and stands of remnant vegetation. Land use is a mix of annual horticulture, hobby farming and rural residential. Annual horticulture is mainly undertaken as protected cropping including under plastic tunnels and shade structures both as hydroponic and soil-based production systems.

Land capability is predominantly Class 4 with water for irrigation supplied from the reticulated potable water supply network. Rural residential properties range from well-established homes, significant fences and gardens planted with a mix of native and exotic plant species to simple homes amongst unimproved pasture through to homes amongst abandoned protected cropping structures.

Land ownership and characteristics:

- Rural land is zoned RU4 – Rural Small Holdings.
- Lots in the precinct are mostly between small between 2 and 10 hectares with some clusters of lots under 2ha.
- Land is mainly held as single lots.

Policy directions from State (including WSAP) and local plans.

- Identifies Rossmore as part of the Western Sydney Aerotropolis, and does not identify specific future directions for the precinct.
- Strategies identified in the 2012 Rural Lands Study were to prevent limit further subdivision/fragmentation of land due to the impending *South West Growth Corridor* plans; it is now covered by the WSAP extent.
- The WSAP shows Rossmore as being a residential and mixed use area.
- Rossmore is identified as a non-initial precinct in the WSAP, meaning detailed planning for this area (and rezoning) will take place over the longer-term.
- In the Aerotropolis Structure Plan, Rossmore is shown as future urban land.

Issues and opportunities

- Rural residential development and conflict with agriculture, particularly intensive agriculture.
- Rural residential development driving land use change and competition with agriculture.
- Land along creeklines throughout this area is identified as Environmentally Significant.

FIGURE 61: HOBBY FARMING (CATTLE GRAZING, GOATS) AND HYDROPONIC LETTUCES



Source: RMCG, 2019.

6.7 Airport Precinct

The airport precinct is generally bounded by South Creek, Bringelly Road, Elizabeth Drive and the Northern Road. The topography changes east to west from flat to gently undulating to undulating. Remnant vegetation is concentrated along Badgerys Creek and South Creek providing linkages between small reserves and stands of remnant vegetation. Annual horticulture, soil-based and protected cropping is clustered in the north east of the precinct around Lawson Road and in the south between Badgerys Creek Road and Mersey Road.

Land capability is predominantly Class 4 with water for irrigation supplied from the reticulated potable water supply network. There is evidence of transition with some abandoned protected cropping structures.

A rural residential estate is located off Bringelly Road along Kelvin Park Drive. The remaining land is less intensely developed with a mix of livestock grazing, extractive industries, waste processing (Boral site). The Defence Forces and the future airport are major land uses in the precinct occupying significant land area.

There is significant land use change associated with the airport development including new road and light rail infrastructure.

Land ownership and characteristics:

- Rural land is zoned RU1 – Primary Production and RU4 – Rural Small Holdings.
- Lots in the precinct are mostly between small between 2 and 10 hectares with some clusters of lots under 2ha.
- There are a number of large lots, in the centre of the precinct.
- Land is mainly held as single lots.

Policy directions from State (including WSAP) and local plans.

- In the 2012 Rural Lands Study, the Airport Precinct was made up of Badgerys Creek and Bringelly.
- Identifies Badgerys Creek and Bringelly as part of the Western Sydney Aerotropolis, and does not identify specific future directions for the precinct.
- For Bringelly, the land was identified as having soils optimal for agriculture, and relatively free from ANEF noise exposure, and extractive industry (SEPP 9), flooding and environmental significance constraints. A new 10 ha minimum lot size was introduced to prevent further land fragmentation.
- For Badgerys Creek, the plan identified most land is owned by the Department of Infrastructure and Transport. The soil in this area has high agricultural capability, and a rezoning proposal was not supported under the 2012 RLS. Some lots also contained extractive industries. A strategy to avoid land fragmentation was also intended to preserve precinct planning for the *Western Sydney Priority Growth Area* (now covered by the WSAP).
- Badgerys Creek is identified as an initial precinct to be planned in the shorter-term under the WSAP; this area will support airport operations and the Aerotropolis Core.

Issues and opportunities

- Airport development, infrastructure development, residential and rural residential development conflict with agriculture
- Development is driving land use change and competition with agriculture.
- A significant proportion of this area is affected by the ANEF noise contours.
- Land along creeklines throughout this area is identified as Environmentally Significant.

FIGURE 62: INFRASTRUCTURE UPGRADES AND AIRPORT DEVELOPMENT



Source: RMCG, 2019.

6.8 Agriculture and agribusiness precinct

The agriculture and agribusiness precinct (now, Agribusiness Precinct and Dwyer Road in the Western Sydney Aerotropolis Plan) is generally bounded by the Northern Road, Greendale Road, Duncan Creek and Elizabeth Drive. Land in the precinct is undulating to gently undulating and land use is mainly broadacre agriculture including grazing and dairy. Significant landholders include Leppington Pastoral, which operates a large dairy (around 2,000 cows) and the University of Sydney which operates the Camden-John B Pye, Wolverton and Coates Park Farms.

A rural residential estate is located in the south east corner of the precinct. Other land uses include livestock grazing and intensive agriculture (poultry). Remnant vegetation is concentrated along waterways, gullies and some ridge tops.

Land capability is predominantly Class 4 in the southern part of the precinct, though water for irrigation is not available. Land capability is generally Class 6 in the northern parts of the precinct.

Land ownership and characteristics:

- Rural land is zoned RU1 – Primary Production and RU4 – Rural Small Holdings.
- Lot sizes range between 10 ha and over 100 ha.
- Land is mainly held as single lots.

Policy directions from State (including WSAP) and local plans.

- The 2012 Rural Lands Study examined Luddenham and part of Wallacia within the now Agriculture and Agribusiness precinct.
- Identifies Luddenham as part of the Western Sydney Aerotropolis.
- Half of Luddenham is owned by the Commonwealth Government.
- In the 2012 RLS, strategies for Luddenham were to investigate expanding R5-zoned residential areas south of Adams Road once the government has reduced the ANEF extent and continue to advocate for future land use options working with the State and Federal government around the airport.
- For Luddenham village, strategies were to contain the town within the existing R2 boundary, due to the ANEF noise contours nearby, servicing (sewerage) limitations, and to preserve the scenic qualities of the area.
- In the 2012 RLS, strategies for Wallacia were to continue to advocate for removal of ANEF noise controls in this area, to retain the agricultural potential of land along the Nepean River (by retaining the RU1 zoning) and retain the RU4 zoning.
- Under the 2019 WSAP, this area contains the Agribusiness Precinct, and a new sub-precinct: the Dwyer Road Precinct. The Dwyer Road precinct was formerly part of the Agribusiness and Agriculture precinct, which has now been reduced in area to form the Agribusiness Precinct. The vision for Dwyer Road is to become a “flexible employment precinct adjacent to the major economic centre of the Aerotropolis Core and the Airport.”
- For the Agribusiness precinct, the WSAP vision is to provide the “long-term retention and growth of agribusiness and intensive plant-based agriculture in the Aerotropolis.” It is envisaged that this precinct will “act as a catalyst for agricultural exports from the region and support the existing rural landscape.”
- For the Dwyer Road precinct, flexible employment is envisaged; while “precinct planning will acknowledge the existing rural village character of Bringelly and support current agricultural operations.”

Issues and opportunities

- Airport development, infrastructure development, residential and rural residential development conflict with agriculture
- Development is driving land use change and competition with agriculture.
- A significant proportion of Luddenham and Wallacia are affected by the ANEF noise contours.
- Land along creeklines throughout this area is identified as Environmentally Significant.

FIGURE 63: CATTLE FEEDLOT



Source: RMCG, 2019.

FIGURE 64: CATTLE GRAZING



Source: RMCg, 2019.

FIGURE 65: LEPPINGTON PASTORAL DAIRY FARM



Source: RMCg, 2019.

6.9 Western rural lands

The western rural lands precinct is generally bounded by Greendale Road, Park Road and the western and southern boundaries of the LGA. The topography of the precinct varies with flat to gently undulating land associated with the floodplain of the Nepean River and more steeply undulating land between the Nepean River and Burragorang State Park.

Land uses include annual horticulture on the Nepean River flats, livestock grazing and poultry. Remnant vegetation is concentrated along waterways, gullies and some ridge tops. Bents Basin State Conservation Area is located within the precinct. Land capability ranges from Class 7 through Class 1. Class 1 soils are found on the floodplain of the Nepean River.

This land is also able to access water for irrigation from the Nepean River. Elsewhere the topography and soils generally limit agricultural uses to broadacre grazing and intensive animal husbandry.

The small township of Wallacia is located in the north west corner of the precinct. This precinct retains a rural feel associated with the larger farm holdings and predominantly rural uses.

Land ownership and characteristics:

- Land zones: RU1 – Primary Production, RU4 – Rural Small Holdings.
- Lot sizes range between 10 ha and over 100 ha.
- Land is mainly held as single lots.

Policy directions from State (including WSAP) and local plans.

- The 2012 Rural Lands Study examined Greendale and part of Wallacia within the now Agriculture and Agribusiness precinct.
- Identifies Wallacia and Greendale as rural/agricultural land that needs to be protected.
- In the 2012 Rural Lands Study, strategies for Greendale were to limit development potential and retain large minimum lot sizes (40 ha), to protect agricultural land use patterns (including for equine uses), and extractive industry activity.
- In the 2012 RLS, strategies for Wallacia were to continue to advocate for removal of ANEF noise controls in this area, to retain the agricultural potential of land along the Nepean River (by retaining the RU1 zoning) and retain the RU4 zoning.

Issues and opportunities

- A significant proportion of Greendale and Wallacia are affected by the ANEF noise contours, with the exception of land to the south towards Bringelly Creek.
- Land along the Nepean River, the Gulguer Nature Reserve and other creeklines throughout this area is identified as Environmentally Significant.
- Areas of scenic quality exist on land at the end of Wolstenholme Avenue and Orient Road due, to its slope and high level of visibility.
- Land within Bents Basin National Park is also of high conservation significance.
- Greendale possesses some of the largest landholding within the local government area with many properties in excess of 40 hectares.
- Lots sizes in the northern section range significantly from around 10 hectares (along Greendale Road and Wolstenholme Road) to over 100 hectares.

FIGURE 66: ANNUAL HORTICULTURE, NEPEAN RIVER FLOODPLAIN



Source: RMCG, 2019.

7. SUMMARY AND RECOMMENDATIONS

This section highlights key findings and sets out principles for any future planning to occur in Liverpool's rural area. It also identifies place-based recommendations for each rural precinct, using the landscape areas reviewed in Section 6.

7.1 Summary

State government planning policy sees the Aerotropolis as Western Sydney's future economic heart. This will see the area transform in the years to come. The Western Sydney City Deal commits to the Aerotropolis and this deal is intended to spur on economic activity from businesses wishing to invest early. The population of Liverpool LGA is also set to increase by 70 per cent between 2019 and 2041, although most population growth is forecast to occur in growth area suburbs (and not in the rural or Aerotropolis areas). The number of homes within Liverpool's urban areas is projected to increase by 99 per cent between 2016 and 2041.

In the urban area, the key economic strength is Liverpool's existing population serving industries: health care and social assistance, and retail. Generally, health and education jobs are forecast to be the largest growing across Australia; and many of these new jobs will also occur in Liverpool.

Agriculture is a key strength in the rural areas of Liverpool. In the rural area there are a high number of Mushroom and Vegetable Growing jobs, particularly in Rossmore. Greendale has a mix of agricultural activities including Dairy Cattle Farming, Poultry Farming and Mushroom and Vegetable Farming. There is also a high presence of Poultry Processing jobs in East Badgerys Creek. These two industries are projected to grow into the future.

Meanwhile, the Aerotropolis is expecting high and diverse job growth. Industries such as retail trade, transport, postal and warehousing, professional, scientific and technical services and accommodation and food services are projected to grow in South Luddenham and Greendale significantly, while eastern rural Liverpool will see continued growth primarily in construction and agriculture, forestry and fishing.

Large scale investment and planned change aside, Liverpool is facing a number of existing opportunities and challenges. Liverpool has an important agricultural sector that significantly contributes to the Sydney Basin food industry. Poultry, mushrooms, nursery, tomatoes, cut flowers, lettuces and strawberries from Liverpool make a significant contribution to overall regional supply. Bearing this in mind, implementation of the Liverpool Rural Lands Study should involve regional collaboration with adjoining peri-urban councils, for example via the Sydney Peri-Urban Network (SPUN), with Parramatta, Wollondilly and Camden LGAs, to reflect the fact that Western Sydney's productive landscape crosses many local government boundaries.

Liverpool's more agriculturally productive land in the horticultural precinct, is highly fragmented, however, and abuts the edge of the residential growth corridor coming from the east (Kemps Creek, Badgerys Creek and Rossmore). The more rural land to the west, although less fragmented and less under pressure from residential encroachment, is also less agriculturally productive (Wallacia and Greendale).

In support of this, the WSAP emphasises that the rural land around the Aerotropolis Agribusiness precinct should be protected for its ongoing use for industry and agriculture into the future, with uses that complement the Agribusiness precinct and/or benefit from their proximity to the airport (in some areas).

The rural lands of Liverpool also have immense intrinsic value to the environmental and visual landscape. The LGA sits within the catchment of the Georges and Nepean Rivers, and the Nepean River forms the western boundary of Liverpool. There are many waterways and rivers recognised for their environmental significance as green and blue corridors across the LGA; and there is opportunity to further recognise these as places that showcase Liverpool's rural and natural landscapes. Intensification of the rural areas (by industry or residential development) will risk detriment to the natural vistas. It also risks environmental harm caused by elements such as nutrient run off or construction pollutants.

A tension therefore exists between retaining current environmental, social and economic values and respecting the environmental and cultural heritage constraints while allowing the region to transform into an Aerotropolis in the future. The Greater Sydney Region Plan and Liverpool LSPS contain objectives and actions that recognise the importance of retaining the environmental, social and economic values of the rural area. They also acknowledge that managing the rural areas and evolving the city within the outstanding natural and scenic landscapes is critical to the future success of the region, and that there are recreational and tourism opportunities to be realised.

State policy states the natural and scenic landscape functions of rural areas are to be protected and enhanced for their intrinsic value; there is a real opportunity for the landscape values identified in Chapter 6 of this Study to underpin further work for Council and the State government to enhance, protect and promote those values. This is especially important in the Western Rural Lands, given the scale of change forecast for current rural places that will transform to become Aerotropolis precincts.

The Liverpool LEP permits a range of non-agricultural uses including dual occupancies, which allows for greater residential intensification on RU1 and RU4 zoned land. In the context of preserving rural activities in the Western Rural Lands, and managing transition to Aerotropolis uses, this flexibility may lead to greater residential and agricultural land use conflicts, against the core purpose of those zones. There is a need for Council to clarify its vision for the long-term of the Western Rural Lands in this context, and adjustments to land uses permitted under the zones could be explored further. To guide Council, this Section sets out planning principles for the rural area, alongside precinct-specific or place-based recommendations that could inform changes to the LEP. The vision should also be informed by community values identified in the Liverpool draft LSPS, including for a *clean, green, safe, sustainable and vibrant* Liverpool.

The Liverpool Rural Land Study is Liverpool City Council's response to balance and manage these tensions across the rural area. For Council, the long-term future of rural lands outside the Aerotropolis is also a crucial consideration, alongside managing current uses in precincts like Kemps Creek, Rossmore and Dwyer Road where the timeframe for precinct planning is very uncertain. The section below suggests how the path between these outcomes and the way Rural Lands are currently operating, could be navigated.

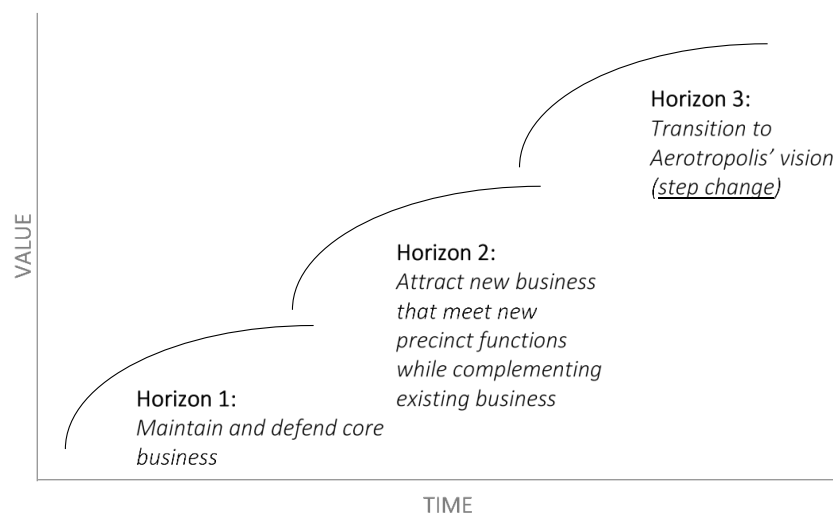
7.2 Future directions

The Three Horizons framework is a concept developed by McKinsey to explain the evolution of businesses that seek to retain market presence and relevance. In summary:

- **Horizon One** is what an organisation is currently doing as core business
- **Horizon Two** are emerging opportunities aligned with these core skills that a business may seek to take advantage of, and
- **Horizon Three** is entirely new business.

This framework has relevance to the Liverpool Rural Lands Study and can be used as an organising principle to guide planning for Liverpool's rural area, in the context of the Aerotropolis transition both within and outside the WSA structure plan area, over the short, medium and long-term.

FIGURE 67: THE THREE HORIZONS FRAMEWORK



Source: SGS Economics and Planning, adapted from McKinsey.

Applying the approach using place-based planning

The Three horizons framework applies at a Western City scale, with the Western Sydney Airport and Aerotropolis providing the catalyst for the region to undergo a step change in role, function and economic contribution. Liverpool's rural lands contribute to this through their partial identification as an Agribusiness Precinct in the WSAP. However, there are significant parts of Liverpool's rural lands that are separate from this transformation process and should be considered at a different scale.

Although the Three horizons framework has a linear approach, planning for Liverpool's rural area in the context of the Aerotropolis should occur in an iterative way. This will involve close collaboration with the Western Sydney Planning Partnership, to ensure Liverpool's local rural economy can remain productive for food production, employment, and as an area that houses several important uses to support the broader city's functioning.

Each step of the approach may take different directions, and could be based on further planning to identify clear visions for each of the rural precincts over the timeframes specified. The basis of such a precinct approach is set out in the place-based recommendations for each landscape area, in Section 7.4. The Greater Sydney Commission's concept of place-based planning is an excellent opportunity to envisage different outcomes based on scenic landscape qualities for each part of the rural land, as outlined in Chapter 6.

This would enable Council to clearly articulate its views for places where there is greater uncertainty in the current draft WSAP, for example Kemps Creek, Rossmore and Dwyer Road. It would also enable Council to leverage infrastructure and investment to elevate other outcomes (such as scenic landscape protection, enhanced tourism activity, biodiversity conservation and innovative land management practices) in the Western Rural Lands precinct.

The Three Horizons framework is a useful way of articulating how change may take place over time and what interventions may need to occur in order to realise these changes. It is important however to recognise that it may not be desirable for a certain land use to transition. In that light, certain precincts may intentionally not evolve beyond horizon one of two.

The rural areas outside of the Agribusiness, including Kemps Creek, Rossmore and Dwyer Road (identified for non-initial planning) precinct should, in the short to medium term, perhaps not proceed past Horizon One. That is, their role is to defend what they currently have, especially seeing the agribusiness precinct is likely to target intensive agriculture and food production uses. It is recommended that Council planning seek to maximise flexibility for these precincts to continue to function as rural places, maximising people's opportunities to reinvest in local business important for the Liverpool economy. Without certainty around timing for both the initial and non-initial precincts in the WSAP, land and business owners will be less likely to do so.

Over time, these lands may extend toward Horizon Two, but only insofar as they may become home to those industries displaced by the Agribusiness Precinct that are not suited to this new agricultural function. Revising and reaffirming a place-based vision for Liverpool's rural lands will be crucial to this process as those values may form the basis of decisions in the LEP and DCP, as well as the key concepts Council can advocate for through the WSAP planning process.

7.3 Planning principles

This section identifies principles for Council which apply to all planning decisions made about rural land in relation to the development of the Western Sydney Airport Plan. There two overarching principles that should inform the development and refinement of recommendations.

1. **Exercise caution.** The Western Sydney Airport's full impact on surrounding land use will only be realised as the Airport and wider precinct mature over the coming decades. Where future land uses are not clear in the various precincts (particular non-initial development precincts), caution regarding the nomination of permissible and non-permissible land uses should be applied. There is a real risk that by even nominating certain possible future uses in areas that are long-term development prospects may lead to speculation and land value increases which could have flow-on effects to the viability of existing businesses that may be desirable to retain in the short to medium term. The definition of the Dwyer Road Precinct as permitting flexible employment uses has already signalled a change of use to higher value land uses such as industrial.
2. **Provide sufficient flexibility.** In addition to exercising caution, flexibility should be retained in currently productive rural land uses where development opportunities are considered medium to long term. The allowance of existing land use rights in initial precincts is important, however flexibility could be extended to allowing any rural land use rather than just that currently on the site. As an example, this report identifies that there is the potential for the Poultry industry to disappear from this region over the next 20 to 30 years. If this happens sooner, lots should have the potential to transition to other uses such as protected cropping, if they retain the broad principles of the rural zoning that currently applies.

Beyond these broad principles, there are a number of recommendations that come out of this study.

Ensure clear visions for non-agribusiness precincts, based on values in each landscape area, and place-based recommendations identified in this study. It is anticipated that those rural lands outside of the Agribusiness precinct do several things:

- Complement the function of those industries that form part of the agribusiness precinct, as part of the wider area's value chain.
- Retain a 'domestic' or local focus within their existing rural character, with a focus on local markets.
- Retain long term flexibility to adapt to the maturation of the Agribusiness Precinct, as well as the area's wider population growth, through the retention of their current character and land use zoning.
- Reinforce their role and purpose as agricultural areas.
- Be able to adapt to potential future displacement in the Agribusiness precinct for those industries that require a Sydney location (and that can transition operations appropriately – based on soil quality, topography and lot size among other things).

Provide a clear timeframe for non-agribusiness precincts. For land in the Aerotropolis not identified for agribusiness uses, including Kemps Creek, Rossmore, Dwyer Road, Bringelly and even Badgerys Creek, a clearer timeframe must be established for the WSAP. More clarity is also needed to allow flexibility for existing uses to maintain, enhance and diversify their agricultural activity to ensure that lots do not spend years in limbo as 'land in waiting', to retain their current productive opportunities as the Aerotropolis matures. An important message for rural zoned land in non-initial precincts will also be to reinforce their role as part of the Metropolitan Rural Area across Greater Sydney while they remain rural. This is reinforced by the Greater Sydney Region Plan and Western City District Plan, which discourage urban development and further fragmentation of rural lands.

Ensure green and blue grid networks are supported. There are real opportunities to refocus activities in Wallacia and Greendale, west of the Aerotropolis towards the Nepean River, and along green-blue spines of environmental and landscape significance throughout. As more of the LGA urbanises in the long term, protection and enhancement of biodiverse and scenic landscapes will be more important than ever.

Consider the wider role of Liverpool in the agribusiness industry. Liverpool City Council could also leverage its role in the newly formed *Future Food Systems Cooperative Research Centre* and within the *Sydney Peri-Urban Network* (SPUN) to identify key projects that would reinforce and support ongoing agricultural and associated activities, given the importance of supporting and maintaining Sydney's food bowl.

Examine ways that tourism opportunities could be leveraged while addressing actions from the Liverpool Strategic Planning Statement. 'Holding the line' for primary production across Liverpool's rural area, alongside support for green and blue grid networks, may expand tourism opportunities in Liverpool, where broader State government planning initiatives are currently focussed on Liverpool's urban areas, and the Aerotropolis. The amenity and intrinsic values offered by natural breaks within the rural area, may drive some demand for a tourism destination on the fringe of urban Sydney. There are opportunities to offer ancillary uses to agriculture that may include conference and accommodation space or restaurants that serve farm-grown produce, which would also be easily accessible from the new airport. Many parts of Liverpool's rural area within and beyond the Aerotropolis precincts are within the Metropolitan Rural Area identified in the Greater Sydney Region Plan, where further subdivision and urban development are discouraged, and will retain this role at least until such time as the WSAP is implemented. It is important to reinforce that non-agricultural uses should be ancillary to the primary agricultural and environmental role of the existing land uses. Any ancillary non-agricultural uses should be managed through local planning policy, to

ensure agriculture as a principal use is retained, and non-agricultural uses add value to core business.

Establish a clear review and monitoring process. The scale (both in area and timeframes) of the Aerotropolis' development means that there is uncertainty about when certain precincts will come online and what their role and industry mix will be. It is important therefore that Council reviews the industry dynamics in the Aerotropolis every couple of years to understand whether the implications for Liverpool's rural lands is changing. This may change the intended role for certain precincts or reinforce the need for retention.

7.4 Place-based recommendations

TABLE 16: PLACE-BASED RECOMMENDATIONS

Rural precinct	Recommendation
Denham Court	<ul style="list-style-type: none"> Review zoning in Denham Court to consider whether the current configuration reflects rural residential land uses, and where important scenic landscape qualities are to be protected As part of that review, reinforce the precinct's location within the Metropolitan Rural Area, where maintaining rural landscapes and environmental values is an important planning consideration Review minimum lot size to provide limited opportunity for subdivision of larger lots except where this would reduce the scenic qualities or there are servicing constraints.
Kemps Creek	<ul style="list-style-type: none"> Introduce a policy statement to confirm the primacy of agriculture in the precinct until detailed planning occurs. This should aim to suppress speculative land investment Confirm the timeframes for detailed planning of the area to encourage growers to continue productively farming their land Consider providing for uses that value add to agriculture and leverage its proximity to urban development such as roadside stalls, farmers markets, pick your own Consider a wider range of uses, where land is no longer suited to agriculture, but further land fragmentation should be avoided. Uses may include garden centre, hardware and building supplies, artisan food and drink, eco-tourism, light industry, local distribution premises, research station, resource recovery facility, self-storage units, storage premises Support the proposed WSAP rezoning along Badgerys Creek and South Creek to protect and enhance environmental and landscape values. In that plan, advocate for land uses that are compatible with and ancillary to environmental and landscape protection and enhancement As part of the Rural Lands Study implementation and working with the Western Sydney Airport Authority, consider what development and land use conditions may be required for development in riparian corridors as distinct from the broader rural area Introduce or retain measures that align with right to farm principles, including: <ul style="list-style-type: none"> Allow for heavy vehicle and agricultural traffic movement on local roads Community engagement programs to management expectations of rural living Prevent further encroachment of non-agricultural uses that introduce land use conflict Encourage 'Good Neighbour' programs to engage the community and mitigate land use conflicts

Rural precinct	Recommendation
Rossmore	<ul style="list-style-type: none"> Consider measures such as rate rebates to encourage landholders to productively use their land Assist growers to secure more affordable water and energy.
Airport	<ul style="list-style-type: none"> As this is an initial precinct to be planned in the shorter-term under the WSAP, there are no recommendations for this precinct.
Agribusiness	<ul style="list-style-type: none"> Introduce a policy statement to confirm the primacy of agriculture in the precinct. This should aim to suppress speculative land investment. Confirm the timeframes for detailed planning of the area to encourage growers to continue productively farming their land Consider providing for uses that value add to agriculture and leverage its proximity to urban development such roadside stalls, farmers markets, pick your own, Introduce or retain measures that align with right to farm principles, including: <ul style="list-style-type: none"> Allow for heavy vehicle and agricultural traffic movement on local roads Community engagement programs to management expectations of rural living

Rural precinct	Recommendation
	<ul style="list-style-type: none"> Prevent further encroachment of non-agricultural uses that introduce land use conflict Encourage 'Good Neighbour' programs to engage the community and mitigate land use conflicts Consider measures such as rate rebates to encourage landholders that productively use their land
Dwyer Road	<ul style="list-style-type: none"> Introduce a policy statement to confirm the primacy of agriculture in parts of this precinct, and ongoing large-lot residential activity within the R5 zone, until detailed planning occurs. This should aim to suppress speculative land investment Consider preserving and enhancing the landscape character and environmental values of this area as part of the Metropolitan Rural Area, including in parts of the precinct where land is zoned for residential (R5 large lot residential), in keeping with the direction of the Western City District Plan, until such time as the WSAP takes precedence over planning for this non-initial precinct. Within the RU4 and RU1 zoned land, consider providing for uses that value add to agriculture and leverage its proximity to urban development such roadside stalls, farmers markets, pick your own Outside the R5 zone, consider a wider range of uses, where land is no longer suited to agriculture, such as garden centre, hardware and building supplies, artisan food and drink, eco-tourism, light industry, local distribution premises, research station, resource recovery facility, self-storage units, storage premises Along creeklines, protect and enhance environmental and landscape values. Land uses should be compatible with and ancillary to environmental and landscape protection and enhancement Confirm the timeframes for detailed planning of the area to encourage growers to continue productively farming their land Consider measures such as rate rebates to encourage landholders to productively use their land Assist growers to secure more affordable water and energy.
Western Rural Lands	<ul style="list-style-type: none"> Introduce a policy statement to confirm the primacy of agriculture in the precinct. This should aim to suppress speculative land investment. Retain large minimum lot sizes Consider policy measures to ensure scenic qualities are retained such as avoiding siting of buildings on crests and ridgelines Consider providing for uses that value add to agriculture and leverage its proximity to urban development and natural assets such as the Gulguer Nature Reserve and Bents Basin National Park such roadside stalls, farmers markets, pick your own and farm stay accommodation Introduce or retain measures that align with right to farm principles, including: <ul style="list-style-type: none"> Allow for heavy vehicle and agricultural traffic movement on local roads Prevent further encroachment of non-agricultural uses that introduce land use conflict Consider measures such as rate rebates to encourage landholders that productively use their land.

APPENDIX 1

State planning policy context

Greater Sydney Region Plan and Western City District Plan

Greater Sydney Region Plan (2018)

The *Greater Sydney Region Plan* (GSRP) is the NSW Government's plan for greater Sydney. It provides a 40-year vision to transform Greater Sydney into a 'Metropolis of Three Cities': The Western Parkland City, the Central River City and the Eastern Harbour City. The directions from the GSRP set a high-level framework for Liverpool City Council's future strategic planning work; for example, planning for the metropolitan rural area within the LGA boundary.

The Liverpool LGA is in the Western City Region (alongside the Camden, Campbelltown, Penrith, Fairfield, Blue Mountains, Hawkesbury and Wollondilly LGAs). The GSRP identifies the Western Sydney Airport and Badgerys Creek Aerotropolis as the heart of the Western City which will catalyse infrastructure, business and knowledge-intensive jobs. The GSRP vision for the proposed Aerotropolis is that it will be the heart of the Western City; it suggests that the airport will catalyse economic development and job growth within the Western City region.

The GSRP sets out three major landscape types, which apply to the Liverpool LGA:

- Metropolitan Rural Area: farmland, mineral resources, and distinctive towns and villages in rural and bushland settings, and
- Urban Area: Business districts, industrial areas, quiet neighbourhoods, parks and reserves, waterways and local parks.

Land in Liverpool that is designated as a rural area falls predominantly within the 'Metropolitan Rural Area' (henceforth, rural area) in the GSRP, and a series of objectives relate to how this area is planned. The GSRP also identifies key land uses in rural areas: farmland and mineral resources.

The productivity and sustainability sections of the GSRP set directions for the rural area in the Liverpool LGA. Those directions contain policy objectives and actions to recognise the importance of retaining the environmental, social and economic values of the rural area. Many rural areas within the GSRP are located on the urban fringe, at the transition between urban areas and natural areas. The plan recognises that a key peri-urban planning challenge is to balance the impacts and viability of the many agricultural, non-urban and rural services activities that occur in these locations, between:

- agricultural production (food processing and production),
- resource extraction and mining (especially for construction),
- rural residential settlements,
- biodiversity values which have intrinsic ecological importance, and natural, scenic break for people to engage with their local landscapes.

Several directions, objectives and strategies relate directly to planning in rural areas. The direction (productivity) and its associated *Objective 22: Investment in Business activity in centres* identifies rural towns and villages in the Metropolitan area and recognises the role that they play in supporting local economies, as centres for rural industries, tourism, businesses and providing for the community's daily needs:

- Encourage business growth within rural villages, provided the local character is maintained or enhanced.

- Enhance rural towns and villages as important centres for rural industry, tourism, local character and local services.
- Retain local rural or bushland character.

These objectives are explored in more detail in the Western District Plan; outlined below.

Western City District Plan (2018)

The Western City District Plan (WCDP) is a 20-year strategy, which sets out actions that will guide State and local government activities, providing more detail as to how Liverpool City Council can to implement the GSRP for the Western District. Local strategic planning and amendments to local planning controls in the Liverpool LGA must be consistent with the WCDP. The WCDP guides strategic land use planning for the Western District and sets the parameters for how councils must plan to manage growth and change within each LGA, including in the rural areas.

The WCDP sets key directions, priorities and actions for zoning in the rural areas. Several planning priorities and associated actions in the WCDP relate to the planning of rural areas; those relevant are summarised below.

Actions from the Western District Plan

These actions will guide Council planning for tourism and agricultural production in the Metropolitan Rural Area.

Action 36

Protect and support agricultural production and mineral resources (in particular, construction materials) by preventing inappropriately dispersed urban activities in rural areas.

Action 39

When preparing plans for tourism and visitation, consider:

Protecting heritage and biodiversity to enhance eco-tourism.

Planning Priority W8: Leveraging industry opportunities from the Western Sydney Airport and Badgerys Creek Aerotropolis.

Objective 20: Western Sydney Airport and Badgerys Creek Aerotropolis are economic catalysts for the Western Parkland City.

In a major departure from past planning in Liverpool's rural area, Western Sydney Airport was announced in 2016. The WCDP outlines a vision and details about planning for the airport the surrounding Western Sydney Aerotropolis. The planned Western Sydney Airport is located within Liverpool's rural area and is an important part of the wider Western Parkland City. In addition to the Western Sydney Airport and Aerotropolis, the Western Parkland City incorporates the existing centres of Penrith, Campbelltown and Liverpool (Figure 68: Western Parkland City). The new airport will be at the economic centre of the Western Parkland City.

Definition of aerotropolis

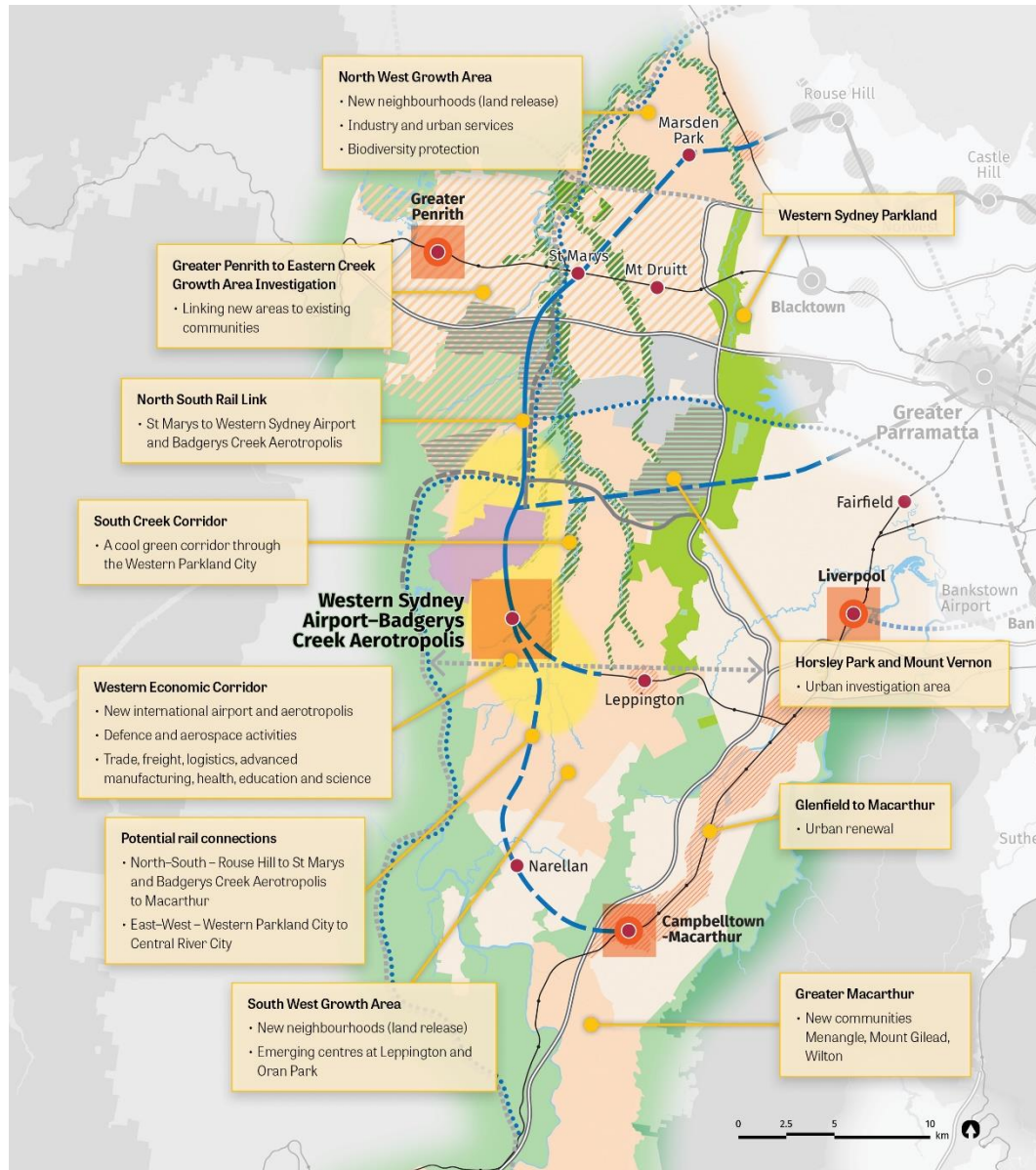
An aerotropolis is defined as "a city or urban area centred around an airport."

The aerotropolis is the catalyst for economic development and metropolitan land use planning for Western Sydney, Liverpool and the NSW Government. The GSRP suggests that the aerotropolis will bring together infrastructure, business and knowledge intensive jobs, centred on the airport and supported by major public transport investment.

The NSW Government is working towards developing a concept for a potential agribusiness precinct that would look to be located adjacent to the new Western Sydney Airport. This initiative would aim to enhance export capability for farmers in NSW, link agribusiness to new markets, establish capacity for high value intensive agricultural industries, develop facilities to manage biosecurity risk, strengthen agricultural research and education, and help create future jobs and skilled workers to support the precinct and the agricultural sector. (Western City District Plan, p. 75).

To realise the vision for a Western Sydney Airport, *Western Sydney City Deal* (an Australian Government funding initiative) commitments have been made across all levels of government to facilitate the realisation of this vision. The *City Deal* identifies the airport as a 'collaboration area,' that will be governed by a tri-level governance framework. The *City Deal* will bring together the eight Western City District councils and Blacktown City Council, the NSW Government and the GSC.

FIGURE 68: WESTERN PARKLAND CITY



Source: GSRP, 2018

Objective 24: Economic sectors are targeted for success.

Objective 24 sets out a framework to encourage growing and supporting industry sectors within the Western City District and within the Liverpool LGA. Sited on the alluvial floodplains of the Hawkesbury-Nepean River and several smaller creeks including South West Creek, Liverpool's agricultural lands are an important component of Greater Sydney's food bowl.

The rural area supports several agricultural industries including the production of eggs and poultry, cut flowers, turf and mushroom farms. The agricultural sector in the WCD is supported by a network of education and research and development facilities that focus on agriculture.

Planning Priority W12: Protecting and improving the health and enjoyment of the District's waterways.

Objective 25: The coast and waterways are protected and healthier.

The objective emphasises the importance of ensuring that the waterways within the Liverpool LGA and the Western City District are protected and enhanced, through proper land use and development management.

Within the Liverpool LGA, the plan identifies the Hawkesbury-Nepean, Georges River and South Creek as assets that provide important habitats for ecosystems. The plan also recognises the important impact that waterways have on cooling and maintaining the health of biodiversity. Where rural and urban lands intersect, it sets a policy direction that these corridors must be protected.

Planning Priority W14: Protecting and enhancing bushland and biodiversity.

Objective 27: Biodiversity is protected, urban bushland and remnant vegetation is enhanced.

The objective outlines the importance of retaining bushland to protect biodiversity and remnant vegetation. The objective suggests that both urban and rural areas have a role in providing habitats. It emphasises that rural areas play a role in minimising the urban heat island effect and are therefore an important asset. The plan suggests that rural and bushland areas be managed through a 'place-based approach,' to ensure that biodiversity is protected, and remnant vegetation is enhanced.

Action 72 identifies Liverpool Council and other State planning agencies as responsible for ensuring that biodiversity is protected and enhanced. State Environment Planning Policies (SEPP) such as *Environmentally Significant Land* (SEPP), *Vegetation in Non-Rural Areas* (applies to some zones that occur in Liverpool's rural area such as Low Density Residential), *Western Sydney Parklands*, and *Georges River Catchment* have stronger influence over biodiversity, ecosystem health and vegetation outcomes than actions in the *Western District Plan*, as they apply to land use and development applications under certain conditions.

Actions from the Western District Plan

These actions sit under Planning Priority W14 and guide Council planning for development in the Metropolitan Rural Area, and what must be considered.

Action 72: Protect and enhance biodiversity

Support landscape-scale biodiversity conservation and the restoration of bushland corridors.
Manage urban bushland and remnant vegetation as green infrastructure.
Manage urban development and urban bushland to reduce edge-effect impacts.

Definition: A place-based approach to planning

The NSW Government defines a place-based planning approach as “a design-led and collaborative way of examining the complexity of the city by viewing it as a mosaic of different places, each with unique sense of place.”

A place-based approach to planning in the rural areas requires a detailed understanding of how rural areas work, based on input from many stakeholders including the local community. This knowledge is then incorporated into a vision and strategies about how to manage change or protect and enhance valued assets. The vision should be developed with people with local expertise, knowledge and responsibility, including with the local community.

For this Rural Lands Study, landscape areas will be identified across Liverpool’s rural area.

Source: Based on the Western City District Plan.

Planning Priority W16: Protecting and enhancing scenic and cultural landscapes

Objective 28: Scenic and cultural landscapes are protected.

This planning priority sets a strategic basis for Council to identify, and protect, its scenic and cultural landscapes. It explains that scenic and cultural landscapes are symbols of Greater Sydney and connect the contemporary urban environment with natural and historic landscapes. Their continued protection is important for their aesthetic, social and economic values and for the character of the region. They create a sense of identity, preserve links to Aboriginal, colonial and migrant era heritage and culture, and create opportunities for tourism and recreation. Views and vistas of ridgelines, waterways and the urban skyline help foster distinctive local character and can strengthen an appreciation of Greater Sydney’s landscape.

The rural areas and the Protected Natural Area create a range of attractive visual settings to the north, west and south of Greater Sydney. With rising demand for biodiversity offsets and continuing support for traditional forms of agriculture within the MRA, more opportunities can be realised to protect and enhance natural landscape.

Actions 76 and 77 identify Liverpool Council and other State planning agencies as responsible for protecting and enhancing scenic cultural landscapes. Scenic views must be protected from the public realm.

Actions from the Western District Plan

These actions sit under Planning Priority W16 and guide Council planning for development in the Metropolitan Rural Area, and what must be considered.

Action 76:

Identify and protect ridgelines, scenic and cultural landscapes, specifically the Scenic Hills, Mulgoa Valley and the escarpments of the Blue Mountains.

Action 77:

Enhance and protect views of scenic and cultural landscapes from the public realm.

Planning Priority W17 Better managing rural areas

Objective 29: Environmental, social and economic values in rural areas are protected and enhanced.

Planning Priority W17 highlights that rural areas play a multifunctional role: they contribute to the agricultural industry, tourism, cultural, extractive industries, landscapes and environmental values.

The policy emphasises that Greater Sydney has enough existing urban land to accommodate housing needs within the current Urban Area boundary, and therefore sets direction to better manage development, and protect scenic qualities, within the rural areas. Importantly, this means the rural areas are not to be seen for potential residential expansion, and their non-urban role and function should be protected. Despite this, the plan emphasises that the Western Sydney Airport will be a catalyst for export within the region.

The plan acknowledges that the Western District's rural areas contribute to habitat, biodiversity, and agriculture. Rural residential development is not supported, unless it can be proven that local character is retained. Liverpool Council and other State planning agencies are identified as being responsible for implementing Actions 69 and 70 (see text box above-right).

Planning Priority W17 contains the following concepts about the role and function of rural areas in greater Sydney; these will inform preparation of the *Liverpool Rural Lands Study*.

- Planning in the rural areas should have a place-based approach (see above), that uses landscape units to help manage environmental, social and economic values, and maximise the productive use of the land.
- Bushland and farmlands are important for the contribution they make to an area's sense of history and character.
- Residential development is not supported in the Metropolitan Rural Area.
- Mineral resources supply construction materials that are vital to building housing infrastructure across Greater Sydney. Local extraction points are of great importance when found in the peri-urban area, to reduce the cost of infrastructure and construction in Sydney.
- It is important to have a plan for rehabilitation and redevelopment of extractive sites once those uses cease.

Actions from the Western District Plan

These actions sit below Planning Priority W17 and guide Council planning the Metropolitan Rural Area, regarding urban development and desired outcomes.

Action 78:

Maintain or enhance the values of the Metropolitan Rural Area using place-based planning to deliver targeted environmental, social and economic outcomes.

Action 70:

Limit urban development to within the Urban Area, except for the investigation areas at Horsley Park, Orchard Hills, and east of The Northern Road, Luddenham.

Western Sydney City Deal

The Western Sydney City Deal is an agreement between the Australian Government, the NSW Government and the eight councils of the Western City District, including Liverpool City Council. The City Deal reinforces the vision for transformative development in Western Sydney set by the *Greater Sydney Region Plan*. It contains commitments from each level of government which seek to facilitate the development of the Western Sydney Aerotropolis, as well as to improve connectivity, liveability, jobs, skills, education, the environment and governance in Western Sydney.

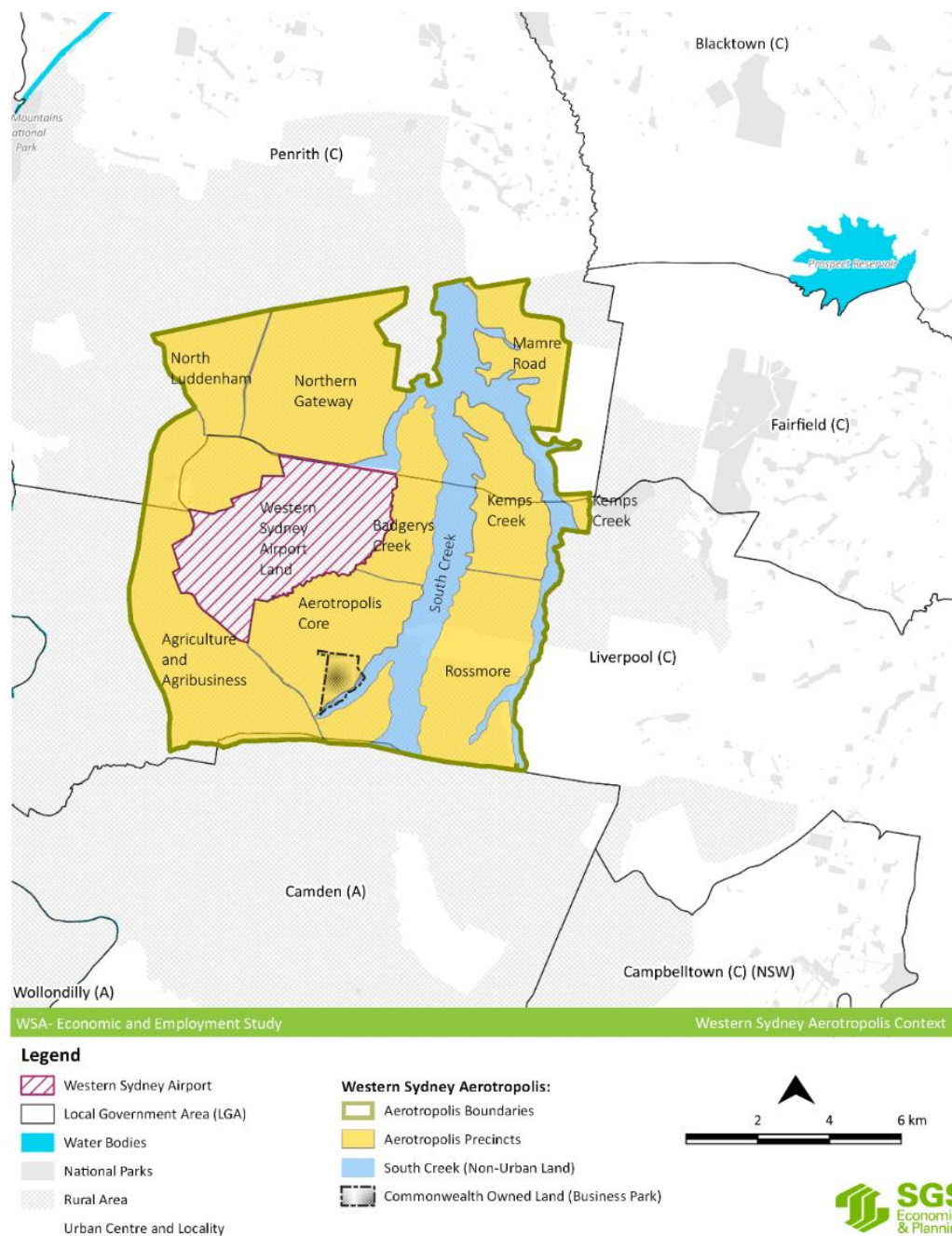
The **Western Sydney City Deal aims to provide over 200,000 jobs** across a range of industries, with development focussed around the Western Sydney Aerotropolis, by 2036. Key aspects of the Deal are:

- A STEM University
- High performance secondary schools
- TAFE Skills exchange
- An Aerotropolis Vocational Education and Training
- Sydney Metro Greater West – stage 1 from St Mary's to Western Sydney Airport.
- The North-South Rail Link from St Marys to Oran Park.
- Rapid bus between western Sydney Airport, Badgerys Creek Aerotropolis and the North-South Rail Link
- Potential rail connection includes the North-South Rouse Hill to St Marys and Badgerys Creek Aerotropolis to Macarthur
- Train link/mass transit investigation 0-10 years to Campbelltown Macarthur from the Aerotropolis
- An Agri-port at the Aerotropolis (the City Deal sets out the first step for this: to conduct a feasibility study determining the optimum size and location)
- An Aerospace Institute.³⁹

The Western City and Aerotropolis Authority was established and committed to by all three tiers of government in March 2018. The authority is tasked with designing and delivering the 114 hectares of Commonwealth-owned land that is located within the Aerotropolis boundary.

³⁹NSWS Government, 2019, 'Western Sydney City Deal', <https://www.nsw.gov.au/improving-nsw/projects-and-initiatives/western-sydney-city-deal/>

FIGURE 69: AEROTROPOLIS AND WESTERN SYDNEY AIRPORT GEOGRAPHIC CONTEXT



Source: SGS Economics and Planning, 2019.

Western Sydney Aerotropolis

As highlighted in Chapter 2, the Western Sydney Aerotropolis and Airport are being planned under the *Western Sydney Aerotropolis Plan (WSAP)*, released in December 2019. The Plan identifies the location and the structure plan for the proposed Western Sydney Aerotropolis.

The Plan describes the Aerotropolis as a 'global airport development' which will catalyse the economic development and support the future population growth in the Western City. The Airport City site will cover 11,200 hectares of land in Liverpool's rural area.

The WSAP extent spreads to Penrith City Council in the north and Wollondilly Shire Council in the south. The WSAP currently contains high-level structure plans and proposed zoning for precincts across the Aerotropolis. Those plans identify the role and function of each area (presented in Section 2.2 of this document). It emphasises that the Airport City will be leveraged from the nearby metropolitan clusters of Campbelltown, Penrith, Fairfield and Liverpool.

The delivery of the Aerotropolis is being led by:

- Sydney Metro: leading the first part of Stage 1 (the proposed North-South Rail Link).
- New Authority (Western City and Aerotropolis Authority): working with Sydney Metro, State government departments, Liverpool, Penrith and Wollondilly Councils.

Under the City Deal, a Western Sydney Planning Partnership has been established, which includes Liverpool City Council, seven other councils from the surrounding region, the NSW Government and the Greater Sydney Commission. The Partnership is consulting with the Australian Government and is responsible for preparing the rezoning in the initial precincts, that will support the rezoning of remaining precincts in the future. The new Authority will coordinate infrastructure delivery, open space and master planning, alongside Sydney Metro.

Initially the *Land Use and Infrastructure Implementation Plan (LUIIP)* (the previous plan) involved preparation of a new State Environmental Planning Policy (SEPP). As outlined earlier in this document, The SEPP has been drafted, and will impact local land use planning instruments (i.e. LEP and DCP). The Western City and Aerotropolis Authority will govern the Commonwealth Land that falls in the Aerotropolis Core precinct (called the Airport precinct in Liverpool's 2012 *Rural Lands Study*).

The plan's vision for governance is:

Every level of planning, development, infrastructure coordination, cross-government collaboration and engagement with landowners, the community and industry, will be underpinned by the plan's core principles.

The Aerotropolis has an overarching objective to acknowledge the traditional owners of land affected by the WSAP:

Recognise Country

Acknowledge traditional owners and provide opportunities for Connecting with Country, Designing for Country and Caring for Country in all stages of planning for the Aerotropolis.

There are four key objective areas in the WSAP, with associated priorities (outlined over the page).

TABLE 17: WESTERN SYDNEY AEROTROPOLIS PLAN: KEY PLANNING PRIORITIES

Direction	Objectives	Priorities relevant to rural lands
Productivity	<ul style="list-style-type: none"> An accessible and well connected Aerotropolis High-value jobs growth is enabled, and existing employment enhanced Safeguard airport operations 	<ul style="list-style-type: none"> Require development up to the 20 ANEC/ANEF contour to adopt appropriate design and construction standards to reduce aircraft noise impacts and prohibit intensification of residential development within the ANEC/ANEF 20 and above contours Require development to accord with the NASF Guidelines.
Infrastructure and Collaboration	<ul style="list-style-type: none"> Infrastructure that connects and services the Western Parkland City as it grows A collaborative approach to planning and delivery 	<ul style="list-style-type: none"> Adopt a collaborative approach to precinct planning and master planning with all three levels of government, the community, industry and landowners.
Liveability	<ul style="list-style-type: none"> A collaborative approach to planning and delivery Social and cultural infrastructure that strengthens communities 	<ul style="list-style-type: none"> Celebrate open space areas as places of shared importance to Aboriginal and non-Aboriginal people and maintain important landscapes and views. Acknowledge and celebrate Aboriginal culture, history and heritage, alongside non-Aboriginal heritage Locate health, education, residential and other sensitive land uses away from major road, rail and freight movement corridors Design major streets as green active parkways supporting new technology
Sustainability	<ul style="list-style-type: none"> A landscape-led approach to urban design and planning A sustainable, low carbon Aerotropolis that embeds the circular economy A resilient and adaptable Aerotropolis 	<ul style="list-style-type: none"> Retain and enhance natural features such as waterways, vegetation and landform and culturally significant landscapes. Retain water in the landscape by maximising permeable surfaces and developing appropriate urban typologies. Orient urban development towards creeks and integrate into the landscape through quality open space, a high degree of solar access and tree canopy. Retain and increase the urban tree canopy and green cover across the Aerotropolis consistent with the Region Plan target of 40 per cent and the Premier's Priority for Greening our city. Identify and protect scenic and cultural landscapes and develop a street grid based on landforms, with long north–south blocks in urban areas to attain good solar performance, and east–west streets to capture long views to the Blue Mountains. Meet the requirements of the biodiversity conservation program in the Cumberland Plain Conservation Plan and approved strategic biodiversity certification and strategic assessment protecting land with biodiversity value, and provide a sensitive urban interface that supports and enhances corridors and reserves. Retain and protect wetland environments to support plant animal communities and to mitigate wildlife attraction or wildlife strike. Plan for compatible land uses within the floodplain, provide safe evacuation and egress from flood events and consider climate change, culvert blockage and floodplain revegetation. Prohibit cut and fill to alter the 1 per cent AEP flood extent. Design, build and manage flood management assets to benefit native habitat, aesthetics, public recreation and amenity. Protect, maintain and improve the water quality and flow to meet the NSW Government waterway health targets. Protect high value terrestrial and aquatic ecosystems to enhance biodiversity and protect environmental values. Adopt an integrated water management approach that considers urban form and streetscape, trunk drainage land and assets, waterway health and flood management.

Source: Western Sydney Aerotropolis Plan, 2019.

Western Sydney Aerotropolis Discussion Paper on the Proposed State Environmental Planning Policy (2019)

A Discussion Paper (released December 2019) for the WSAP provides information about governance arrangements and how to interpret the draft planning policies for the WSAP. The Discussion paper highlights that the Minister for Planning and Public Spaces or the local councils will be the consent authority for development within the Aerotropolis, depending on the nature of the development.

The proposed Aerotropolis zones were reviewed in detail in the previous Chapter (see Section 2.2 and 2.3).

Precinct planning

According to the discussion paper, precinct planning processes will also incorporate planning for a fuel pipeline to the Airport. Consideration will be given in ongoing planning to appropriate setbacks to the pipeline, suitable adjacent development types and mitigation measures to ensure compatible land use development is planned for; this may also influence rural land uses in the short- to medium-term.

Private masterplanning

A masterplanning process is included in the WSAP implementation process, which would enable landowners (under limited circumstances) to provide granular details of land use allocation and arrangements across a site. This may lead to the use of other pathways to streamline new land uses and development (e.g. complying development).

According to the Discussion Paper, the existing masterplanning approach will allow “existing rural activities to continue to operate, recognising the longer-term occupation and use of this land for rural-based uses, along with its economic contribution.”

The masterplans would “build on the level of detail shown on the WSAP or relevant Precinct Plan,” but would only be available for sites with a minimum 100 ha.

Importantly for Council, Kemps Creek, North Luddenham and Dwyer Road precincts are exempt from this process.

Proposed zones

The proposed zones (outlined in the previous chapter) do not contain provision (other than for existing use rights) for agriculture or related rural industries. This effectively means the establishment of new uses in the areas designated for Enterprise (Badgerys Creek and part Aerotropolis Core) and Mixed Use (part Aerotropolis Core) would not be permitted once the draft SEPP zones are adopted. Based on Council’s previous submission to the LUIIP Stage 1, this challenges their vision to enable ongoing agriculture to support the local economy in at least the short- to medium-term while Aerotropolis plans are implemented and development commences.

The proposed zones are “closed,” meaning any land use not listed as permitted without consent or permitted (with consent) cannot be applied for, despite any transitional arrangements that could be made otherwise, under a development consent (for example, a time limit on particular uses). This underlines the uncertainty of timing for businesses, as discussed above.

Existing use rights

Regarding existing use rights, the Discussion Paper states:

The proposed rezoning will not negatively affect farming operations, including extensive agricultural uses, if such uses have lawfully commenced prior to the commencement of the proposed SEPP.

The conditions surrounding the draft zones do, however, prevent new rural uses establishing in the planned Enterprise or Mixed Use areas despite uncertain timeframes surrounding implementation and plan realisation. Furthermore, for Kemps Creek, Rossmore and Dwyer Road where the Structure Plan shows these places as urban and mixed use business land, a key challenge to preserving farming operations will be uncertainty around timing for actual rezoning and Precinct Plans to be prepared.

Development constraints

The WSAP Discussion Paper emphasises how the WSA is to be constructed in a greenfields area, creating an urban development zone relatively free from constraints. As a consequence, the precinct planning detail is being progressed using a series of amendments that add detail at each stage.

This is challenging for current landowners and rural activities, as it increases uncertainty around timing and the future designation of land. In the absence of precinct plans for longer-term precincts like Kemps Creek, Rossmore and Dwyer Road, a slow migration of existing land uses may occur as landowners reduce reinvestment in their businesses in the hope of a windfall from rezoning (over an uncertain timescale).

ANEF contours

A key consideration in Liverpool's 2012 Rural Lands Study was the extent of ANEF contours related to airport noise control, and the constraint these contours place on development. Given the proposed 24-hour operation of the planned WSA, the ANEF controls have been made more stringent to ensure residential development beyond the rural area is not impacted. Development within the Aerotropolis precincts has also been designated to avoid disturbance as much as possible and ANEF maps will be updated as the draft WSA SEPP progresses. Due to likely noise pollution, this reinforces the State government's direction towards industrial uses around the airport.

The SEPP Discussion Paper highlights factors related to the airport that may be a consideration for rural land uses, depending on the timing of each precinct:

- glare from artificial light or reflected sunlight
- air plumes from stacks, vents or plumes
- development or construction activities including the use of cranes that extend into prescribed airspace (subject to temporary exemptions operating prior to the commencement of Airport operations)
- development located in the windshear assessment area
- uses that incorporate lighting that could cause distraction to pilots.

Liverpool City Council submission to the LUIIP (2018)

Liverpool City Council is part of the Western Sydney Planning Partnership set up to implement the Aerotropolis. As part of the current planning process, Council submitted a response to the form and direction of the *LUIIP Stage 1*, raising its views on the economic, environmental and social impacts of the Western Sydney Aerotropolis on the surrounding rural area. Council suggested that their concerns could be addressed with several amendments; the key aspects of their submission are summarised below.

Council supports the:

- economic job growth and the education opportunities that the airport will deliver,
- a mixed-use Kemps Creek precinct which will provide key open space. However, Council advocates for additional east-west corridors to be included in the plan (no east-west links are currently proposed), and
- restoration and investment into the creek tributaries that surround airport.

Council raised the following concerns:

- provision of infrastructure is slow, existing centres that have new rail lines within the LGA have been neglected and left by the State government, and
- the plan should understand what types of land uses will strengthen and support the development of the airport.

Council does not support the planned location for residential development within the Aerotropolis core. It raised the following concerns:

- Plans indicate that residential development is located within the aerotropolis core (1km from the airport); the airport will create negative environmental externalities which may lead to health impacts,
- The suggested location of residential development conflicts with the plan's intention to create a centre that promotes an active and healthy lifestyle,
- the precautionary noise principle should be taken, to ensure that the airport is set back at least 5 kilometres from residential development. This would require removing residential development from the commercial core of the aerotropolis,
- locating residential development away from the airport will also ensure that the airport will be able to expand in the future and not face the challenges currently felt by the Sydney Airport, and
- locating residential development away from the core will also ensure that environmental pollutants are diminished at a higher rate. Poor air quality and traffic congestion would thus be mitigated.

Council suggested that the governance of the plan could be problematic and create a top-heavy framework. It recommended that:

- there must be a clear governance structure,
- the Western Sydney Planning Partnership should be the responsible authority that makes evidence- and place-based development guidelines (for example, establishing the height and density of the new precincts within the aerotropolis),
- clarity be given around planned community consultation processes, as it is currently unclear how this will occur,
- LCC has received feedback from concerned residents who are confused about the community consultation process but doesn't have a clear pathway to engage and advocate for greater community involvement, and
- the department and the Aerotropolis Authority engage with residents who are impacted by the project, particularly in the rural lands.

Other suggestions made to improve the LUIP and the potential airport's impacts:

- the environmental and sustainability of the LUIP could be taken further and that it should be the 'greenest airport in the world,' and
- strong connections to the city should be provided so if the Aerotropolis does not proceed, or does not achieve job growth aspirations, alternative land uses and/or development patterns (including continuing to have a second airport) will be possible.

Council advocated for a precautionary approach to rezoning agricultural land, as:

- agricultural lands contribute to Liverpool's economy,
- the growth of the airport will be slow this will mean that industrial development will happen gradually at the airport,
- agricultural lands in peri-urban areas contribute to providing environmental amenity and resilience in cities, and
- rural lands can be used a 'holding zone' as they are compatible with airport operations; ensuring that agricultural jobs are supported in the shorter-term, and that there is flexibility in the future.

How the plan addresses Council's comments

Council raised concerns in a previous submission. Council did not support that there were:

- No east west links in the plan.
- Response: the blue and green corridor. Do not link the east and west in the draft WSAP (2019).
- That the uptake of infrastructure was slow.
- Response: Commitments made by the state government suggest that infrastructure delivery will remain slow. Potential transport corridors such as connections to Macarthur and Campbelltown are mentioned in policy. The Liverpool City Council prefers a FAST Corridor. The government has not committed to providing this infrastructure.
- That residential development is planned for the Aerotropolis Core.
- Response: Residential development is planned for the aerotropolis core. The plan emphasises that significant residential development capacity in adjoining areas outside of the aerotropolis will mean that residential development will not occur within the short to medium term. Further the plan suggests that there will be a total of 8,000 homes at full development. The land use table suggests that residential development will be in the form of medium density housing, mixed use buildings and residential flat buildings.
- The governance of the plan is lacking.
- Response: The governance of the plan remains the same. The department and the Aerotropolis authority are the primary actors who engage with residents who are impacted by the project, particularly in the rural lands.
- That Environmental sustainability is lacking.
- The environmental sustainability of the plan is focused around the Wianamatta – South Creek precinct that will form a clear north south blue green corridor. Clear linkages to the east and west through a blue green corridor are not identified in the plan.
- The plan commits to NSW net zero emissions target. This target means that the aerotropolis will be net zero for 2050. There are no commitments to reduce emissions earlier than 2050 in the plan.
- The airport will not be the green city in the world. It will follow suit with other cities to become net zero by 2050.
- The plan will meet the NSW government waterway health targets.
- The plan aims to embed circular economy principles into the city. Despite this there are no priorities which identify how this will be facilitated in the development. The plan states that the circular economy principles include:
 - installing solar rooftops and solar gardens models for new residences
 - using smart grid technologies, with onsite battery storage
 - considering electric vehicle charging stations during precinct planning
 - if green infrastructure such as rooftop solar cannot be built upfront, incorporating the ability for future provision.
 - The plan also supports circular economy uses and Circular economy enabling infrastructure (see text box which contains definition of circular economy).
- Precautionary approach to rezoning agricultural lands should be undertaken.
 - The plan recognises that Supporting existing rural industry during the gradual transition to other employment uses” in Badger’s Creek, Agribusiness precinct.
 - And that supporting existing agricultural operations as interim uses” in Dwyer Road, Rossmore is important.

Local planning context

Liverpool Local Environmental Plan (2008)

The Liverpool LEP provides the statutory basis for development and land use within the Liverpool LGA. A summary of the zones applied within the Rural Lands Study investigation area is included below.

The zones are based on the NSW Government *Standard Planning Instrument*, which is a template used by all councils when preparing planning legislation. The following section contains a list of rural and non-rural uses permitted in each zone, along with a comparative analysis of Local Environmental Objectives and Planning Standards.

This review of the LEP will articulate the permissible uses under the relevant land use zones and provide this with an accompanying map illustrating the location of these zoned lands, as well as any other relevant planning controls.

Planning zones within the Liverpool rural area

The purpose of the **RU1 Primary Production** zone is to encourage and support the development of sustainable primary production which maintains and enhances the natural resource base. The Standard Planning Instrument supports this through standardised objectives, which are presented overleaf in Table 18.

The **RU2 Rural Landscape** zone identifies the importance of maintaining the rural landscape character of the land. These zones are also to be used for extensive agriculture. Like the RU1 zone, the RU2 zone includes additional non rural uses relate to tourism.

The purpose of the **RU4 Primary Production Small Lots** zone is to identify land that should support sustainable primary industry and 'compatible uses' (for example, community facilities and places of public worship are permissible in the RU4 zone). The primary production small lot zone also supports intensive small lot agriculture.

The **E2 Environmental Conservation** zone seeks to conserve environmental landscapes and support ecosystem services. A focus of the zone is to ensure that the catchment water quality is maintained and improved.

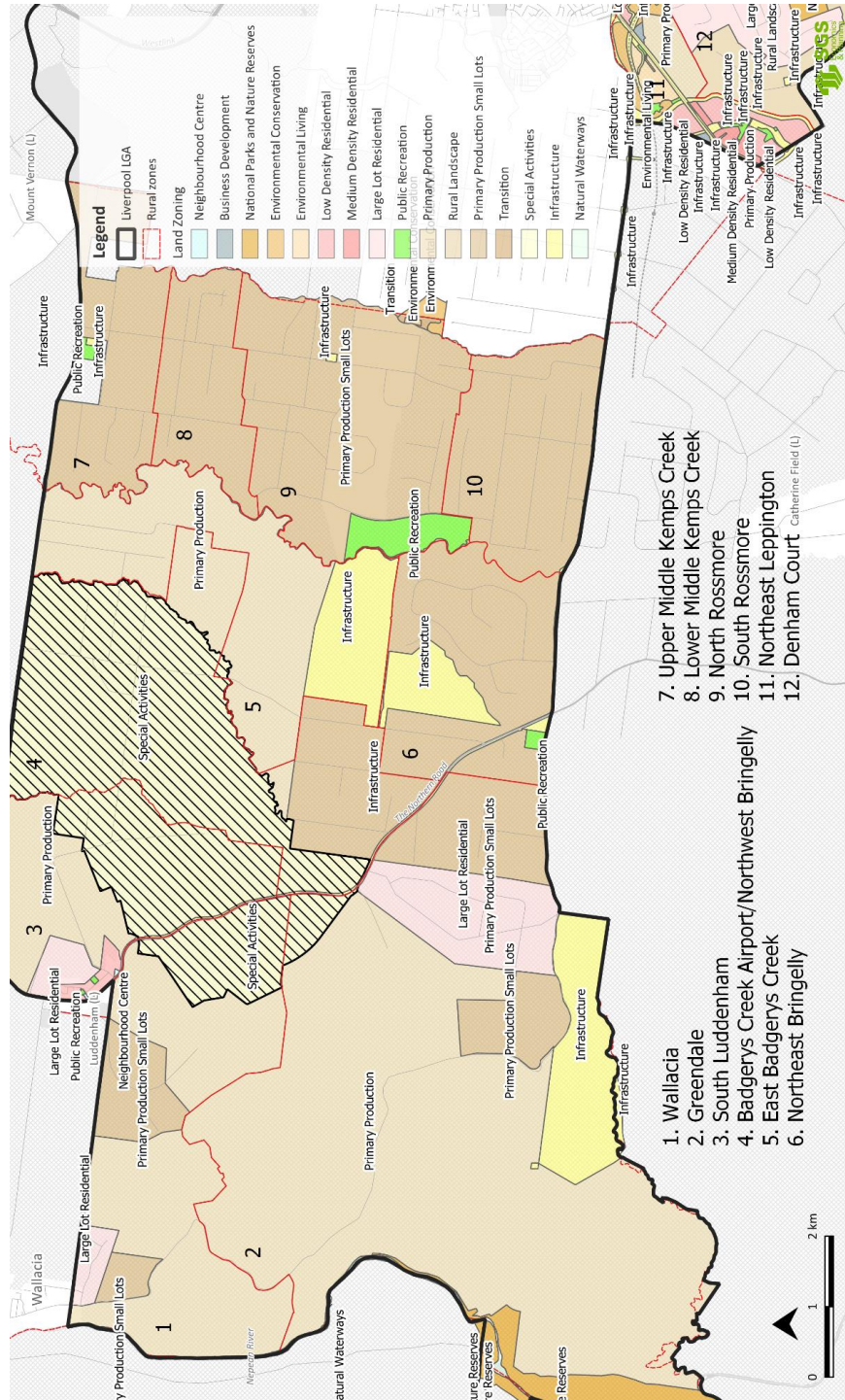
The **E3 Environmental Management** zone expresses the importance of managing, restoring and protecting ecological, scientific, cultural or aesthetic values. Decision guidelines include that development should not interfere with these values.

The **W1 Natural Waterways** protects scenic and ecologic values and works towards preventing development that does not have a significantly impact on the waterway. Recreational enjoyment that does not significantly impact the natural waterways is permissible in this zone. Scientific study, fishing industries and recreational fishing are also encouraged in the zone.

The table overleaf outlines uses that are permitted with or without consent in each rural zone within Liverpool. Uses permitted without consent suggests activities that are compatible with the overall intent (for example, agricultural productivity) of the zone. In some instances, they may be activities that the population living in a rural area would require, for example, dwelling houses, health consulting rooms, home businesses and recreation areas.

Figure 70 shows the current application and extent of rural zones in the Liverpool LGA.

FIGURE 70: LAND ZONES IN LIVERPOOL



Source: SGS Economics and Planning, 2019

TABLE 18: LIVERPOOL RURAL LAND USE TABLE

Land Use Zone	Uses permitted without consent	Uses permitted with consent*	Prohibited Uses
RU1 Primary Production	Environmental protection works; Extensive agriculture; Home based child care; Home occupations	Agriculture; Airstrips; Animal boarding or training establishments ; Aquaculture; Bed and breakfast accommodation; Building identification signs; Business identification signs; Cemeteries; Community facilities; Dual occupancies (attached) ; Dwelling houses; Environmental facilities; Extractive industries; Farm buildings; Flood mitigation works; Forestry; Hazardous storage establishment; Health Consulting Rooms; Helpads; Helpouts; Home businesses; Home industries; Intensive livestock agriculture; Intensive plant agriculture; Landscaping material supplies; Offensive storage establishments; Open cut mining; Plant nurseries; Recreation areas; Recreation facilities (outdoor); Roads; Roadside stalls; Rural industries; Rural supplies; Rural workers' dwellings; Secondary dwellings ; Veterinary hospitals; Water recreation structures	Any development not specified in item 2 or 3
RU2 Rural Landscape	Extensive agriculture; Home-based child care; Home occupations	Aquaculture; Bed and breakfast accommodation; Building identification signs; Business identification signs; Community facilities; Dual occupancies (attached) ; Dwelling houses; Environmental facilities; Environmental protection works; Farm buildings; Farm stay accommodation; Flood mitigation works; Helpads; Home businesses; Home industries; Horticulture; Places of public worship; Recreation areas; Recreation facilities (outdoor); Roads; Roadside stalls	Any development not specified in item 2 or 3
RU4 Primary production Small lots	Extensive agriculture; Home-based child care; Home occupations	Agriculture; Animal boarding or training establishments ; Aquaculture Bed and breakfast accommodation; Building identification signs; Business identification signs; Cemeteries; Community facilities ; Crematoria; Dual occupancies ; Dwelling houses; Entertainment facilities ; Environmental facilities; Environmental protection works; Farm buildings; Farm stay accommodation; Flood mitigation works; Helpads; Home businesses; Home industries; Landscaping material supplies; Places of public worship ; Plant nurseries; Recreation areas; Recreation facilities (indoor); Recreation facilities (outdoor); Roads; Roadside stalls; Rural industries; Rural supplies; Rural workers' dwellings; Secondary dwellings; Veterinary hospitals; Water recreation structures	Backpackers' accommodation; Hotel or motel accommodation; Livestock processing industries; Sawmill or log processing works; Serviced apartments; Stock and sale yards; Any other development not specified in item 2 or 3
E2 Environmental Conservation	Environmental protection works	Building identification signs; Environmental facilities; Flood mitigation works; Information and education facilities ; Oyster aquaculture Roads	Business premises; Hotel or motel accommodation; Industries; Multi dwelling housing; Pond-based aquaculture; Recreation facilities (major); Residential flat buildings; Restricted premises; Retail premises; Seniors housing; Service stations; Tank-based aquaculture; Warehouse or distribution centres; Any other development not specified in item 2 or 3
E3 Environmental Management	Environmental protection works; Home-based childcare ; Home occupations	Building identification signs; Cellar door premises ; Dwelling houses; Environmental facilities; Flood mitigation works; Home businesses; Home industries; Information and education facilities ; Kiosks; Neighbourhood shops; Oyster aquaculture; Pond-based aquaculture; Roads; Recreation areas. Recreation facilities(outdoor) ; Roadside stalls; Tank-based aquaculture	Industries; Multi dwelling housing; Residential flat buildings; Retail premises; Seniors housing; Service stations; Warehouse or distribution centres; Any other development not specified in item 2 or 3

Land Use Zone	Uses permitted without consent	Uses permitted with consent*	Prohibited Uses
Natural Waterways	Environmental protection works	Aquaculture Boat sheds; Building identification signs; Business identification signs; Environmental facilities; Flood mitigation works; Information and education facilities; Marinas; Mooring pens; Moorings; Recreation areas; Roads; Water recreation structures	Business premises; Hotel or motel accommodation; Industries; Multi dwelling housing; Recreation facilities (major); Residential flat buildings; Restricted premises; Retail premises; Seniors housing; Service stations; Warehouse or distribution centres; Any other development not specified in item 2 or 3

Note: Land uses **highlighted in bold** are selected as 'non-rural' uses permitted within a rural zone; in some instances, these are considered acceptable because they may support nearby urban populations, or to serve those living within the rural area.

Zone implementation in Liverpool

All rural areas in Liverpool have **closed zones**, which means that land uses permitted are only those that are specifically listed in the zone (shown in Table 18 on page 134). In other words, closed zones mean that any development that is not specified in the land use table is prohibited.

In the LEP, Clause 7.24 permits the use of dual occupancies that are detached in the RU2 zone and the RU4 zone. Dual occupancies are permissible in the RU2 zone provided the gross floor area of the dwelling is not over 200 square metres. Dual occupancies are permitted in the RU4 Primary Production zone but only if the dwellings are not over 350 square metres. This means that the planning framework gives people the opportunity to develop their land for the purpose of residential intensification.

FIGURE 71: DUAL OCCUPANCY CONSTRUCTION IN ROSSMORE



Source: Google Maps, 2019

Liverpool Development Control Plan (2008)

The Liverpool Development Control Plan (DCP) contains a range of planning controls for rural areas. The policies apply to an application to use or develop land under the LEP provisions, and address planning considerations such as encouraging development that will be environmentally sustainable and protecting water quality and native flora and fauna. The built form aspects of buildings are also considered; for instance, buildings are to be 'compatible with the environment' and their design should 'protect and enhance the visual qualities and characteristics of rural areas'.

The Liverpool DCP identifies the need to 'protect and manage rural areas,' and sets out a range of design requirements that seek to preserve and retain the character of the rural area:

- Buildings heights are limited to 8.5 metres
- Impermeable surfaces (other than building footprints) are only permissible on driveways.
- There is a focus on maintaining natural features.
- Run-off is to be treated on site to ensure that waterways are protected.

Previous rural lands studies

Liverpool Rural Lands Study (2007)

The 2007 *Liverpool Rural Lands Study* was prepared by Don Cox Planning, as an update to a 1994 study. It sought to understand the changing nature of agricultural economics. The study split the rural lands into two different areas:

- A primary study area, consisting 1,422 hectares of land around the (now) Badgerys Creek Airport and Commonwealth Land, and excluded the south west Sydney Growth Area.
- A secondary study area included 1,498 hectares of land which included part of the South West Growth Corridor.

The agricultural sector in Liverpool was worth \$26.1 million in 2001; this represented 6 per cent of the total value of agriculture in the Sydney Basin. Poultry farming had the highest value out of agricultural industries in the Liverpool region, contributing \$26.1 million GDP. At the same time, the study suggested that the primary area would be converted to residential land within the next 25 years (by 2032).

Due to peri-urban pressures and land use conflicts, alongside residential growth pressures from the east, Badgerys Creek was forecast to transition within 25 years of the study. This had been forecast in rural planning since 1994, when a noticeable trend in agricultural decline began. Indeed, similar trends were occurring across the peri-urban areas of Sydney by 2007. The study suggested that urban encroachment had reduced agricultural activities to a point where they are no longer “economically sustainable” in peri-urban areas of Sydney. The study also found:

- In 2007, 11 per cent of the primary study area was being used for commercial farming, predominantly with semi-commercial extensive livestock grazing (which made up most of the agricultural sector).
- Other prominent agricultural activities were cattle grazing, equestrian, poultry, and protective cropping (controlled environment horticulture). The study projected these activities would decline based on residential encroachment.
- At the time of writing, agriculture in peri-urban areas around Sydney Basin was (and continues to be) impacted by pressure for residential expansion. In 2007, agricultural activity in the Badgerys Creek area was already declining.
- In and around Badgerys Creek, several farms reported that they were no longer competitive due to competition from larger landholders who were able to produce a larger yield. Many reported being in a ‘run off’ phase (not reinvesting capital into their farming business).
- The market gardening sector was also affected by this; for example, areas that had had strong representation of this sector such as Martin Road and Lawson Road (Badgerys Creek) along the Nepean River flats had significantly (or completely) reduced. The feasibility of market gardens on lots less than 10 hectares was becoming less viable than in the past due to land value changes and (on smaller lots) limited ability to expand.
- Vegetable growing and horticultural activities in polyhouses were declining; only 22 polyhousing horticultural farms were identified in the Commonwealth study area
- The proportion of agricultural activities were higher in the Badgerys Creek area than in the secondary study area.
- A large proportion of the land in the secondary study area was used for poultry. This agricultural industry was found to be in decline due to urban encroachment pressures (the odour and noise emissions from poultry farming make it particularly incompatible with residential development). Similar challenges faced other noise, dust and odour-emitting agriculture sectors including protected agriculture, aquaponics and intensive farms.
- The average annual rainfall for the Liverpool rural lands was 800 mm. In Liverpool, access to reliable water was identified as an issue, where the average temperature for the January maximum was 29 degrees; 3 degrees warmer than the coast.

- Water scarcity could limit the viability of future agricultural production; however, water licences that were obtained to harvest water from the Nepean River enabled farms to retain better viability.
- Badgerys Creek, Cosgrove Creek and the arm of South Creek were subject to high salinity and low soil fertility.
- The Leppington Pastoral Company is the largest agricultural business in the Liverpool LGA.

Given the broader trends and local conditions, the 2007 Rural Lands Study recommended:

- Lots with ANEF (emissions) contours in place should not be reduced in size, to enable their ongoing viability and protect them from encroachment.
- Current agricultural land that runs along the Nepean River should be maintained and protected based on its productive capacity, and should not be fragmented.
- Higher tourist visitation should be encouraged, by permitting land uses that provide tourists with accommodation, such as B&Bs (in appropriate locations and of an appropriate scale).

Rural Lands Study (2012)

Council prepared its most recent Rural Lands Study in 2012. The study aimed to understand the current planning framework context and any changes in the physical environment since 2007. The study's recommendations sought to balance the challenges between residential development and the importance of agricultural production. Overall, the recommendations aligned with a desire to maintain and enhance agricultural productivity. Based on the plan's recommendations, the following local policy changes were made:

- Allow dual occupancy development in certain RU1 zones.
- Identify certain areas as primary production areas to secure food production through RU1 primary production lots.
- Implement DCP design controls to ensure that rural character is maintained throughout the area.
- There is some tension between Council's aim to maintain agricultural lands and the planning recommendations in 2012, which expanded the list of permissible non-agricultural uses such as dual occupancy development. At the same time, this policy change may have enabled some light industrial and urban population serving uses to enable a wider range of businesses to occupy the rural areas, where agriculture has been steadily declining since 1994.

APPENDIX 2

Proposed Western Sydney Aerotropolis SEPP land use table

LAND USES PROPOSED UNDER THE DRAFT SEPP (WESTERN SYDNEY AEROTROPOLIS)

Objectives	Permitted without consent	Permitted with consent	Prohibited
Enterprise Zone			
<ul style="list-style-type: none"> To ensure a range of uses that enable successful aerospace and defence industries. To manage the transition of land from non-urban uses to employment uses To support the development of well-planned and serviced new urban communities in accordance with the Precinct Indicative Layout Plan. To safeguard land used for non-urban purposes from development that could prejudice the use of the land for future commercial land use purposes. To encourage a precinct built around professional services, high technology, food production and processing, health and education and creative industries To ensure that land which has the potential to impact environmental conservation areas is developed appropriately and enhance biodiversity outcomes for the Precinct. • To protect the operations of the Airport, including 24-hour operations, and provide appropriate protections for the community. Ensure there are no sensitive land uses (such as residential, aged care, early education and childcare, educational establishments and hospital amongst other uses) located within the ANEC 20 and above contours. Ensure that land uses up to the ANEC 20 contour are subject to appropriate design and construction standards to reduce any potential for airport noise impacts. Prevent potential conflicts between airport operations and land use/development outcomes. 	Nil	Animal boarding or training establishment, Building identification sign, Car park, Centre-based child care facility, Commercial premises, Community facility, Depot, Educational Establishment, Electricity generating works, Emergency Services Facility, Entertainment facility, Environmental protection works, Flood mitigation works, Freight transport facility, Function centre, Funeral home, Garden centre, General industry, Hardware and building supplies, Hazardous industries Health services facility, Hotel or motel accommodation, Industrial retail outlet, Industrial training facility, Information and education facility, Landscape material supplies, Light industry, Liquid fuel depot, Neighbourhood shop, Passenger transport facility, Places of public worship, Public administration building, Pubs, Recreation area, Recreation facility (indoor), Recreation facility (major), Registered club, Research station, Restricted premises, Road, Service station, Serviced apartment, Sex services premises, Signage, Storage premises, Telecommunications facility, Transport depot, Truck depot, Vehicle body repair station, Vehicle body repair workshop, Vehicle sales or hire premises, Veterinary hospital, Warehouse or distribution centre, Waste or resource management facility, Water supply system, Water treatment facility, Wholesale supplies	Any development not specified in item 2 or 3
Mixed Use Zone			
<ul style="list-style-type: none"> To manage the transition of land from non-urban uses to a range of urban uses. To encourage the development of well-planned and well-serviced new urban communities in accordance with the Precinct Indicative Layout Plan. To ensure a range of uses are located in a way that are consistent with the strategic planning for the Western Sydney Aerotropolis. To safeguard land used for non-urban purposes from development that could prejudice the use of the land for future urban purposes. To ensure that land adjacent to environmental conservation areas is developed in a way that enhances biodiversity outcomes for the Precinct. 	Home business • Home occupation • Home-based child care	Attached dwelling, Backpackers' accommodation, Boarding house, Business identification sign, Car park, Commercial premises, Community facility, Early education and care facility, Educational Establishment, Electricity generating works, Emergency Services Facility, Entertainment facility, Environmental protection works, Flood mitigation work, Function centre, General industry, Group home, Health services facilities, Home industry, Hostel, Hotel or motel accommodation, Industrial training facility NSW Department of Planning, Industry and Environment 18, Information and education	Any development not specified in item 2 or 3

Objectives	Permitted without consent	Permitted with consent	Prohibited
<ul style="list-style-type: none"> To protect the operations of the Airport, including 24-hour operations, and provide appropriate protections for the community. To ensure there are no sensitive land uses (such as residential, aged care, early education and childcare, educational establishments and hospitals amongst other uses) located within the ANEC 20 and above contours To ensure that land uses up to the ANEC 20 contour are subject to appropriate design and construction standards to reduce any potential for airport noise impacts. 		facility, Light industry, Multi dwelling housing, Passenger transport facility, Places of public worship, Public administration building, Pubs, Recreation areas, Recreation facility (indoor), Recreation facility (major), Registered club, Residential care facility, Residential flat building, Respite day care centre, Road, Semi-detached dwelling, Service station, Serviced apartment, Sex services premises, Shop top housing, Storage premises, Telecommunications facility, Vehicle repair station, Veterinary hospital.	
Environment and Recreation Zone			
<ul style="list-style-type: none"> To protect, manage and restore areas of high ecological, scientific, cultural or aesthetic values. To prevent development that could destroy, damage or otherwise have an adverse effect on ecological or recreational values. To enable land to be used for public open space or recreational purposes. To provide a range of recreational settings and activities and compatible land uses. To ensure that development is secondary and complementary to the use of land as public open space, and enhances public use, and access to, the open space. To encourage, where appropriate key regional pedestrian and cycle connections. 	Environmental protection works, Flood mitigation work.	Environmental facility, Information and education facility, Kiosk, Recreation area, Recreation facilities (outdoor), Water recreation structure, Road.	Any other development not specified in item 2 or 3 * land that is of high biodiversity value and intended to be preserved for environmental conservation will benefit from additional planning controls in the proposed SEPP which are intended to prevent the clearing of vegetation or broader uses and activities that are not consistent with this object. These areas will be mapped.
Infrastructure Zone (SP1)			
<ul style="list-style-type: none"> To provide for special land uses that are not provided for in other zones. To facilitate development that is in keeping with the special characteristics of the site or its existing or intended special use, and that minimises any adverse impacts on surrounding land. 	Nil (noting that developments on the Airport Site are subject to the Airports Act regime).	The purpose shown on the Land Zoning Map, including any development that is ordinarily incidental or ancillary to development for that purpose (noting that developments on the Airport Site are subject to the Airports Act regime).	Any development not specified in item 2 or 3 (noting that developments on the Airport Site are subject to the Airports Act regime).

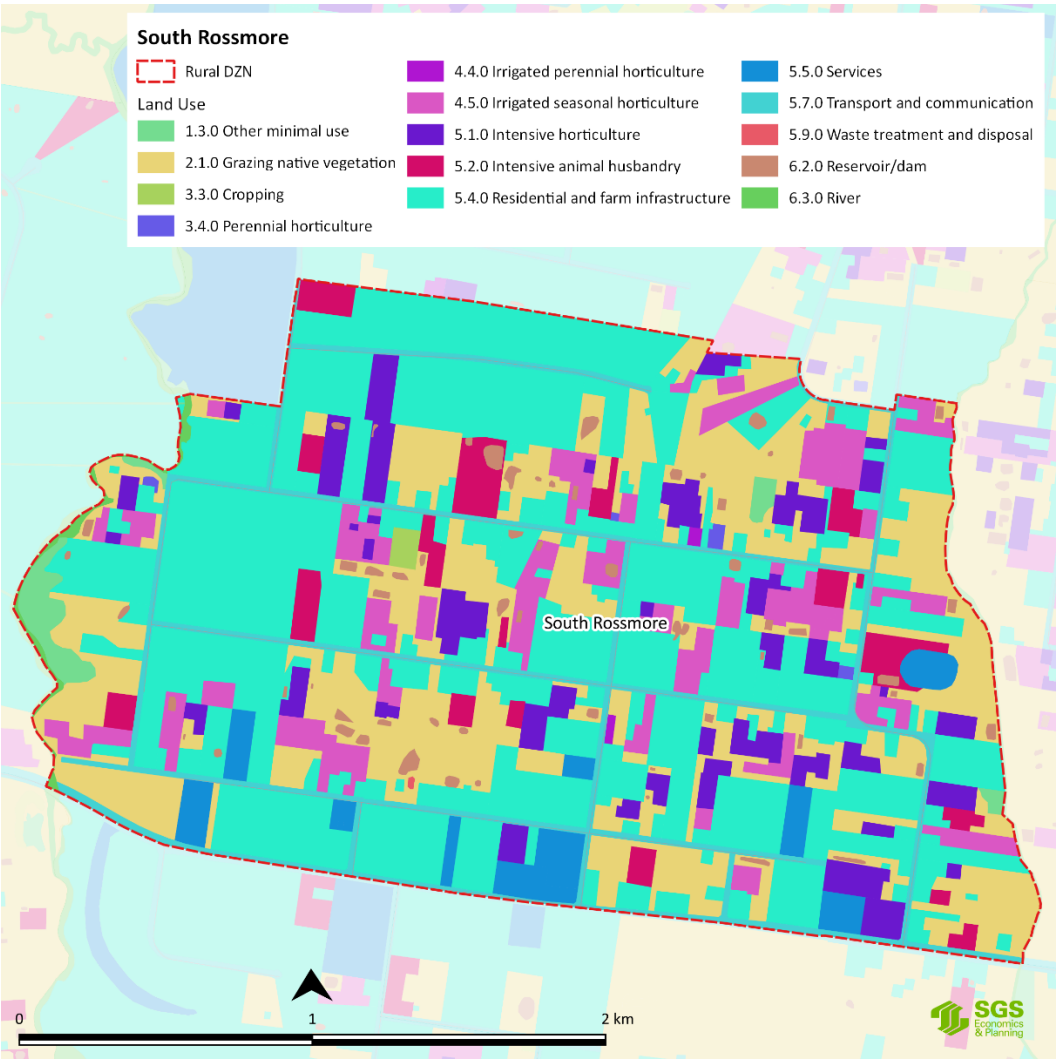
Objectives	Permitted without consent	Permitted with consent	Prohibited
Infrastructure Zone (SP2)			
<ul style="list-style-type: none"> To provide for infrastructure and related uses. To prevent development that is not compatible with or that may detract from the provision of infrastructure. 		The purpose shown on the Land Zoning Map, including any development that is ordinarily incidental or ancillary to development for that purpose.	Any development not specified in item 2 or 3
Agribusiness Zone			
<ul style="list-style-type: none"> To encourage sustainable and high technology Agribusiness and Agricultural production with links to food production and processing. To encourage diversity in Agricultural and Agribusiness enterprises and systems appropriate for the area. To encourage the development of integrated food and supply chain related industries. To minimise conflict between land uses within this zone and land uses within adjoining zones. To maintain and enhance natural rural character, biodiversity and sustainability of the area To allow for non-agricultural land uses that will not restrict the use of other land in the locality for agricultural purposes. To allow for the sustainable and holistic development of agritourism product and experiences. To protect the operations of the Airport, including 24-hour operations, and provide appropriate protections for the community. Ensure there are no sensitive land uses (such as residential, aged care, early education and childcare, educational establishments and hospitals amongst other uses) located within the ANEC 20 and above contours. Ensure that land uses up to the ANEC 20 contour are subject to appropriate design and construction standards to reduce any potential for airport noise impacts 	Home occupation	Animal boarding or training establishment, Business premises, Car park, Community facility, Earthworks, Educational establishment, Eco-tourist facility, Electricity generating works, Environmental protection works, Environmental facility, Farm building, Farm stay accommodation, Flood mitigation work, Food and drink premises, Freight transport facility, Function centre, Garden centre, Health services facility, Industrial training facility, Information and education facility, Intensive plant agriculture, Landscaping material supplies, Light industry, Market, Places of public worship, Plant nursery, Recreation area, Research station, Roadside stall, Rural industry, Rural supplies, Rural workers' dwelling, Service station, Telecommunications facility, Warehouse or distribution centre, Water recycling facility, Water supply system	Any development not specified in item 2 or 3

Source: Western Sydney Aerotropolis Draft SEPP, 2019.

APPENDIX 3

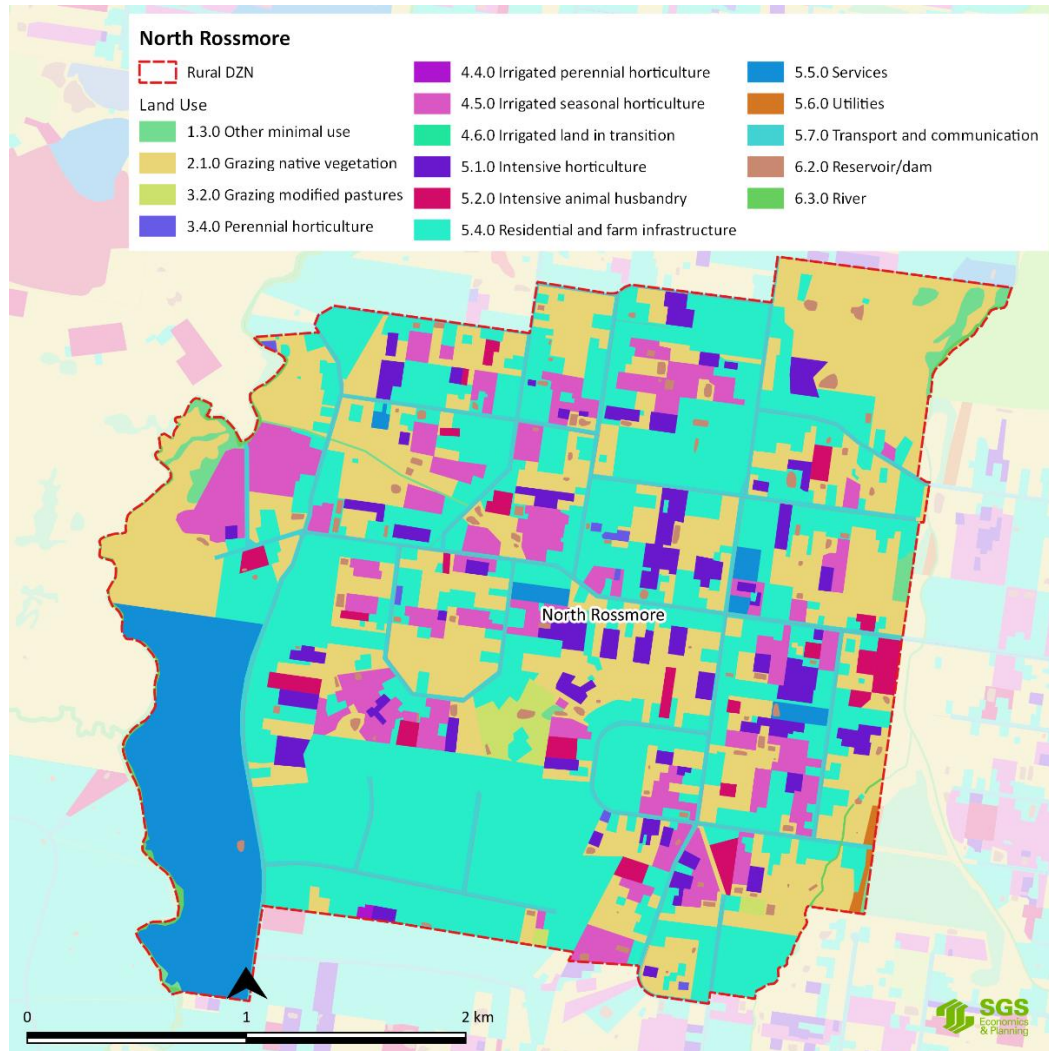
Agricultural land uses across rural Liverpool

FIGURE 72: SOUTH ROSSMORE LAND USE



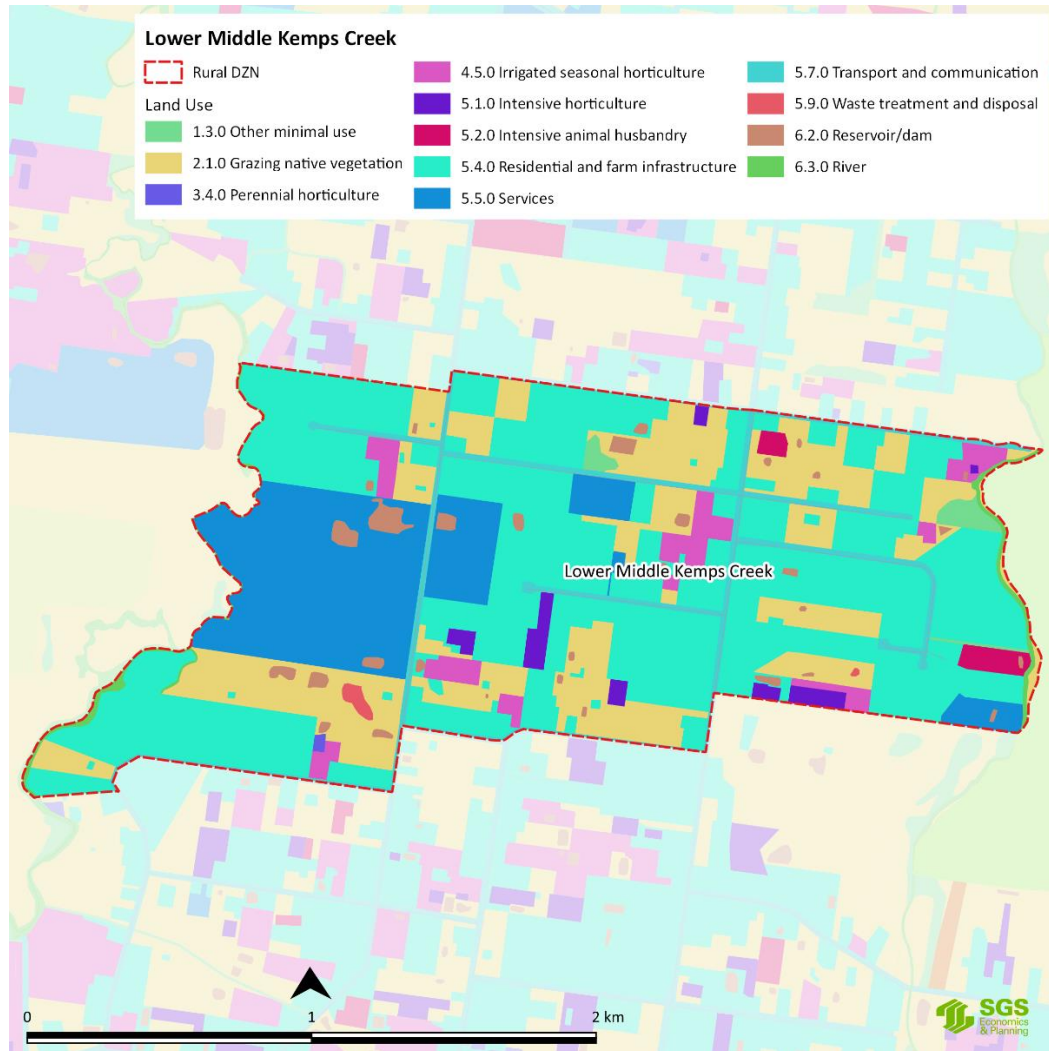
Source: Department of Planning, Industry and Environment 2013

FIGURE 73: NORTH ROSSMORE LAND USE



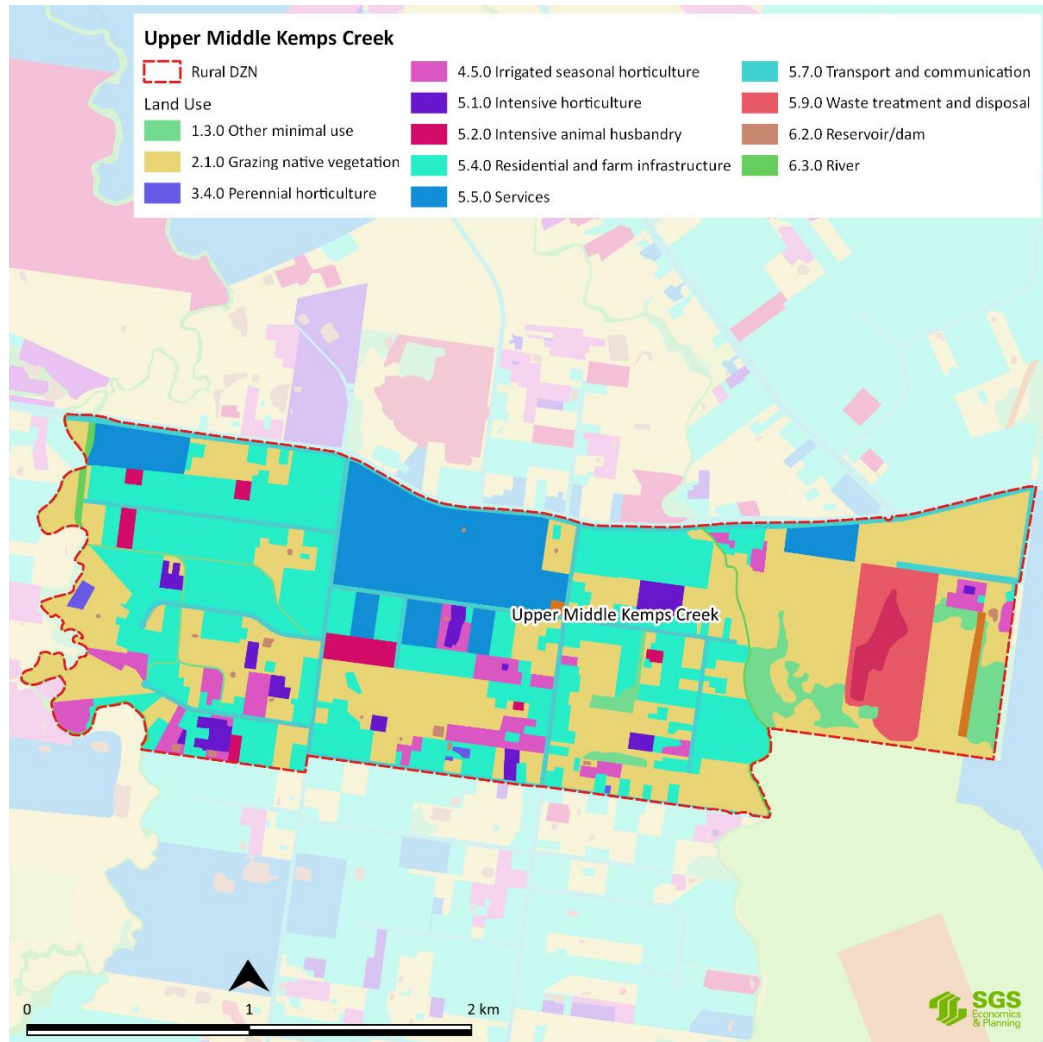
Source: Department of Planning, Industry and Environment 2013

FIGURE 74: LOWER MIDDLE KEMPS CREEK LAND USE



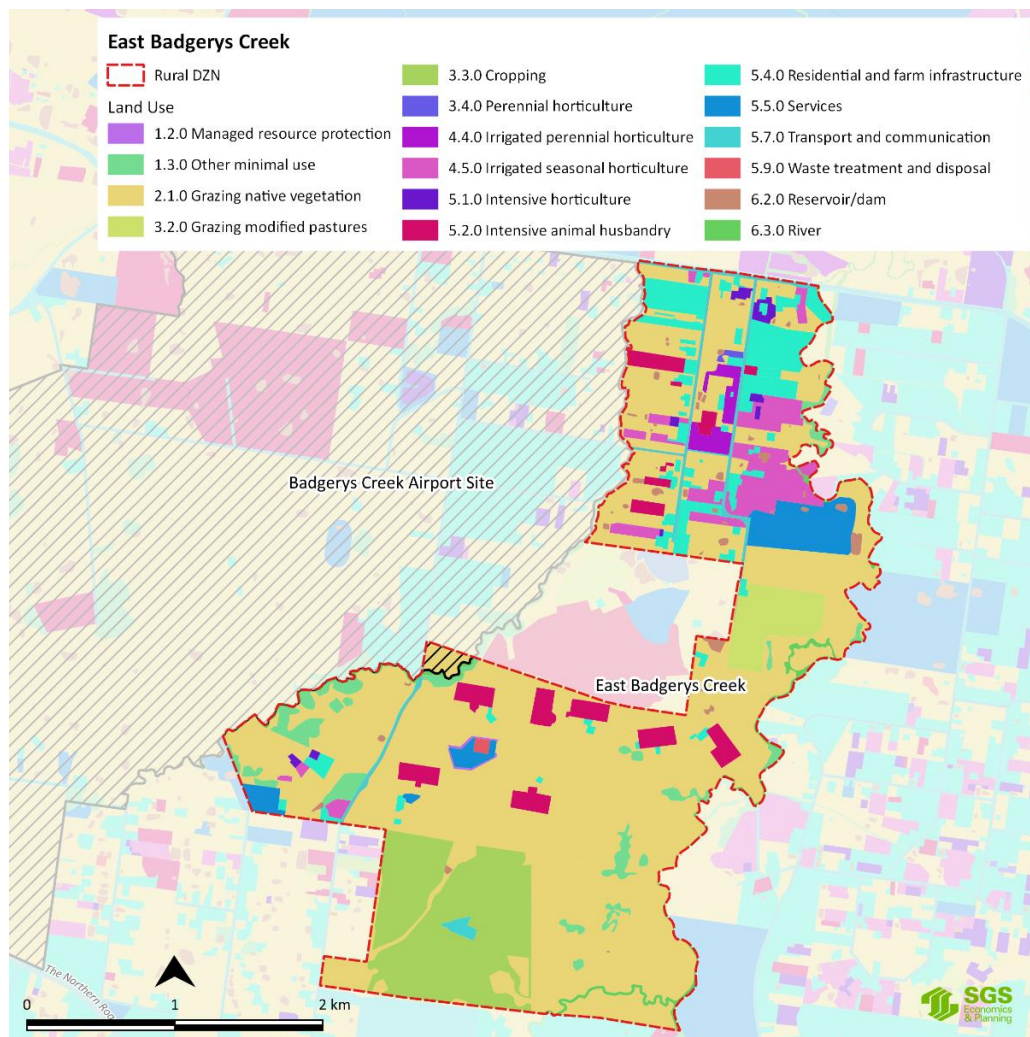
Source: Department of Planning, Industry and Environment 2013

FIGURE 75: UPPER MIDDLE KEMPS CREEK LAND USE



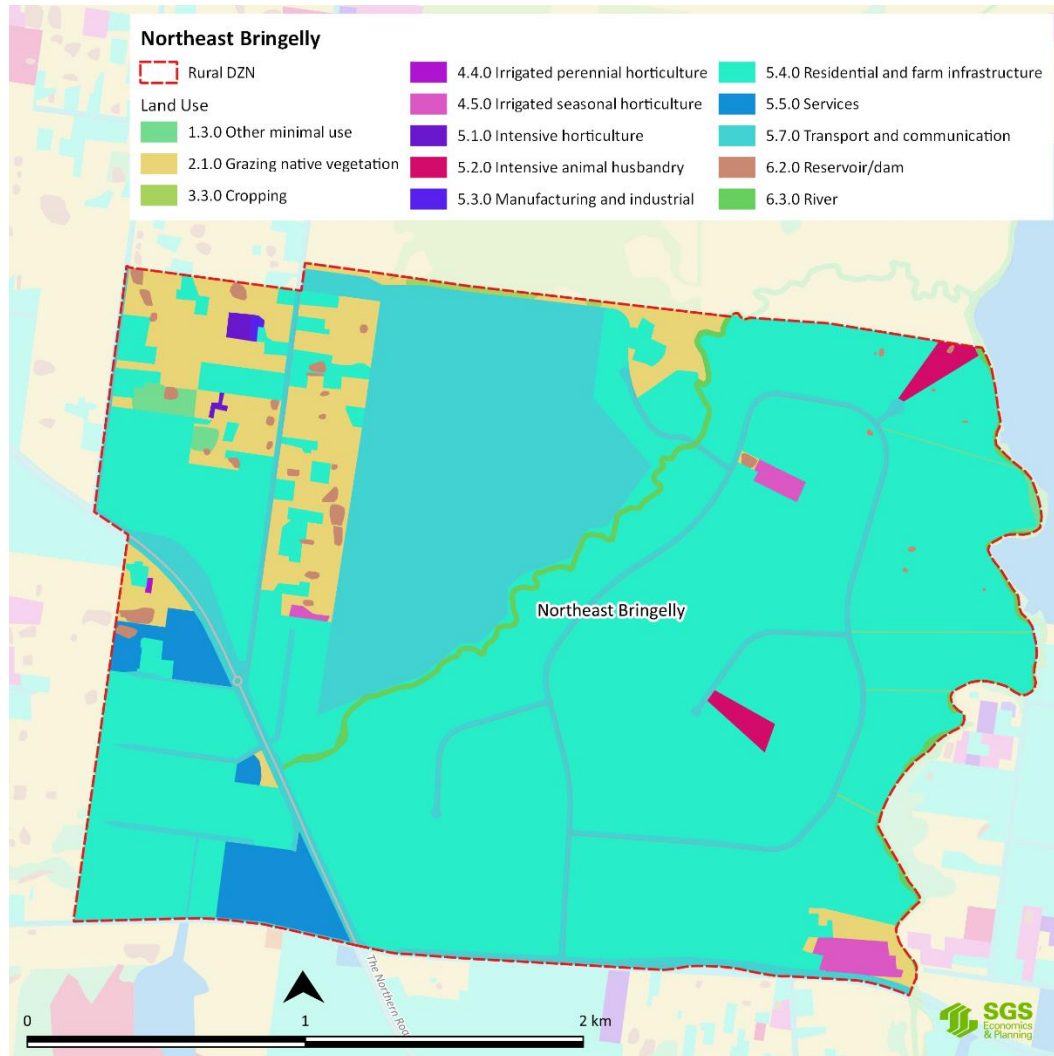
Source: Department of Planning, Industry and Environment 2013

FIGURE 76: EAST BADGERYS CREEK LAND USE



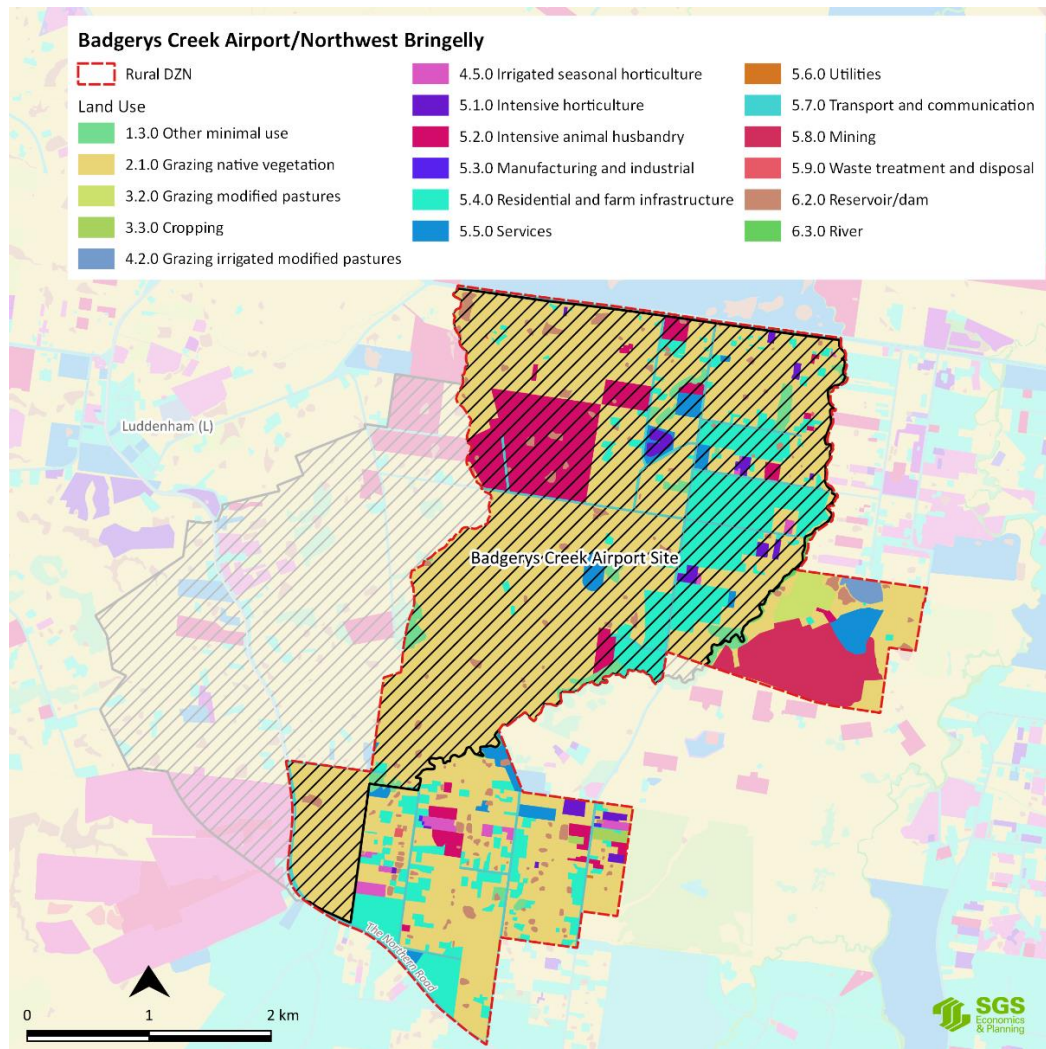
Source: Department of Planning, Industry and Environment 2013

FIGURE 77: NORTHEAST BRINGELLY LAND USE



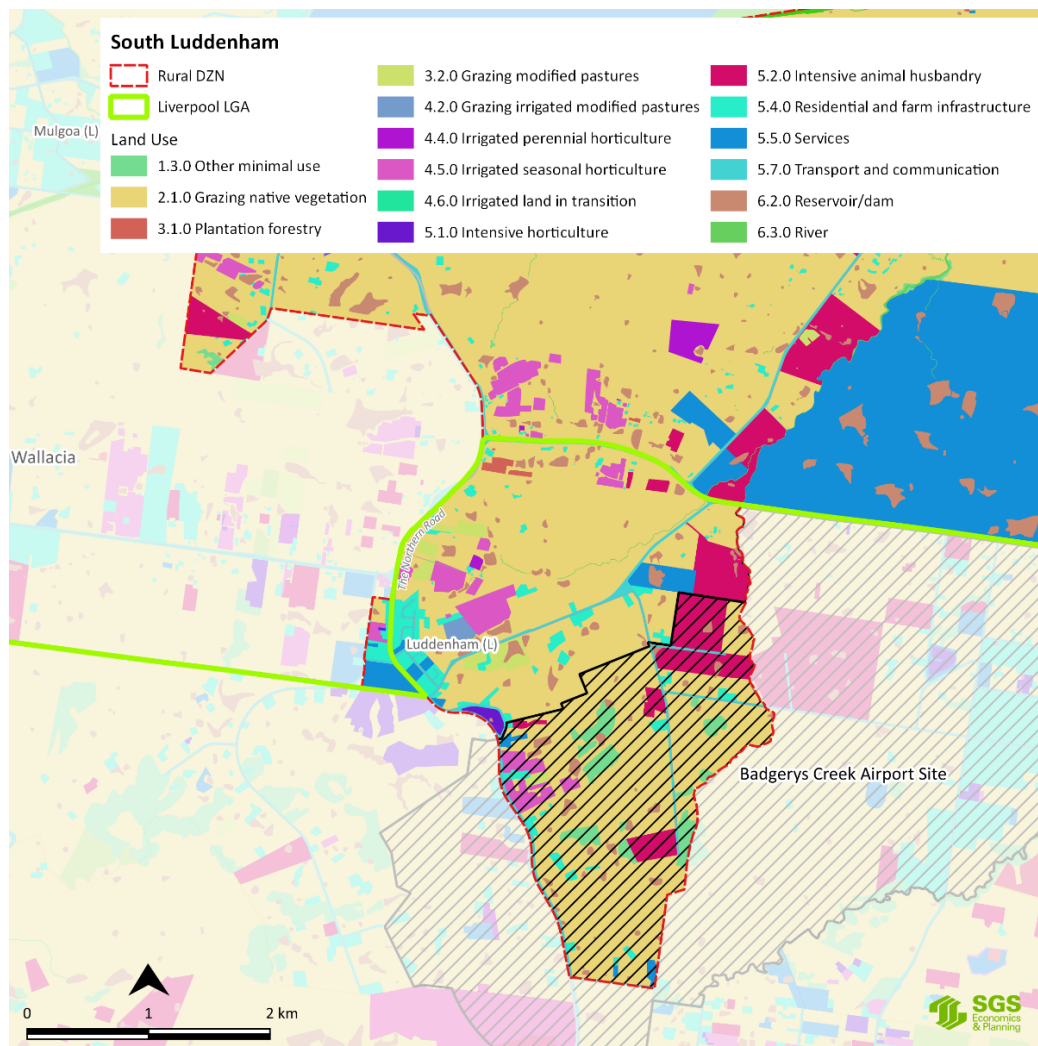
Source: Department of Planning, Industry and Environment 2013

FIGURE 78: BADGERYS CREEK AIRPORT/NORTHWEST BRINGELLY LAND USE



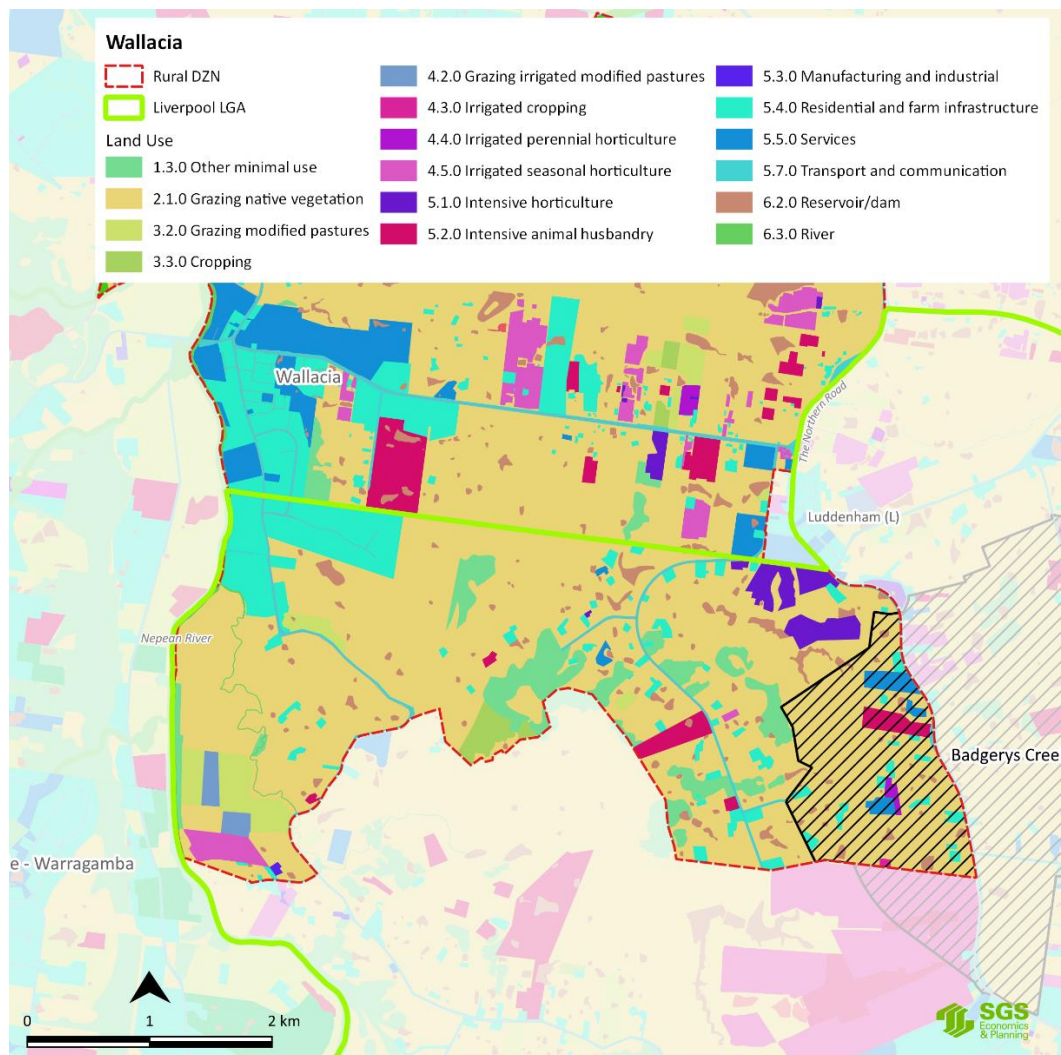
Source: Department of Planning, Industry and Environment 2013

FIGURE 79: SOUTH LUDDENHAM LAND USE



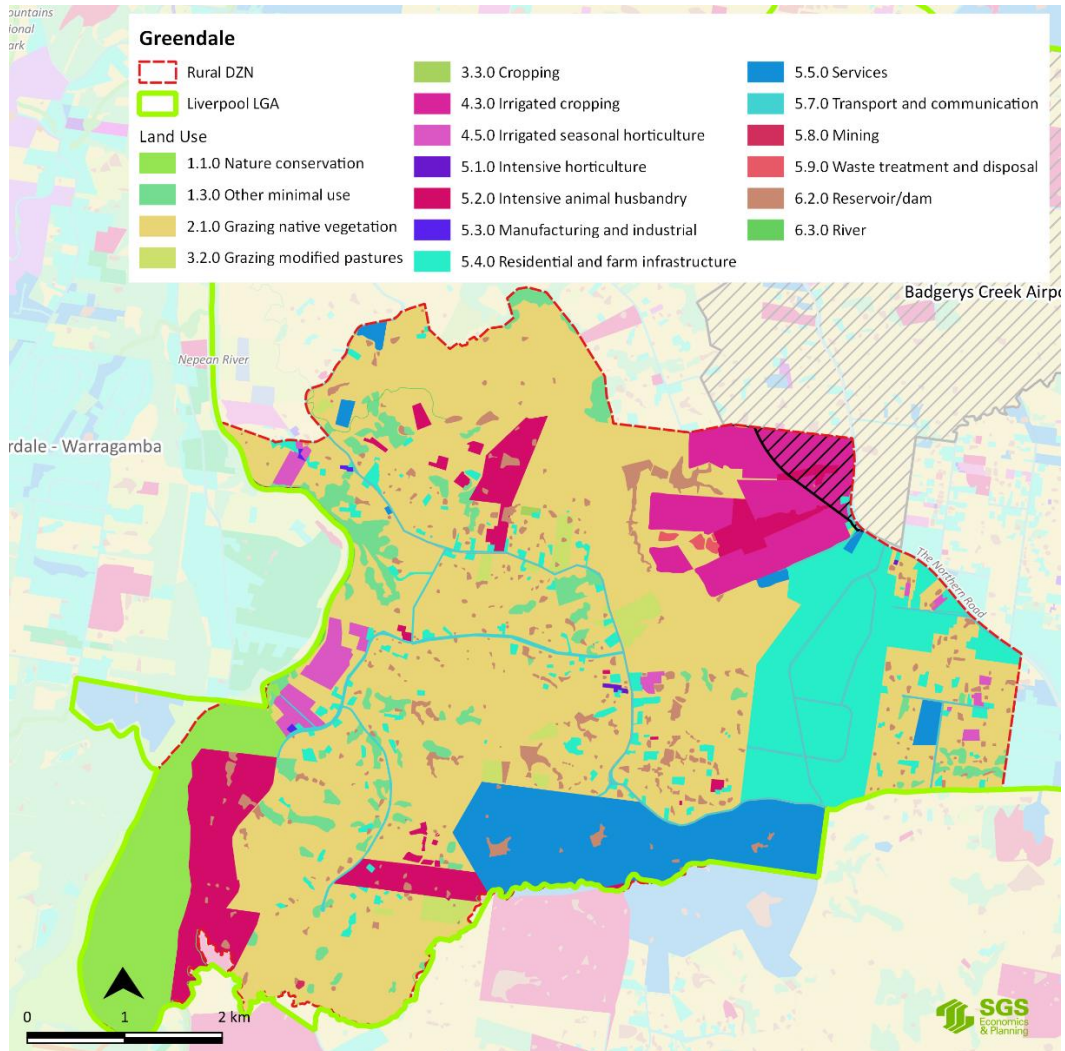
Source: Department of Planning, Industry and Environment 2013

FIGURE 80: WALLACIA LAND USE



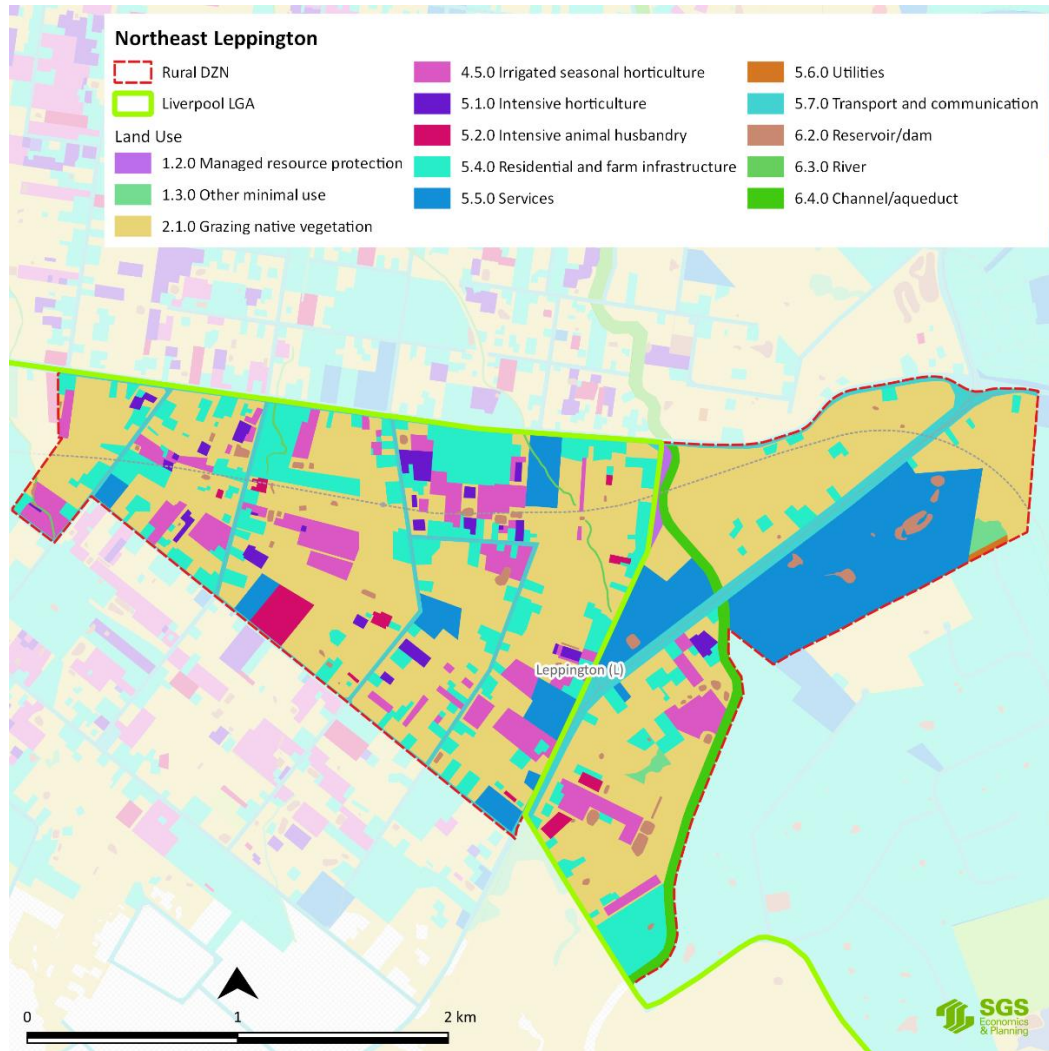
Source: Department of Planning, Industry and Environment 2013

FIGURE 81: GREENDALE LAND USE



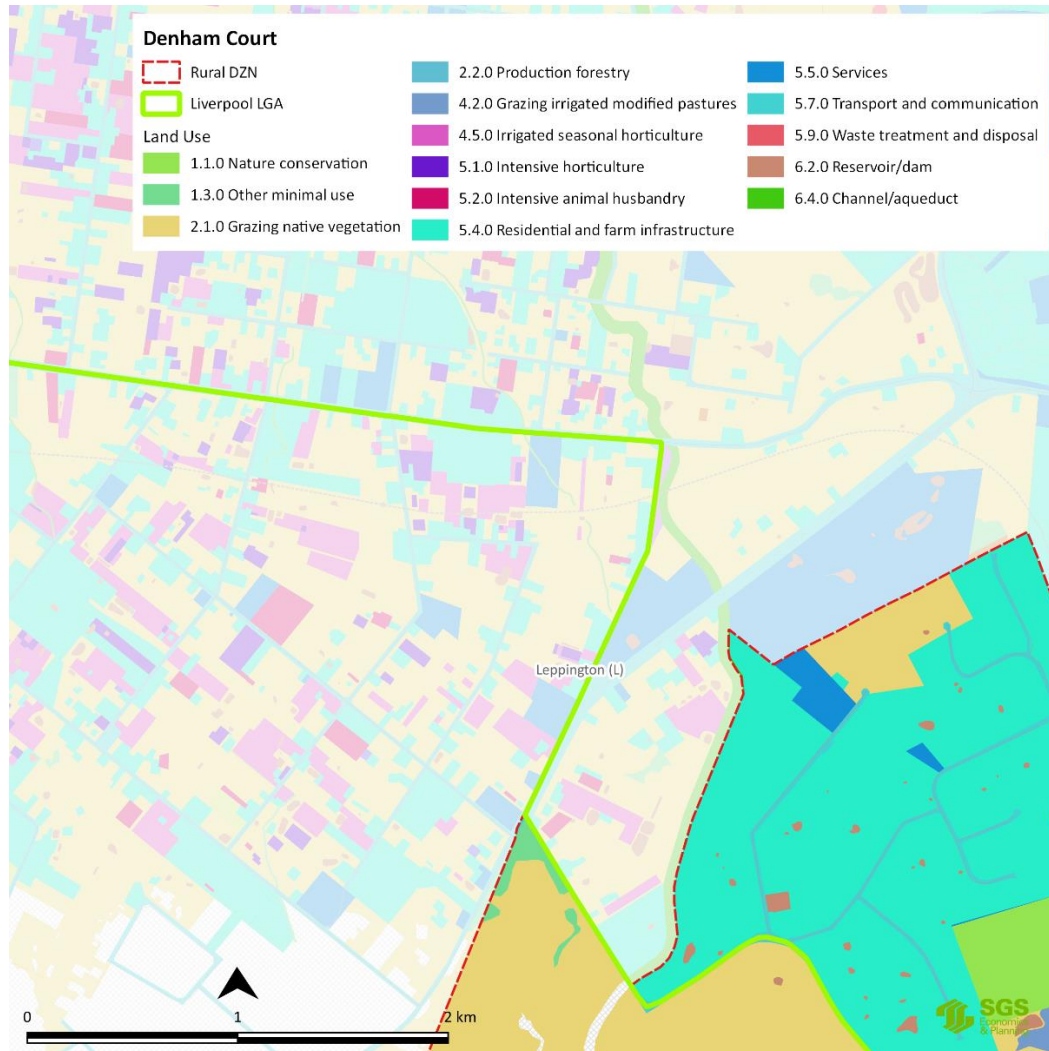
Source: Department of Planning, Industry and Environment 2013

FIGURE 82: NORTHEAST LEPPINGTON LAND USE



Source: Department of Planning, Industry and Environment 2013

FIGURE 83: DENHAM COURT LAND USE



Source: Department of Planning, Industry and Environment 2013

APPENDIX 4

Liverpool LGA output by industry

LIVERPOOL LGA OUTPUT BY INDUSTRY (\$M), 2015-16

Source	Supply Chain	Final Consumption Expenditure		Gross Fixed Capital Formation			Total demand	Exports	Total supply
		Households	Gov't	Private	Public Enterprise	General Gov't	= Sum of columns at left		= Total demand + exports
Agriculture, Forestry & Fishing	89	47	2	7	0	1	146	58	204
Mining	20	1	0	0	0	0	21	4	24
Manufacturing	784	294	33	70	3	19	1,203	2,054	3,257
Electricity, Gas, Water & Waste Services	288	117	10	13	4	3	435	30	464
Construction	1,161	9	2	616	52	111	1,950	7	1,957
Wholesale Trade	409	341	7	50	3	12	822	397	1,219
Retail Trade	158	620	26	11	1	3	818	112	930
Accommodation & Food Services	49	294	0	0	0	0	343	79	422
Transport, Postal & Warehousing	456	141	112	11	1	4	725	688	1,413
Information Media & Telecommunications	117	69	8	6	1	2	203	61	264
Financial & Insurance Services	271	75	0	2	0	1	348	172	520
Rental, Hiring & Real Estate Services	436	1,345	3	19	0	0	1,803	2,537	4,340
Professional, Scientific & Technical Services	467	23	22	41	2	7	562	57	619
Administrative & Support Services	413	31	41	1	0	0	486	19	505
Public Administration & Safety	95	8	732	7	0	2	844	886	1,731
Education & Training	8	203	327	1	0	0	540	155	695
Health Care & Social Assistance	19	314	732	1	0	0	1,066	245	1,312
Arts & Recreation Services	29	81	30	1	0	0	140	34	174
Other Services	154	171	4	0	0	0	329	74	403
Compensation of employees	5,443	0	0	0	0	0	5,443	0	5,443
Gross operating surplus & mixed income	4,247	0	0	0	0	0	4,247	0	4,247
Taxes less subsidies (products)	54	169	0	45	0	2	271	0	272
Taxes less subsidies (production)	371	0	0	0	0	0	371	0	371
Imports	4,915	4,420	229	1,051	82	279	10,976	280	11,256
Total Production	20,454	8,772	2,319	1,953	151	445	34,094	7,948	42,043

Source: ABS Census Table Builder (2016) and ABS National Accounts (2015-16).

Note: Industries shown are ANZSIC 1-digit.

APPENDIX 5

Land and soil capability assessment scheme: classes



See table overleaf.

LAND AND SOIL CAPABILITY CLASSES

Class	Description	Land management considerations
Class 1 (Very slight to negligible limitations)	<ul style="list-style-type: none"> Best cropping country in NSW. Used for a wide variety of agricultural uses that involve regular cultivations, including vegetable and fruit production, grain and oilseed crops, and fodder and forage crops in specific areas. Occasional flooding may restrict its use for some specific rural land uses, such as some cropping and horticulture. Typically uniform with deep, often productive soils. 	<ul style="list-style-type: none"> No special land management practices to control water and wind erosion are required. Good drainage, with sufficient water holding capacity to supply growing crops and pastures. Soils generally have good buffering capacity against soil acidity, no specific management practices to control soil acidity is required. Free of rock outcrop and large stones that would restrict farm machinery operation. Some land management practices that will preserve soil structure and chemical fertility are required.
Class 2 (Slight but significant limitations)	<ul style="list-style-type: none"> Very good cropping land with often fertile soils and short, gradual, gentle slopes. Capable of a wide variety of agricultural uses that involve cultivations. These include vegetable and horticultural production, and a range of crops including cereals, oilseeds and pulses. Common on plains and on extensive footslopes where run-on from slopes above is not concentrated or can be controlled. 	<ul style="list-style-type: none"> Land can be subject to sheet, rill and gully erosion as well as wind erosion and soil structure decline. Conservation tillage and conservation farming practices can control these limitations. Windbreaks and ground cover should be retained in areas prone to wind erosion. Salinity can be a slight hazard. Land managers need to be aware that deep drainage may cause salinity Acidity can also be a slight hazard. Land managers need to ensure their practices are not slowly acidifying the soils, and pH levels should be monitored regularly.
Class 3 (Moderate limitations)	<ul style="list-style-type: none"> Especially widespread on NSW slopes and in coastal areas. Typically sloping lands that require earthworks to control runoff and erosion if used for regular cultivation. Class 3 land has limitations that must be managed to prevent soil and land degradation. Includes other soils with acidification and soil structure limitations that are sufficient to require the application of specific management practices. Off-site impacts of land management can be significant if limitations are not managed adequately (for example, water erosion, water erosion, water quality and sedimentation, wind erosion and air quality, or salinity). 	<ul style="list-style-type: none"> Land can be subject to sheet, rill and gully erosion as well as wind erosion and soil structure decline. Limitations can be controlled with land management practices readily available and easily implemented. Included are conservation tillage and farming practices such as retaining stubble, reducing tillage, sowing with minimum ground disturbance and the use of pasture rotations in the cropping system. Practices to manage salinity and ensuring that plant growth is adequate to maintain evapotranspiration rates, and minimising the length of fallows in cropping cycles. Acidity can be a moderate hazard and needs to be managed or the soils will suffer long-term degradation, particularly if acidity extends deep into the soil.
Class 4 (Moderate to severe limitations)	<ul style="list-style-type: none"> Moderate to severe limitations for some land uses that need to be consciously managed to prevent soil and land degradation. The limitations can be overcome by specialised management practices with high levels of knowledge, expertise, inputs, investment and technology. This class includes sloping lands. 	<ul style="list-style-type: none"> Land is generally used for grazing, and is suitable for pasture improvement. Acidification can be a problem under introduced annual legume pastures. Class 4 land can be cultivated occasionally for sowing of pastures and crops. However, it has cropping limitations because of erosion hazard, weak structure, salinity, acidification, shallowness of soils, climate, wetness, stoniness or a combination of these factors. Essential cropping practices include retaining stubble, reducing tillage and sowing with minimum disturbance. Salinity can be a moderate to severe hazard. Land management practices need to prevent deep drainage that causes salinity. Land management practices need to prevent possible soil acidification and pH should be monitored regularly. Lime should be added or acid-tolerant perennials should be grown when required.

Class	Description	Land management considerations
Class 5 (Severe limitations)	<ul style="list-style-type: none"> This class includes sloping lands with highly erodible soils and/or significant existing soil erosion, or land that will be subject to wind erosion when cultivated and left bare. Other limitations include shallow soils, stoniness, climatic limitations, acidification, potential for structure decline and salinity hazards. Land has severe limitations for high impact land management uses such as cropping. There are few management practices generally available to overcome these limitations. 	<ul style="list-style-type: none"> This land is not capable of supporting regular cultivation due to the various limitations. Soil erosion can be severe without adequate erosion control measures. Fertility is generally lower than land in Class 4 and there is a lower capacity to regenerate ground cover. Class 5 land can be cultivated occasionally for fodder crops and pasture renewal or establishment. It is important to minimise soil disturbance, maintain cover and maintain good organic matter levels. Eroded land that require earthworks are included in this class. Salinity can be a severe hazard. Acidification can be a severe hazard, particularly under introduced annual legume pastures, and soils can be naturally acidic near the surface and at depth.
Class 6 (Very severe limitations)	<ul style="list-style-type: none"> Class 6 land has very severe limitations for a wide range of land uses and few management practices are available to overcome these limitations. Land generally is suitable only for grazing with limitations and is not suitable for cultivation. Class 6 land includes steeply sloping lands that can erode severely even without cultivation, or land that will be subject to severe wind erosion when cultivated and left exposed. 	<ul style="list-style-type: none"> Class 6 land has severe to very severe site limitations for grazing and other land uses. It may have very severe limitations due to off-site effects such as salinity and the impact of soil erosion on water and air quality. Soil erosion can be very severe without adequate erosion control measures. Fertility varies with geology, soil depth and type. This land is suited for less productive grazing. Limitations prevent most other land uses.
Class 7 (Extremely severe limitations)	<ul style="list-style-type: none"> This land has extremely severe limitations for most land uses. It is unsuitable for any type of cropping or grazing because of its limitations. Use of this land for these purposes will result in severe erosion and degradation. It may be too steep, rocky, swampy or fragile for grazing. The land may be suitable for commercial timber plantations or for native timber on undeveloped land. Includes significantly sloping lands. 	<ul style="list-style-type: none"> Class 7 land is not capable of any cultivation or grazing by stock. It also has severe to very severe site limitations for other land uses, but may be suitable for wood production, passive tourism or honey production. Soil erosion control is difficult because of site limitations. Fertility varies with geology, soil depth and type. These limitations prevent most land uses.
Class 8 (Extreme limitations)	<ul style="list-style-type: none"> Class 8 land is not suitable for any agricultural production due to its extremely severe limitations. It includes precipitous slopes and cliffs, areas with a large proportion of rock outcrop, or areas subject to regular inundation and waterlogging (swamps, lakes, lagoons, stream beds and banks). 	<ul style="list-style-type: none"> This land is unusable for any agricultural purposes. Recommended uses are restricted to those compatible with the preservation of natural vegetation including water supply catchments, wildlife refuges, national and State parks, and scenic areas.

Source: OEH 2012.

APPENDIX 6

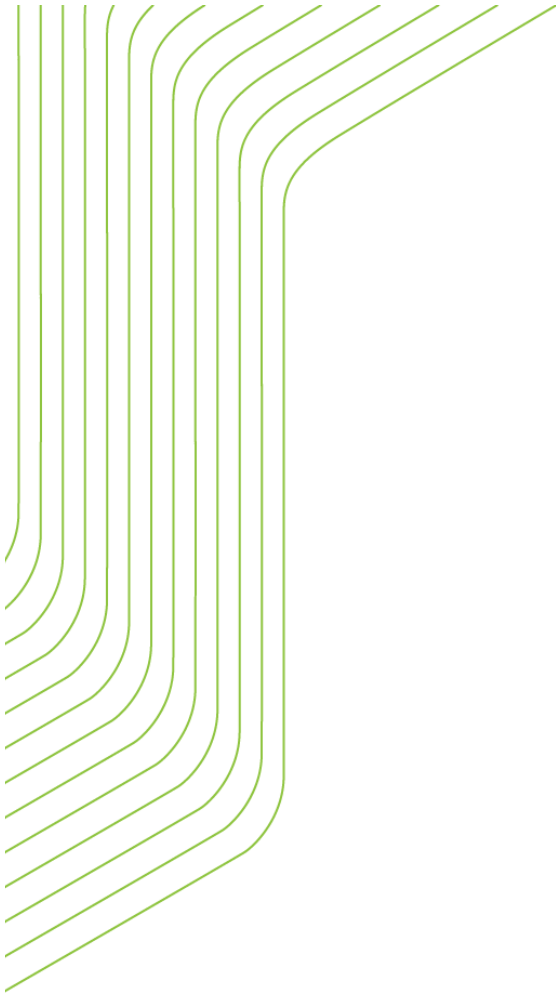
Fertility classes of great soil groups

FERTILITY CLASSES OF GREAT SOIL GROUPS

Soil Type (Great Soil Group)	Estimated Fertility	Fertility Value
Acid Peats	Low	1
Alluvial Soils - Light Sandy Textured (Sands to Sandy Loams)	Moderately low	2
Alluvial Soils - Medium Textured (Loams, Clay Loams)	Moderately high	4
Alpine Humus soils	Low	1
Black Earths	High	5
Brown Earths	Moderate	3
Brown Podzolic Soils	Moderate	3
Calcareous Red Earths	Moderately low	2
Calcareous Sands	Low	1
Chernozems	High	5
Chocolate Soils	Moderately high	4
Chocolate Soils - low iron	Moderately high	4
Desert Loams	Moderately low	2
Earthy Sands	Low	1
Euchrozems	Moderately high	4
Gleyed Podzolic Soils	Moderately low	2
Grey Brown and Red Calcareous Soils	Low	1
Grey Brown Podzolic Soils	Moderately low	2
Grey, Brown and Red Clays	Moderate	3
Humic Gleys	Moderately low	2
Humus Podzols	Low	1
Kraznozems	Moderately high	4
Lateritic Podzolic Soils	Moderately low	2
Lithosols	Low	1
Neutral to Alkaline Peats	Low	1
Non Calcic Brown Soils	Moderate	3
Peaty Podzols	Low	1
Podzols	Low	1
Prairie Soils	Moderately high	4
Red and Brown Hardpan Soils	Low	1
Red Brown Earths	Moderate	3
Red Earths - less fertile (granites and metasediment)	Moderately low	2
Red Earths - more fertile (volcanics and granodiorites)	Moderately high	4
Red Podzolic Soils - less fertile (granites and metasediment)	Moderate	3

Soil Type (Great Soil Group)	Estimated Fertility	Fertility Value
Red Podzolic Soils - more fertile (volcanics and granodiorites)	Moderately high	4
Rendzinas	Moderate	3
Siliceous Sands	Low	1
Solodic Soils	Moderately low	2
Solodized Solonetz	Moderately low	2
Solonchaks	Low	1
Solonetz	Moderately low	2
Solonized Brown Soils	Moderately low	2
Soloths	Moderately low	2
Terra Rossa Soils	Moderate	3
Weisenboden	Moderate	3
Xanthozems	Moderate	3
Yellow Earths	Moderately low	2
Yellow Podzolic Soils- less fertile (granites and metasediment)	Moderately low	2
Yellow Podzolic Soils - more fertile (volcanics and granodiorites)	Moderate	3

Source: Modified from Charman, P.E.V. 1978 (ed.), *Soils of New South Wales: Their Characterisation, Classification and Conservation*, Tech. Handbook No. 1, Soil Conservation Service of NSW, Sydney



Contact us

CANBERRA

Level 2, 28-36 Ainslie Place
Canberra ACT 2601
+61 2 6257 4525
sgsact@sgsep.com.au

HOBART

PO Box 123
Franklin TAS 7113
+61 421 372 940
sgstas@sgsep.com.au

MELBOURNE

Level 14, 222 Exhibition St
Melbourne VIC 3000
+61 3 8616 0331
sgsvic@sgsep.com.au

SYDNEY

209/50 Holt St
Surry Hills NSW 2010
+61 2 8307 0121
sgsnsw@sgsep.com.au

Planning Proposal

**Amendment 98 to the Liverpool Local
Environmental Plan 2008**

22 Box Road Casula (Mimosa Park)

Contents

Introduction	3
Foreword.....	3
Overview of Planning Proposal	3
Site & Locality Description	4
Statutory Planning Framework	8
Delegation of plan making functions.....	8
Part 1 – Objectives and intended outcomes	9
Part 2 – Explanation of provisions	9
Part 3 – Justification of strategic and site-specific merit	10
Section A – Need for the planning proposal.....	10
3.1 Is the planning proposal a result of an endorsed LSPS strategic study or report? ...	10
3.2 Is the planning proposal the best means of achieving the objectives or intended outcomes, or is there a better way?	10
Section B – Relationship to the strategic planning framework.....	10
3.3 Will the planning proposal give effect to the objectives and actions of the applicable regional or district plan or strategy (including any exhibited draft plans or strategies)?	10
3.4 Is the planning proposal consistent with a council LSPS that has been endorsed by the Planning Secretary or GSC, or another endorsed local strategy or strategic plan?.....	12
3.5 Is the planning proposal consistent with any other applicable State or regional studies or strategies?	13
3.6 Is the planning proposal consistent with applicable SEPPs?	13
3.7 Is the planning proposal consistent with applicable Ministerial Directions (Section 9.1 directions)?	14
Section C – Environmental, social, and economic impact.....	15
3.8 Is there any likelihood that critical habitat or threatened species, populations or ecological communities, or their habitats, will be adversely affected because of the proposal?	15
3.9 Are there any other likely environmental effects of the planning proposal and how are they proposed to be managed?.....	15
3.10 Has the planning proposal adequately addressed any social and economic effects?	16
Section D – Infrastructure (local, state and commonwealth)	16
3.11 Is there adequate public infrastructure for the planning proposal?	16
Section E – State and commonwealth interests	17
3.12 What are the views of state and federal public authorities and government agencies consulted in order to inform the Gateway determination?	17

Part 4 – Maps	18
Part 5 – Community consultation.....	20
Part 6 – Project timeline	20
Appendices	20

Introduction

Foreword

This Planning Proposal has been prepared to initiate an amendment to the *Liverpool Local Environmental Plan 2008* (LLEP 2008). The amendment involves the rezoning and reclassification (from community to operational land) of 22 Box Road, Casula (Lot 1103 DP 1051233), gazetted as Mimosa Park.

The Planning Proposal will be referred to the Local Planning Panel on 14 November 2022 for advice.

Overview of Planning Proposal

This planning proposal is Council initiated and intends to rezone and reclassify 22 Box Road Casula (Lot 1103 DP 1051233), locally known as Mimosa Park. The site is a vacant pocket of open space of zoned RE1 Public Recreation within the *Liverpool Local Environmental Plan 2008* (LLEP 2008), and is approximately 565m² in size. The site is currently unembellished and underutilised and is bound by double storey single dwellings within the R2 Low Density Residential zone to the north west and south. It has frontage to a public road to the east (which is restricted to private vehicles via a bus filter).

In October 2020, Council resolved to allocate funds to undertake a feasibility study, environmental testing and a concept development for Mimosa Park. The investigation identified several risk pertaining to public safety, accessibility, fall heights and maintainability.

The recreational value of the site was found to be limited and at its Council ordinary meeting on 31 August 2022, it was resolved that Council:

1. *“Proceed with an amendment to Liverpool LEP 2008 to seek a rezoning for the property at Box Road, Casula (Lot 1103 DP 1051233) to R2 Low Density Residential and reclassification of the site to “operational” land for potential future sale with the proceeds from any future sale to be allocated for the embellishment of Jardine park.*
2. *That if a rezoning and reclassification process are approved as part of an amendment to the LEP, that a future report be presented to Council recommending methods of sale and establishing a reserve / minimum price for the property, prior to proceeding with any sale”*

Report structure

This planning proposal has been prepared in accordance with Section 3.33 of the *Environmental Planning & Assessment Act 1979* with consideration to the Department of Planning and Environments (DPE) 'Local Environmental Plan Making Guideline' (September 2022). Accordingly, the proposal is discussed in the following parts:

- Introduction
- Part 1 – Objectives and intended outcomes
- Part 2 – Explanation of provisions
- Part 3 – Justification of strategic and site-specific merit
- Part 4 – Maps

- Part 5 – Community consultation
- Part 6 – Project timeline

Site & Locality Description

The planning proposal relates to 22 Box Road, Casula (Lot 1103 DP 1051233). The subject site is shown in Figure 1 and locality context in Figure 2 below.



Figure 1: Subject site at 22 Box Road, Casula (Source: Nearmap)



Figure 2: Locality (Source: LCC Geocortex)

The site is also known as Mimosa Park. It is a vacant block of land of approximately 565m², currently zoned RE1 Public Recreation under the LLEP 2008. The site slopes approximately 4m from the Box Road street frontage to the west of the site, and has a gradient of close to 1:10. The site is currently constrained by access, as part of the road is closed along the sites frontage, to prevent Box Road being used as a bypass from the Hume Highway. The road still allows for pedestrian, bus and cycle access to the site. It is bound by low density residential development on the north, south and west frontages. The site has a limited functionality due to its size, access, safety and level change constraints. The context of the site is shown in the two figures below.



Figure 3: Bus filter in front of the site, facing south.



Figure 4: View from the road, facing west.

The surrounding development is of low density context, with the streetscape characterised by detached 2 storey dwellings. Residential land to the north, south and west is zoned R2 Low Density Residential, and land to the east is zoned R3 Medium Density Residential which predominantly contains low density dwellings, with a small number of multi-dwelling developments.

The site is approximately 1km from Casula Town Centre, containing library, recreation facilities and shops including Coles, Aldi and Kmart. The site is also located with 280m of a District Park, Peter Miller Reserve, which is currently well used by the community, and Jardine Park Casula, approximately 1.5km north east.

Statutory Planning Framework

The site is zoned RE1 Public Recreation under the *Liverpool Local Environmental Plan 2008* (LLEP 2008) (**Figure 5**).

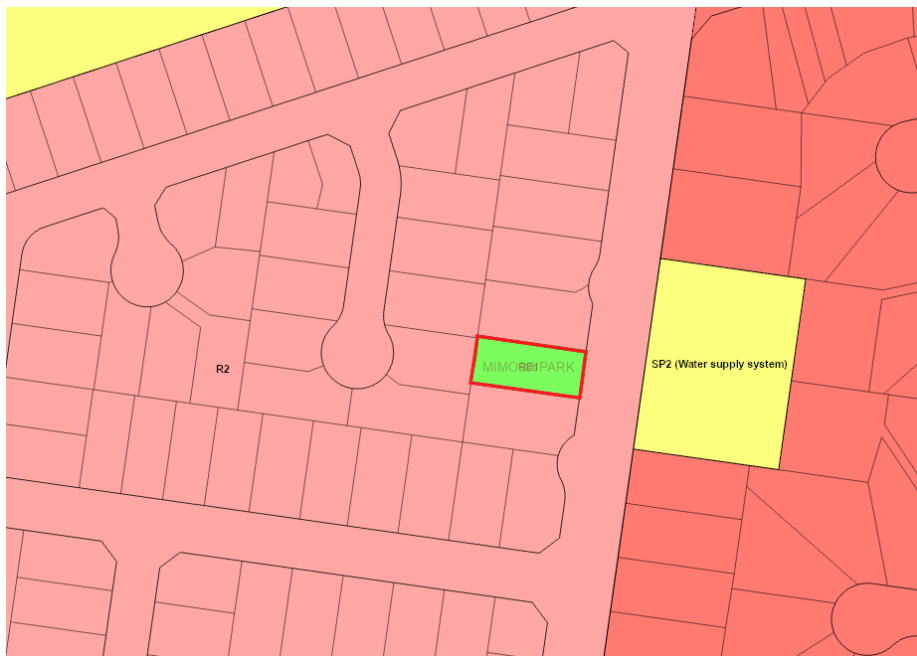


Figure 5 Zoning Map (Source LLEP 2008)

Delegation of plan making functions

Council is seeking authority of plan making functions pursuant to Section 3.36 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Part 1 – Objectives and intended outcomes

The intent of the planning proposal is to facilitate the reclassification of No. 22 Box Road, Casula (Lot 1103 DP 1051233) from Community Land to Operational Land, and to enable its future development as a single dwelling within a low density residential area, as the site is deemed too constrained for its use as a quality public park.

At its meeting on 27 October 2020, Council considered a report on Mimosa Park, 22 Box Road, Casula and resolved to endorse Option 1 of the following two options:

- *Option 1: Mimosa Park to be kept as a local park and embellished.*
- *Option 2: Reclassify, rezone and dispose of Mimosa Park.*

Following this, a feasibility study, environmental testing, and conceptual development was undertaken. The study identified several risks including site topography, public safety, accessibility, fall heights, and maintainability. At its meeting, on 31 August 2022, Council resolved to:

“That Council:

1. *Proceed with an amendment to Liverpool LEP 2008 to seek a rezoning for the property at 22 Box Road, Casula (LOT 1103 DP 1051233) to R2 Low Density Residential and reclassification of the site to ‘operational land for potential future sale with proceeds from any future sale to be allocated for the embellishment of Jardine park*
2. *That if a rezoning and reclassification process are approved as part of an amendment to the LEP, that a further report be presented to Council recommending methods of sale and establishing an reserve / minimum price for the property, prior to proceedings with any sale.”*

Council intends to dispose of the site to allow redevelopment for low density residential purposes, as it is currently underutilised and not appropriate for further embellishment into a park. Low density residential is consistent with the character of the locality. The planning proposal will facilitate this outcome by rezoning the site so it can be redeveloped in the future. Applying the same LLEP 2008 development standards as observed in the locality will only facilitate the development of one dwelling. Funding from the sale of the site will be allocated to the embellishment of Jardine Park in Casula.

Part 2 – Explanation of provisions

The planning proposal seeks to rezone the site from RE1 Public Recreation to R2 Low Density Residential, accompanied by changes to development standards and the reclassification from Community Land to Operational Land.

The planning proposal seeks to implement a Floor Space Ratio (FSR) of 0.6:1, Height of Building (HOB) of 8.5m and Minimum Lot Size of 300m² on the site, which are commensurate with adjacent R2 Low Density Residential development standards. The site currently contains nil development standards under the RE1 Public Recreation zone.

Part 3 – Justification of strategic and site-specific merit

Section A – Need for the planning proposal

3.1 *Is the planning proposal a result of an endorsed LSPS strategic study or report?*

The planning proposal is not the result of any endorsed strategic planning statement, strategic study or report. The planning proposal is as a result of a Council resolution. An assessment was carried out as to how the site could be developed for the purpose of open space, and the outcome of this assessment concluded that the site was unsuitable. The site is currently underutilised and Council intends to sell of the land, with all proceeds from the sale being allocated for the embellishment of Jardine Park, located 1.5km north east from the subject site.

3.2 *Is the planning proposal the best means of achieving the objectives or intended outcomes, or is there a better way?*

The planning proposal is the best means of achieving the intended outcome, as the land is no longer intended to be used for a public purpose, it is required to be rezoned and reclassified to achieve its intended future use as a private dwelling.

Section B – Relationship to the strategic planning framework

The Department of Planning and Environments, 9.1 Ministerial Directions '1.1 Implementation of Regional Plan', gives legal effect to the vision, land use strategy, goals, directions and actions contained in Regional Plan. It is considered that this planning proposal meets these tests outlined in the following section.

3.3 *Will the planning proposal give effect to the objectives and actions of the applicable regional or district plan or strategy (including any exhibited draft plans or strategies)?*

a. Strategic Merit

The planning proposal is generally consistent with relevant regional, sub-regional or district plan or strategies, where inconsistencies arise, they are justifiable. The most relevant State and District plans that guide the land use direction for the site, are:

- Greater Sydney Regional Plan – A Metropolis of Three Cities (Region Plan)
- Western City District Plan (District Plan)
- Liverpool Local Strategic Planning Statement 'Connected Liverpool 2040' (LSPS)

Greater Sydney Regional Plan – A Metropolis of Three Cities

The Greater Sydney Regional Plan – A metropolis of three cities was released in March 2018 and prepared by the Greater Cities Commission (formally Greater Sydney Commission). The Region Plan encompasses a global metropolis of three cities – the Western Parkland City, The Central River City and The Eastern Harbour City. The Liverpool LGA is located with the Western Parkland City. Consistency with the relevant parts of the regional plan is provided below :

Table 1 Consistency with the Regional Plan

Objective	Comment
A city supported by infrastructure	
Objective 4: Infrastructure use is optimised	<p>This objective aims to maximise asset utilisation to ensure higher levels of social, economic and environmental outcomes.</p> <p>This planning proposal is consistent with this objective. It is recognised that Mimosa Park is underutilised and able to accommodate low density residential without reducing accessibility to functional open space. Whilst it technically results in a reduction of open space, the funds raised from the sale of the land will embellish nearby Jardine Park. This is expected to increase the capacity of Jardine Park which is more functional and currently serves a larger population. Therefore, the planning proposal is considered consistent.</p>
A city for people	
Objective 6 Services and infrastructure meet communities' changing needs	<p>This objective advocates for the provision of social infrastructure to reflect the needs of the community.</p> <p>The population of Liverpool is growing, and whilst there is a need for additional open space within Liverpool, this pocket park is currently underutilised and not capable of facilitating an adaptable and usable space. Council officers conducted a risk assessment which found the existing site constraints (including topography, access, and drop off along the western boundary) were a safety concern and establishing a pocket park was not feasible.</p> <p>The planning proposal seeks to rezone the site to R2 Low Density, which will facilitate the redevelopment of 1 single dwelling. The funds generated will help embellish Jardine Park and increase its functionality.</p> <p>Therefore despite loss of open space, the proposal is justifiable loss in poor quality open space, in order to embellish Jardine Park, a larger space which can adapt over time to provide a range of different activities.</p>
A city of great places	
Objective 12 Great places that bring people together	<p>The direction aims to encourage well designed social infrastructure and attractive and enjoyable places. Great places are characterised by connectivity, accessibility and amenity.</p> <p>No. 22 Box Road does not have great accessibility for vehicles or pedestrians and the site slopes approximately 4m to the rear. By rezoning the site and selling the site, funds will be created to embellish Jardine Park which does offer high amenity and a people-friendly public realm. Therefore, the planning proposal is considered consistent.</p>
A city in its landscape	
Objective 31 – Public open space is accessible, protected and enhanced.	<p>Objective 31, states a key consideration for planning open spaces are quantity, quality and distribution. Access to high quality open space is becoming increasingly important as more people are living within high density housing.</p> <p>The objective also aims to enhance open space so it can meet a wider range of community needs. This can include better landscaping, more durable and higher quality facilities, better lighting and multi-use playing fields.</p>

Objective	Comment
	As stated throughout this report, No. 22 Box Road is not very accessible or safe. The sale will generate funds to embellish Jardine Park. Therefore despite the loss on public open space, the proposal is considered justified.

Western City District Plan

The site is located within the Western City District and the applicable District Plan is the Western City District Plan (2018), as established by the Greater Cities Commission in March 2018. Relevant directions from the Western City District Plan are noted at Table 2 below.

Table 2 Consistency with the Western City District Plan

Planning Priority	Comment
A city for people	
<i>Planning Priority W3: Providing services and social infrastructure to meet peoples changing needs</i>	<p>This priority acknowledges that facilities need to be accessible with direct and safe walking and cycling connections that can be used by all. It also notes that improving safety and accessibility benefits all residents and visitors, noting that public owned land presents opportunities to optimise social infrastructure.</p> <p>Council recognises that the subject site is currently underutilised, and even in an embellished form it would present risks to the community. Therefore its re-sale as residential land will allow for the enhancement of Jardine Park.</p>
<i>Planning Priority W6: Creating and renewing great places and local centres, and respecting the district heritage</i>	<p>This priority acknowledges a number of elements that create great places include:</p> <ul style="list-style-type: none"> • Well-designed built environment (safe, clean and flexible spaces) • Social infrastructure (opportunities for social interaction and connections and access for all abilities) • Fine grain urban form (walkable, mix of land uses and accessible social infrastructure) <p>The site does not offer a safe or accessible environment for a public park. As stated above, this rezoning will create the funds to embellish Jardine Park which reinforce the elements above. The rezoning will facilitate a single dwelling which is consistent with the residential context of the area.</p>

3.4 Is the planning proposal consistent with a council LSPS that has been endorsed by the Planning Secretary or GSC, or another endorsed local strategy or strategic plan?

Liverpool Local Strategic Planning Statement (LSPS)

Councils local strategic planning statement was endorsed in 2020. Assessment of consistency with the LSPS is below:

Table 3 Consistency with LSPS

Planning Priority	Comment
Liveability	
<i>Planning Priority 6 High-quality, plentiful and accessible community facilities, open space and infrastructure aligned with growth</i>	<p>Planning Priority 6 states that Liverpool City Council is committed to the delivery of high quality facilities. Specifically, this directions commits to:</p> <ul style="list-style-type: none"> • Ensure community facilities, open space and recreation facilities meet the need of a growing population across the entire LGA • Increase public open space and work with key stakeholder to revitalize and develop parks and open space across the LGA • Priorities a collaborative approach towards community and social infrastructure planning. <p>The site was identified as having low recreational value, and subsequently not being used to its full potential. This proposal will help revitalise Jardine Park in Casula, and also facilitate the redevelopment of 22 Box Road as a residential dwelling. The area is well serviced by infrastructure, including open space, and the reduction of this site will result in better open space outcomes for Casula, in comparison to the poor quality space provided at the site today.</p>

3.5 Is the planning proposal consistent with any other applicable State or regional studies or strategies?

The planning proposal is not inconsistent with SEPPs applying to the land. Further justification is explained in Table 4 and 5 below.

3.6 Is the planning proposal consistent with applicable SEPPs?

Several State Environmental Planning Policies (SEPPs) apply to the land. The consistency of the planning proposal with pertinent SEPPs has been provided in Table 4 below. It is noted that SEPPs which the planning proposal will not materially impact nor undermine have been omitted from Table 4.

Table 4 Consistency with State Environmental Planning Policies

State Environmental Planning Policy	Comment / Consistency
Housing SEPP	The Housing SEPP gives incentives to supply affordable housing in the right place. The redevelopment of this site is anticipated to facilitate one single dwelling. Therefore, not applicable.
Transport and Infrastructure SEPP	N/A
Resilience and Hazard SEPP	Chapter 4 of the Resilience and Hazard 2021 SEPP provides a state wide planning approach to the remediation of contaminated

State Environmental Planning Policy	Comment / Consistency
	land. It aims to remediate contaminated land for the purpose of reducing risk and harm to human health. Council has conducted previous investigations on the site which has found it is unlikely to be contaminated. Investigations will continue to ensure this is the case. Therefore, consistent
Industry and Employment SEPP	N/A
Planning Systems	The SEPP identifies state and regionally significant development and provides considerations of the planning assessment. Therefore not applicable to this proposal.

3.7 Is the planning proposal consistent with applicable Ministerial Directions (Section 9.1 directions)?

Table 5 Consistency with the Ministerial Directions

Ministerial Direction	Comment / Consistency
Direction 1.1 Implementation of Regional Plan	The regional plan, district plan and local strategic planning statement is outlined through this report. It is considered consistent.
Direction 4.1 Flood Prone Land	The site is not identified as flood prone land or located within a flood planning area as per LLEP 2008 maps. Therefore, consistent.
Direction 4.3 Planning Bushfire Protection	The site is not identified as bushfire prone in a bushfire prone land map endorsed by the NSW Rural Fire service (RFS). Therefore, consistent.
4.4 Remediation of Contaminated Land	<p>The objective of this direction is to reduce the risk of harm to human health and the environment by ensuring that contamination and remediation are considered by the planning proposal authorises. It applies specifically where residential development is going to occur.</p> <p>Council has considered contamination as a risk on site due to the nature of illegal dumping on vacant land.</p> <p>In July 2021, a soil contamination assessment (SCA) including soil classification on subject site was conducted by Environmental Earth Science, investigated for the suitability of a park. The findings of the SCA are summarised below:</p> <ul style="list-style-type: none"> • A surface inspection of the site identified domestic rubbish and minor building rubble along the western boundary wall. No other signs of contamination were evident at the site surface; • Ten test pits excavated to a maximum depth of 1.8m below ground level;

	<ul style="list-style-type: none"> The subsurface conditions encountered fill material mostly comprised of firm brown clay with minor inclusions of glass, brick, tile fragments to depth between 0.15m (ease side) and 0.5m bgl (west side) underlain by clay and dark grey shale cobbles and boulders; and No friable asbestos, asbestos fibres or bonded ACM were identified. <p>The full investigation is attached. Council staff will continue to investigation to ensure alignment with this direction. However, the proposal is justifiably consistent with this direction.</p>
6.1 Residential Zone	<p>The rezoning of the site to R2 Low Density, will mean residential uses will become permissible. This direction will broaden the options available in Casula, as it is very rare for a vacant block to become available. It will also make more efficient uses of the existing land. It is therefore considered consistent.</p>

Section C – Environmental, social, and economic impact

3.8 *Is there any likelihood that critical habitat or threatened species, populations or ecological communities, or their habitats, will be adversely affected because of the proposal?*

The site is currently a vacant grassy lot with minimal vegetation. The planning proposal is not expected to affect any critical habitat or threatened species, populations, or ecological communities. The site is not mapped as Environmentally Significant Land under the LLEP 2008, and redevelopment for a single dwelling is likely to add further vegetation to the site which will support local ecosystems.

3.9 *Are there any other likely environmental effects of the planning proposal and how are they proposed to be managed?*

Stormwater Drainage:

The site contains a drainage easement that runs along the northern boundary. The subject easement is 1.2m wide, and benefits and burdens the Lot 1103 DP 10511233. The proposal was referred to Council Development Engineer who stated any future dwelling could connect to the easement.

Drainage design will be considered as part of the Development Application assessment.

Site Access

The site is currently constrained by access with the existing road section along the subject site closed to vehicles, however does permit walking and cycling. This occurred to prevent through traffic to ensure the road was not used as a bypass road from the Hume Highway to Casula Town Centre.

The subject proposal was referred to Council Traffic Management team, who stated vehicular access to the site could be extended as long as the extension included traffic calming devices and continued to permit walking and cycling.

The proposed rezoning is expected to generate 1 vehicle trip per hour, this will not have a noticeable impact on Box Road.

Development controls

The subject rezoning will facilitate the redevelopment of one single dwelling. The planning proposal will apply FSR and HOB controls same as the adjoining R2 Low Density Residential zone. As this will result in a 300m² minimum lot size, the site is not able to undergo residential subdivision, and will be limited to one future dwelling.

As part of the Development Application stage, the site will be subject to the controls outlined Liverpool Development Control Plan 2008.

3.10 Has the planning proposal adequately addressed any social and economic effects?

Economic effects

The planning proposal is not expected to have any negative economic effects. The sale of the site will generate additional funds for Council to embellish Jardine Park in Casula, to increase its functionality. The development of a single dwelling will generate small scale economic benefits through construction.

Social effects

The rezoning of the site is expected to have positive social outcomes, despite the loss of public open space. Council initially planned to embellish the site for increased public use, however further investigation identified safety issues with the sites suitability for a public park. In its current state and/or even in an embellished state, the site poses safety risks, as there is low visibility from street and minimal passive surveillance due to the slope and the land being fenced in by neighbouring residences. The site is more conducive to development for a dwelling and not a pocket park.

The redevelopment as a single dwelling will activate the streets frontage and provide more security to adjacent dwellings than an open park would. The funds generated by the sale will contribute to the embellishment of Jardine Park in Casula, which will enhance this existing community asset. Therefore, despite the loss of open space, the proposal results in positive social outcomes.

Section D – Infrastructure (local, state and commonwealth)

3.11 Is there adequate public infrastructure for the planning proposal?

The subject site is located in Casula which is a developed residential area with adequate public infrastructure to accommodate for the additional dwelling on the subject site.

Section E – State and commonwealth interests*3.12 What are the views of state and federal public authorities and government agencies consulted in order to inform the Gateway determination?*

As a part of the Gateway determination, relevant public authorities will be identified who are to be consulted in relation to the planning proposal. The referral advice provided by the public authorities will be considered, following consultation in the public exhibition period.

Part 4 – Maps

To facilitate the proposed changes, the follow LEP 2008 maps is to be amended:

Floor Space Ratio

- FSR_013 (4900_COM_FSR_013_020_20210318)

Height of Buildings

- HOB_013 (4900_COM_HOB_013_020_20210318)

Zoning

- LZN_013 (4900_COM_LZN)013_020_20210318)

Lot Size:

- LSZ_013 (4900_COM_LSZ_013_020_20210318)

Land Use Zoning

Table 6 Existing and Proposed Zoning Map

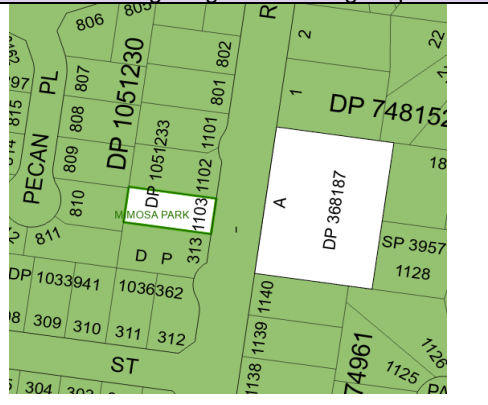
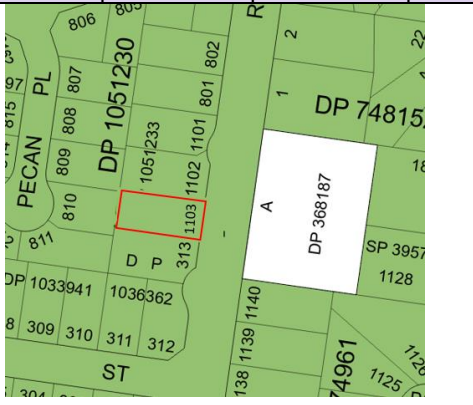
Existing Zoning	Proposed Zoning

Floor Space Ratio Maps

Table 7 Existing and Proposed Floor Space Ratio Map

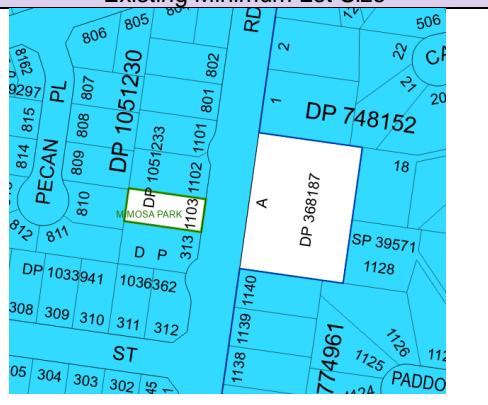
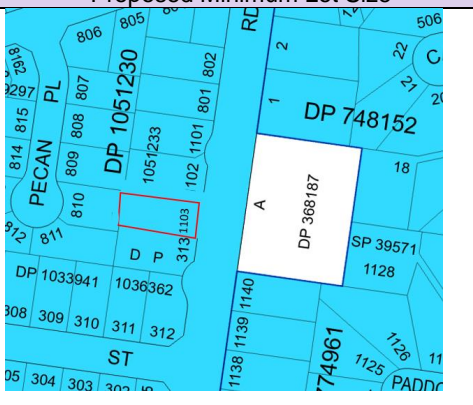
Height of Building Maps

Table 8 Existing and Proposed Height of Building Map

Existing Height of Building Map	Proposed Floor Space Ratio Map
	

Minimum Lot Size Maps

Table 9 Existing and Proposed Lot Size Map

Existing Minimum Lot Size	Proposed Minimum Lot Size
	

Part 5 – Community consultation

Schedule 1, Clause 4 of the EP&A Act requires the relevant planning authority to consult with the community in accordance with the Gateway determination. The planning proposal will be publicly exhibited for at least 28 days in accordance with DPE's 'Local Environmental Plan Making Guideline' (September 2022). The planning proposal exhibition will also be carried out in accordance with Council's Community Participation Plan.

The site is required to be reclassified from Community to Operational, and under the *Local Government Act 1993* Clause 29 requires Council to arrange a Public Hearing. The requirements outlined in the *Local Government Act 1993* will be dealt with during the community consultation period.

Part 6 – Project timeline

An anticipated project timeline is shown in Table 10.

Table 10 Anticipated Project Timeline

Timeframe	Action
February 2023	Report to Council for endorsement
March 2023	Submission to DPE for Gateway Assessment
May 2023	Gateway Determination issued
June - July 2023	State agency consultation
June - July 2023	Community consultation
August 2023	Consideration of submissions and proposal post-exhibition
September	Post-exhibition report to Council
October 2023	Legal drafting and making of the plan

Appendices

1. Safety Design Report Mimosa Park
2. Council Resolution – 27 October 2020
3. Council Resolution - 31 August 2022

Local Planning Panel Report 14 November 2022

Application Number:	RZ-9/2022
Proposal:	Planning proposal to amend the zoning, floor space ratio, height of building and minimum lot sizes development standards applying to the land.
Property Address	22 Box Road, Casula (Mimosa Park)
Legal Description:	Lot 1103 DP1051233
Recommendation:	Proceed to Gateway determination
Assessing Officer:	Brianna van Zyl – Strategic Planner

1. EXECUTIVE SUMMARY

This Planning Proposal has been prepared to initiate an amendment to the *Liverpool Local Environmental Plan 2008* (LLEP 2008). The amendment involves the rezoning and reclassification (from community to operational land) of 22 Box Road, Casula (Lot 1103 DP 1051233), known as Mimosa Park. A height of building, floor space ratio and minimum lot size development standard will also be applied to the site.

Mimosa Park is a vacant block of land of approximately 565m², currently zoned RE1 Public Recreation under the LLEP 2008. The site slopes approximately 4m from the Box Road street frontage to the west of the site, and has a gradient of close to 1:10. The site is currently constrained by access, as part of the road is closed along the sites frontage, to prevent Box Road being used as a bypass from the Hume Highway. The road still allows for pedestrian and cycle access to the site. It is bound by low density residential development on the north, south and west frontages. The site has a limited functionality due access, safety and level change constraints.

Several site constraints were identified pertaining to public safety. Accordingly, at its meeting on 31 August 2022, Council resolved to:

1. *“Proceed with an amendment to Liverpool LEP 2008 to seek a rezoning for the property at 22 Box Road, Casula (Lot 1103 DP1051233) to R2 Low Density Residential and reclassification of the site to “operational” land for potential future sale with the proceed from any sale to be allocated for the embellishment of Jardine Park.*
2. *That if a rezoning and reclassification process are approved as part of an amendment to the LEP, that a further report be presented to Council recommending methods of sale and establishing a reserve / minimum price for the property, prior to proceeding with any sale.”*

The planning proposal has been drafted (**Attachment 1**) as required by the above Council resolution. This planning proposal represents the first step in rezoning the property and facilitating the sale of the property. It is envisioned the site will be redeveloped as a single detached dwelling and the funds generated by the sale will embellish Jardine Park, which is located 1.5km from the subject site.

Determination of strategic and site-specific merit has been assessed in accordance with A guide to preparing planning proposal published by NSW Department of Planning and Environment (September 2022).

Local Planning Panel Report 14 November 2022

The proposal is referred to the Local Planning Panel in accordance with Section 2.19 of the EP&A 1979 for advice.

Council officers recommend that the planning proposal proceed to gateway and consideration by the elected Council.

2. Site Description and Locality

The planning proposal relates to 22 Box Road, Casula (Lot 1103 DP 1051233). The subject site can be seen in Figure 1 below.

The site is constrained and has limited functionality due access, gradients, safety and the adjoining residential dwellings.

Zoned RE1 Public Recreation, with nil development standards, and is classified as 'Community Land'. The surrounding development is of low density context, with the streetscape characterised by detached 2 storey dwellings. Residential land to the north, south and west is zoned R2 Low Density Residential, and land to the east is zoned R3 Medium Density Residential which is predominately characterised by low density developments, with a small number of multi-dwelling developments.

The site is approximately 1km from Casula Town Centre, containing library, recreation facilities and shops including Coles, Aldi and Kmart. The site is also located with 280m of the District Park, Peter Miller Reserve which is currently well used by the community, and Jardine Park Casula, is approximately 1.5km north east.



Figure 1: Locality (Source Near Map)

Local Planning Panel Report 14 November 2022

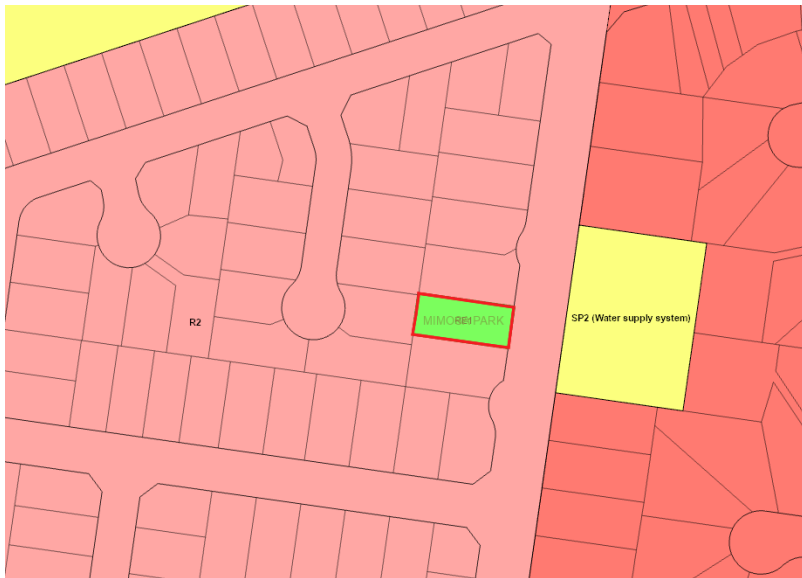


Figure 2: Zoning Map (Source: Geocortex)

3. Details of the Proposal

The intent of the planning proposal is to facilitate the reclassification of No. 22 Box Road, Casula (Lot 1103 DP 1051233) from Community Land to Operational Land, and to enable its future development as a single dwelling within a low density residential area, as the site is deemed too constrained for its use as a quality public park.

The planning proposal will impose a Maximum Floor Space Ratio of 0.6:1, Maximum Height of building of 8.5m and a minimum lots size of 300m², commensurate with adjoining land.

At its meeting on 27 October 2020, Council considered a report on Mimosa Park, 22 Box Road, Casula and resolved to endorse Option 1 of the following two options:

- Option 1: Mimosa Park to be kept as a local park and embellished
- Option 2: Reclassify, rezone and dispose of Mimosa Park.

Following this, a feasibility study, environmental testing, and conceptual development was undertaken. The study identified several risks, including the site topography, public safety, accessibility, fall heights, and maintainability.

At its meeting, on 31 August 2022, Council resolved to:

“That Council:

Local Planning Panel Report 14 November 2022

1. *Proceed with an amendment to Liverpool LEP 2008 to seek a rezoning for the property at 22 Box Road, Casula (LOT 1103 DP 1051233) to R2 Low Density Residential and reclassification of the site to 'operational land for potential future sale with proceeds from any future sale to be allocated for the embellishment of Jardine park*
2. *That if a rezoning and reclassification process are approved as part of an amendment to the LEP, that a further report be presented to Council recommending methods of sale and establishing an_[sic] reserve / minimum price for the property, prior to proceedings with any sale."*

Council intends to sell the site to allow redevelopment for low density residential purposes, as it is currently underutilised and not appropriate for further embellishment into a park. The planning proposal will facilitate this outcome by rezoning the site so it can be redeveloped in the future. Under the existing LLEP 2008 development standards, the application of the R2 Low Density Residential zone and development standards will only facilitate the development of one dwelling. Funding from the sale of the site will be allocated to the embellishment of Jardine Park in Casula.

The site will have to be reclassified from Community to Operational Land. This will be done as per the requirements in the *Local Government Act 1993*.

4. Consideration of Strategic Merit

In summary, the proposed amendment is considered to have strategic merit as outlined within the planning proposal justification report (**Attachment 1**). The proposed amendment is considered the best outcome for the site and the community. The site is currently under-utilised and the risk analysis identifies several safety risks if the site was developed as open space. Thus, the rezoning will generate additional funds to embellish Jardine Park and subsequently increase its functionality. Consideration has been given to the relevant 9.1 Ministerial Direction and State Environment Planning Policies to confirm consistency. This is outlined in detail in **Attachment 1**.

5. Consideration for Site Specific Merit

In summary, the proposed amendment is deemed to have site specific merit as outlined within the Planning Proposal justification report (**Attachment 1**). It is noted the site is constrained in regards to access, site access, and level changes which make it unsuited for public open space, but acceptable for low density residential development.

Ministerial direction '4.4 Remediation Contaminated Land' required consideration where residential development is to occur. Council has considered contamination risks as outlined in **Attachment 1**, due to the nature of illegal dumping on vacant site. However, a recent investigation in July 2021 found the site to be unlikely to be contaminated. Investigations will be ongoing, but the proposal is considered consistent with this direction.

6. Next Steps

Local Planning Panel Report 14 November 2022

Following the panel's consideration, the planning proposal will be reported to Council for their consideration. Should the planning proposal request be endorsed, it will be forwarded to DPE seeking a Gateway determination.

Following a Gateway determination in support of the planning proposal, there will be a public authority and community consultation. This will include a Public Hearing to meet the criteria for reclassifying under the *Local Government Act 1993*. Following consultation, a further report will be tabled to Council.

It is noted additional studies and clarification may be required by DPE prior to exhibition occurring.

7. Conclusion

Pursuant to the requirements of a Guide to preparing planning proposal and relevant ministerial directions, this attached planning proposal provides a merit assessment of the planning proposal.

The following amendments can be supported to proceed with the planning proposal process:

- Rezone to site from RE1 Public Recreation to R2 Low Density Residential;
- Apply a Floor Space Ratio of 0.6:1;
- Apply a Height of Building of 8.5; and
- Apply a minimum lot size of 300m².

The planning proposal request is presented to the panel for consideration.



MINUTES AND DETERMINATION OF THE LIVERPOOL LOCAL PLANNING PANEL MEETING

28th of November 2022

Held online via
MS Teams

Panel:

Michael Mantei (Chair)

David Ryan

Marjorie Ferguson

Daryl Hawker

There were no conflicts of interest declared by any panel members in relation to any items on the agenda.

LIVERPOOL CITY COUNCIL**LIVERPOOL LOCAL PLANNING PANEL MINUTES AND DETERMINATION
PAGE 8****28th November 2022**

LOCATION:	22 Box Road, Casula (Mimosa Park)
OWNER:	Liverpool City Council
APPLICANT:	Liverpool City Council
AUTHOR:	Brianna Van Zyl

ISSUES RELATED TO THE APPLICATION

The panel has reviewed the Council officers' planning proposal documents. Council's strategic planners addressed the panel.

The panel notes the special procedure required by section 32 of the *Local Government Act 1993* for the reclassification of community land dedicated under section 94 of the EP&A Act. If the land the subject of this planning proposal was dedicated under section 94 of the EP&A Act, the requirements of section 32 of the LG Act 1993 are threshold requirements to the reclassification of the land. Accordingly, Council officers should be satisfied before proceeding to request a gateway determination that evidence exists to demonstrate that the land is unsuitable for the purpose for which it was dedicated.

The panel notes that the planning proposal will be publicly notified if a gateway determination is issued giving adjoining owners the opportunity to comment on the proposal. Council ought to give careful consideration to any public submissions on the proposal.

The panel considers based on the Council officers report and subject to consideration of the matters identified above, that the planning proposal has sufficient strategic and site specific merit to progress to the next stage of the planning proposal process.

VOTING NUMBERS:

4 – 0

ADVICE OF PANEL:

The panel considers that the planning proposal has sufficient strategic and site specific merit to progress to the next stage of the planning proposal process, subject to Council officers being satisfied that evidence exists to demonstrate that the land is unsuitable for the purpose for which it was dedicated as required by section 32 of the LG Act 1993.

Safety In Design Report

Mimosa Park

22 Box Road Casula, NSW 2170



Revision	Date	Author	Checked
A	16.11.21	EB	JS

Contents

01	Introduction & Approach to Safety in Design
02	Safety in Design Methodology
03	Risk Management - Safety in Design
04	Safety in Design Matrix - Design
05	Safety in Design Matrix - Construction
06	Safety in Design Matrix - Operation - TBC

01 Introduction & Approach to Safety in Design

1.1 Project Overview

This report has been prepared as part of the ongoing design process for a new pocket park located at 22 Box Road, Casula for the Liverpool City Council (Figure 1).

Through the ongoing design process several risks have been identified pertaining to public safety, accessibility, fall heights, maintainability and material selection.

In this report we aim to highlight potential risks of the project and outline the steps taken to reduce or eliminate these risks.

The key items with potential risk include:

- Site access
- Safety around vehicles and pedestrians
- Site contamination

The Safety in Design matrix at the end of this document highlights the shared obligation of the designer and the client, Liverpool City Council, in managing risk associated with their work systems.



Figure 1: Mimosa Park, Casula

1.2 Background

The proposed Mimosa park concept located in Casula seeks to provide a new local pocket park which shall offer informal recreation and leisure activities through maintaining a passive open space for the local residents. The park concept includes site retention, new native vegetation plantings to the western boundary, passive open space and new seating opportunities. This report details potential risks, and proposed actions put in place, to mitigate these risks. The identification of the risks and recommended actions have been nominated by the design team in association with Liverpool City Council.

1.3 What is Safety in Design (SiD)

Safety in Design (SiD) is a process defined as the integration of hazard identification and risk assessment methods early in the design process to eliminate or minimise health and safety risks throughout the life of the space being designed. Designers can achieve SiD through a structured approach to identifying hazards & risks associated with the design. By employing recognised risk management strategies, risks to users of a facility can be eliminated or significantly reduced through mitigation strategies and the implementation of design solutions based on risk assessments.

A sound approach to SiD includes assessment of risks during key phases of the design development, development of risk control options and direction for safe construction, installation, commissioning, operation and maintenance of the completed facility.

The Code of Practice for Safe Design of Buildings and Structures developed by WorkCover NSW identifies five key principles for safe design. Table 1: Principles of Safe Design demonstrates these principles.



Figure 2: Mimosa Park Casula Concept

PRINCIPLES OF SAFE DESIGN		
Principle 1	People with Control	Safe design is everyone's responsibility – ensuring safe design rests with all parties influencing the design of a building, structure or space.
Principle 2	The Life Cycle	Safe design employs life cycle concepts – applying to every phase in the life cycle of a building or structure, from conception through to redevelopment and demolition.
Principle 3	Risk Management	Safe design implements risk management – through systematically identifying, assessing and controlling hazards.
Principle 4	Knowledge & Capability	Safe design requires knowledge and capability – which should be either demonstrated or accessed by any person influencing design.
Principle 5	Information Transfer	Safe design relies on information – requiring effective documentation and communication between everyone involved in the life cycle of a building or structure.

Table 1: Principles of Safe Design

The implementation of safe building design requires a thorough understanding of the WHS issues associated with each stage of a building's life cycle. These life cycle stages are summarised as below:

- Concept / schematic development
- Detailed design
- Construction
- Building occupation and operation
- Building maintenance & repair
- Renovation &/or modification
- Demolition or demobilisation

1.4 Harmonised National Workplace Health & Safety

As of the 1st of January 2012, the new harmonised National Workplace Health and Safety (WHS) legislation came into effect. As of August 2013, seven jurisdictions the Commonwealth, NSW, QLD, SA, TAS, ACT, and the NT have enacted Work Health & Safety legislation. VIC has stated that it supports the principle of harmonisation but will not implement model WHS laws in their current

form. The WHS model sets out new Codes of Practice aiming to regulate all the existing laws throughout the country, and create a more consistent Work Health and Safety standard for all Australian employers and workers.

Under the new Act, designers have a responsibility to ensure that their designs of built form elements eliminates and/or controls risks to the health and safety of people using them. Designers must also ensure that the facility is designed to eliminate or minimise the need for any hazardous manual task to be carried out and give information to each person who is provided with the design about any features that eliminate the need for these tasks to be carried out.

WorkCover NSW has developed the Code of Practice (CoP) for Safe Design of Buildings and Structures. The CoP was adopted in July 2014, and is referenced as a guide to realising the standards of WHS under the act.

NSW has also adopted a number of other codes, most particularly the Code of Practice on Managing Workplace Risks. This code contains information on hazard identification and risk assessment.

Of particular interest, designers of construction projects are required under the WHS legislation to provide a Safety in Design Report to their client identifying the health and safety aspects of the design. Health and safety consideration should be given to those hazards or risks relating to areas such as access, site conditions, working environment, fall prevention, plant, structural safety, manual handling, amenities and facilities, fire and emergencies, hazardous substances, noise exposure and radiation.

This Safety in Design report will specify the hazards relating to the design of the structure and any control strategies recommended. Designers are required to develop and implement methods and processes to ensure safe design. In addition to this, when a design is altered, an additional review must be conducted to ensure that modifications do not present new risks.

Clients or organisations responsible for commissioning / managing designers on behalf of their clients must consult with their design team to ensure that any hazards and risks that may be present in the completed structure or space are addressed. Additionally, clients are required to inform their designers of any risks and hazards that may exist in the area construction work is to take place.

It is recommended that the SiD Report be passed onto any participant in the project who may extend the design or further develop the design. This includes D&C Sub-contractors, designing fabricators, and specialist design consultants. In addition to this, the legislation recommends that the SiD Report be issued in parallel with the completed design documents to the principal contractor (if not already involved in the design), associated authorities, building certifier, or agencies involved in the assessment or critique of the design.

Clients and designers must consult with the project stakeholders who will be using the facility / workplace, during the planning phase of the project, as their health and safety may be affected by the new design.

The benefits of employing a design risk management process during the development of a design extend beyond the provisions of a facility that can be constructed and operated safely. Table 2: Benefits of SiD Process demonstrates the positive outcomes achieved via this process.

BENEFITS OF THE SiD PROCESS		
Design	<ul style="list-style-type: none"> • Identification of potential risks. • Elimination, reduction and control of risks. 	<ul style="list-style-type: none"> • Reduction of abortive design. • Reduced need for post--delivery retrofits.
Construction	<ul style="list-style-type: none"> • Communication of residual risk to the contractor and sub-contractors. • Reduced likelihood of work site accidents and injury. 	<ul style="list-style-type: none"> • Reduction in contractor risk contingency. • Greater time and cost certainty.
Operation	<ul style="list-style-type: none"> • Increased health and safety for building occupants. • Increased health and safety to members of the public. 	<ul style="list-style-type: none"> • Reduced operator WHS costs. • Amplified organisational image. • Reduction in civil claims.
Maintenance	<ul style="list-style-type: none"> • Safe practice for maintenance strategies. • Reduced likelihood of workplace accidents and injury. 	<ul style="list-style-type: none"> • Reduction in maintenance costs. • Streamlined maintenance strategies (time & cost benefits).
Refurbishment / Demolition	<ul style="list-style-type: none"> • Communication of residual risk to the contractor and sub-contractors. • Reduced likelihood of unplanned events. 	<ul style="list-style-type: none"> • Reduction in Contractor risk contingency. • Greater time and cost certainty.

Table 2: Benefits of SiD Process

1.4 Objectives of the Safety in Design Process & Report

The objectives of the SiD process and report is to ensure that safe design principles are undertaken by the company on each project in alignment with WHS legislation.

As building design impacts on the overall safety of a completed facility and often plays a significant role in determining operational WHS within the built environment, the SiD process must be seen as an essential element in achieving best practice outcomes. Employing the SiD process should result in minimisation of illness and injury to contractors, end users operating the facility, and facilities staff maintaining the building.

Further to this, the SiD process presents positive commercial outcomes for designers, contractors and clients alike. The cost associated with unsafe design can be generated through the need to retrofit additional building infrastructure, inefficient operations, higher insurance premiums, and potentially litigation or civil action. It is substantially more economical to eliminate workplace safety hazards through the implementation of a structured risk management process during the design phase.

02 Safety in Design Methodology

2.1 Safe Design Process

The following section of this report describes the methodology and implementation of the SiD process. The safe design process should be engaged as early as possible in the development of the design. By considering SiD during the very early concept design phase, fundamental decision-making can occur during preliminary design development. This will avoid unnecessary reworks or abortive design. The steps below describes the eight steps associated with the delivery of safe design through the SiD process.

STEP 1: DISCUSS THE PROJECT

The design team and Client representative involved in the development of the design must collaboratively plan and discuss the project to ensure the exchange of information. The designers and Client must identify all operations to take place in and around the facility to ensure the design can be tailored to the operational requirements. These discussions will also help to identify the potential hazards and risk associated with the intended operations.

STEP 2: IDENTIFY KEY STAKEHOLDERS

The project team is to identify additional project stakeholders for inclusion in the consultation process. The operational expertise of the facilities users should be drawn upon to help develop functional design.

STEP 3: DETERMINE THE CONSULTATION PROCESS

Once the design team has been established, the design manager should determine the approach to communication and collaboration.

STEP 4: PREPARE A RISK AND SOLUTIONS REGISTER

The design team should conduct a preliminary risk analysis in consultation with key project stakeholders. The intention of this step is to identify all conceivable risks and hazards that are relevant to the facility and its intended operations. All risks and hazards will be recorded in the risk register. Once all risks and hazards have been identified, the design team is to identify the likelihood and consequence associated with the risk. Commonly this is achieved through a quantitative assessment to establish a risk ranking.

Once the risks are assessed the design team will develop solutions to each of the risks to either eliminate or mitigate the effect of the risk. Each solution will be documented in the risk register.

STEP 5: PREPARE AN INITIAL REPORT TO CLIENT

On completion of the risk assessment, a report to the client will be prepared to identify the intended design solutions for review and approval.

STEP 6: AMEND AND FINALISE THE DESIGN

Based on the Client's review and acceptance of the report, the design is to be updated in alignment with the documented strategies.

STEP 7: PROVIDE A FINAL REPORT TO THE CLIENT & PRINCIPAL CONTRACTOR

On completion of the design, a final SiD report is to be prepared and issued to the client and principal contractor for construction. It is recommended that the final SiD report be passed onto the facility occupant to contribute to their development of safe work practices and procedures. The report must identify any residual risk, so that further operational controls can be developed by the facility operator.

STEP 8: REVIEW THE DESIGN

As design development in certain projects continues into the construction phase through the development of workshop drawings and contractor proposed alternatives, it is important that any risk controls potentially affected by these elements are re-assessed. Furthermore, if additional information with regard to facility operations becomes available post completion of the design documentation, further assessment and development of controls may be necessary.

03 Risk Management - Safety In Design**3.1 Risk Management**

Designers, design managers & individuals involved in the production of the design should endeavour to eliminate any foreseeable hazards that may arise from the design. As it is not always reasonably practical to eliminate all risks associated with the built environment, designers and design managers must implement risk control measures through a structured approach to risk management. Risk management must form an integral part of the design development process. Ideally, risk management should be discussed regularly at design meetings, and through planned workshops to ensure key decision making and design development is cognisant of the necessary risk controls required to deliver safe design.

The risk management process includes four key stages to developing and maintaining safe outcomes. These stages are described below and further represented in Figure 1: Risk Management Process.

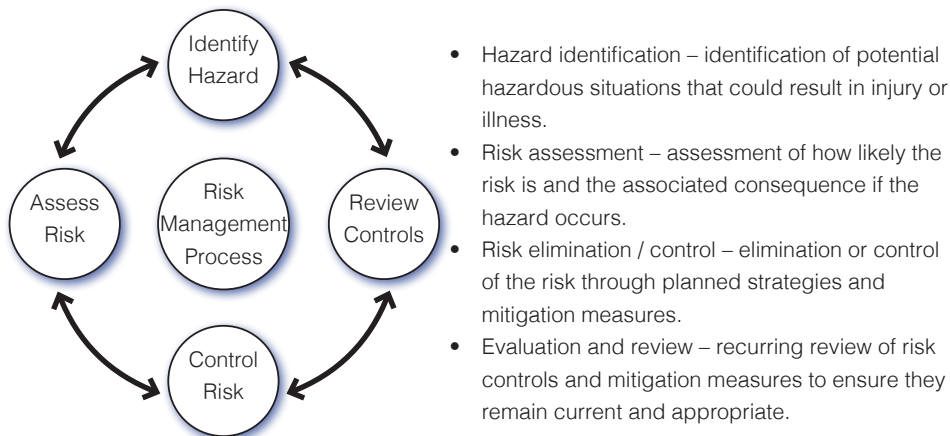


Figure 1: Risk Management Process

3.2 Risk Evaluation

Safety risks present within the design of a space can be categorised by the following:

RISK TYPE	
TYPE	DESCRIPTION
R	Reliability
A	Accessibility
M	Maintainability
B	Buildability
O	Operability
S	Security

3.3 Hierarchy of Controls

The two key definitions of risk controls are as follows:

Static controls – the physical components part of the designed environment that will be handed over to the end user. These controls are the responsibility of the project team, including the subcontractors, the landscape architects, the engineering designers and other sub-consultants on the project.

Dynamic controls – the administrative procedures to be implemented by the 'tenant' during the operation of the facility.

Risk mitigation strategies that form the outcome of the SiD process can be characterised by the following hierarchy of controls shown in the Table 3: Hierarchy of Controls. The name 'hierarchy of controls' emphasises that elimination of a risk will always be preferred to mitigation or reduction strategies where achievable.

HIERARCHY OF CONTROLS		
CLASS	CONTROL	DESCRIPTION
1	Elimination	Design the hazard out of the landscape or built form element.
2	Substitution	Substitute less hazardous materials, fixtures, fittings, plant or construction methods.
3	Isolate	Use guards or barriers to limit access to the hazard.
4	Engineering	Minimise risk by engineering means.
5	Administrative Controls	Recommend the establishment of systems of work or signage, where required, to control residual risks.
6	Personal Protective Equipment	Recommend suitable personal protective equipment and training, where required, to control residual risks.

Table 3: Hierarchy of Controls

3.4 Risk Evaluation

Risks will be evaluated in alignment with the table below. High and extreme rated risks will require additional controls. The likelihood allocation combined with the consequence score identifies the risk ranking as displayed in the matrix below.

RISK EVALUATION							
			Determine the Consequence				
			1	2	3	4	5
			Insignificant	Minor	Moderate	Major	Catastrophic
Determine the Likelihood (L)	A	Almost Certain	High	High	Extreme	Extreme	Extreme
	B	Likely	Moderate	High	High	Extreme	Extreme
	C	Possible	Low	Moderate	High	Extreme	Extreme
	D	Unlikely	Low	Low	Moderate	High	Extreme
	E	Rare	Low	Low	Moderate	High	High

3.5 Severity of Consequences


Table 4 below, identifies the ascending severity of consequences. The greater the consequence the higher numeric scores, for example, 1 represents an insignificant consequence, while 5 represents a catastrophic consequence.

SEVERITY OF CONSEQUENCE	
SCORE	CONSEQUENCE
1	Occurrence would have an insignificant impact on the operation of the built form elements and the health & safety of the users of the space.
2	Occurrence would have a minor impact on the operation of the built form elements and the health & safety of the users of the space.
3	Occurrence would have a moderate impact on the operation of the built form elements and the health & safety of the users of the space.
4	Occurrence would have a major impact on the operation of the built form elements and the health & safety of the users of the space.
5	Occurrence would have a significant impact on the operation of the built form elements and the health & safety of the users of the space.

Table 4: Severity of Consequences

MIMOSA PARK, CASULA - SAFETY IN DESIGN MATRIX - DESIGN										REV A					
RISK ID	ISSUE	TYPE OF RISK (RAMBOS)	FORSEEABLE RISK ASSOCIATED	LIKELIHOOD (A-E)	CON-SEQUENCES	RISK SCORE	CONTROL DESCRIPTION/ ACTION	ACTION BY	CONTROL HIERARCHY	CONTROL TYPE STATIC/ DYNAMIC	LIKELIHOOD (A-E)	CON-SEQUENCES	RISK SCORE	ADDITIONAL CONTROL REQUIRED	
1.1	Signicant level change across the site.	A, B	Accidents, where park users may injure themselves due to unsafe access across the site.	B	3	High	Ensure that earthworks and retention provide safe access across the site with a maximum slope of 1:20.	Moir LA	ELIMINATION	STATIC	D	2	Low		
1.2	Blind spots and areas shielded from view within the park.	A, B, S	Reduction in clear sightlines and passive surveillance increased the prevalence of anti-social behaviour.	B	4	Extreme	Ensure that earthworks and retention allows for clear and open sightlines to all areas of the park. Ensure sufficient sitelines into the park and promote passive surveillance through location of bench seating.	Moir LA	ELIMINATION	STATIC	D	3	Moderate		
1.3	Conflict between vehides and pedestrians.	A	Accidents, where pedestrians and vehicles come into conflict	C	4	Extreme	Maintain turfed verge to ensure pedestrians can walk off the road when required.	Moir LA	ELIMINATION	STATIC	D	3	Moderate		
1.4	Existing drop off to property below site.	A, B, S	Accidents, where park users injure themselves by falling off existing retaining wall to property below	B	5	Extreme	Provide a significant buffer of native planting along retaining wall / boundary enclosed by a new retaining wall with 1.8m high fence above to prohibit access.	Moir LA	ELIMINATION	STATIC & DYNAMIC	E	3	Moderate		
1.5	Longevity and appropriateness of materials.	R, B, O	Unsuitable materials for the setting failing and becoming hazardous. Materials becoming a maintenance issue and burdensome to Council. Materials failing due to dimatic conditions or events, such as bushfires.	C	2	Moderate	Ensure that all materials chosen vigorously analysed to ensure that the are appropriate and cognisant of their setting. Discuss with industry experts about the suitability of all materials chosen for the location and climate	Moir LA	ELIMINATION/ SUBSTITUTION	STATIC	E	1	Low		
1.6	Plants not suitable to the climate or maintenance availability	M, B	Mass die backs of plants dying before opportunity to get established	C	2	Moderate	Ensure plant selection is suitable to the Liverpool climate. All species to be of low maintenance.	Moir LA	ELIMINATION	STATIC	C	1	Low		
1.7	Greenfield site, areas of identified asbestos	A, B	exposure of hasardous materials	B	4	Extreme	Site remediation incorporated into the design	Moir LA	ELIMINATION	STATIC	D	3	Moderate		

MIMOSA PARK, CASULA - SAFETY IN DESIGN MATRIX - CONSTRUCTION														REV A
RISK ID	ISSUE	TYPE OF RISK (RAMBOS)	FORSEEABLE RISK ASSOCIATED	LIKELIHOOD (A-E)	CON-SEQUENCES	RISK SCORE	CONTROL DESCRIPTION/ ACTION	ACTION BY	CONTROL HIERARCHY	CONTROL TYPE STATIC/ DYNAMIC	LIKELIHOOD (A-E)	CON-SEQUENCES	RISK SCORE	ADDITIONAL CONTROL REQUIRED
1. GENERAL														
1.1	General excavations.	S	Personal injury whilst using manual tools or machinery.	D	5	Extreme	It is the responsibility of the contractor to ensure all works relating to excavations are undertaken by fully qualified professionals. Contractor to provide team with appropriate PPE that is in good working order. A work risk assessment must be prepared for every excavation, hazards identified and a work method statement provided and implemented.	Contractor	Engineering	Static	E	4	High	
1.2	Site access	A,S	Personal injury. Safety to general public. Safety of on-site staff.	D	4	High	It is the responsibility of the contractor and project manager to provide safe all weather access to the site. Appropriate and secure barriers, fencing and signage is to be installed to prohibit unauthorised access.	Contractor	Engineering	Static	E	2	Low	
1.3	Working with other trades	S	Conflict of on-site workers and equipment.	D	2	Low	It is the responsibility of the Civil Contractor, Principal Contractor and the Project Manager to coordinate all work areas where multiple trades need to work in close proximity and ensure safe work practices are implemented.	Contractor	Engineering	Static	E	2	Low	
1.4	Demolition works	B	Exposure to dangerous contaminants such as asbestos.	C	3	High	All demolition works to be carried out by an experienced and accredited professional. Suitable PPE is to be worn throughout all stages of demolition works. A work risk assessment must be prepared prior to the commencement of demolition works.	Contractor	Engineering	Static	D	2	Low	
1.5	Existing underground services.	B	Damage to existing services.	D	3	Moderate	It is the responsibility of the Civil Contractor and Principal Contractor to engage a qualified underground service locator to identify all underground services prior to any excavation occurring in all areas.	Contractor/ Civil Consultant	Engineering	Static	E	3	Moderate	

Item No.		RCL	Description (Supply and install unless noted otherwise)	Quantity	Unit	Rate (\$/unit)	Amount (\$)
MIMOSA PARK - OPINION OF PROBABLE COSTS REV A							
The following figures provide an indication of the probable order of costs for the specified works as described in the Moir LA Mimosa Park dated 16/11/2021. This is for the park only and does not include any costs associated with the design of the drainage channel. This is not an estimate and is intended to give an indication of the probable costs. Should a detailed accurate estimate be required, it is recommended that the services of a qualified quantity surveyor be engaged.							
							
1.0 PRELIMINARIES							
1.1			Site mobilisation and establishment	1	item	\$2,500.00	\$2,500.00
1.2			Supply and install temporary fence	1	lin.m.	\$6,000.00	\$6,000.00
1.3			Letter box drop to residents	1	lin.m.	\$1,000.00	\$1,000.00
TOTAL							\$9,500.00
2.0 DEMOLITION							
2.1			Demolition and disposal of existing pathways	0	m2	\$17.00	\$0.00
2.2			Demolition and disposal of existing play equipment	0	items	\$1,000.00	\$0.00
TOTAL							\$0.00
3.0 EARTHWORK							
3.1			Allowance to box out footpaths, pavements and other finishes and stockpile onsite for disposal offsite	1	item	\$10,000.00	\$10,000.00
TOTAL							\$10,000.00
4.0 PAVING WORKS / STAIRS							
4.1			Supply and install 100mm thick reinforced concrete paving	0	sq.m.	\$110.00	\$0.00
4.2			Supply and install 1200mm wide concrete stairs	1	item	\$3,500.00	\$3,500.00
4.3			Supply of static guard during curing	1	item	\$1,000.00	\$1,000.00
TOTAL							\$4,500.00
5.0 STORMWATER & DRAINAGE							
5.1			Supply and install 300 diameter RCP stormwater pipe <=1500 deep	0	lin.m.	\$195.00	\$0.00
5.2			Allowance to connect stormwater pipe into existing pit	0	each	\$750.00	\$0.00
5.3			Allowance for 100 diameter socked subsoil drainage	0	lin.m.	\$40.00	\$0.00
5.4			Extra over allowance for flushing points to last	0	each	\$95.00	\$0.00
5.5			Tailouts to subsoil drainage lines/connection to existing stormwater lines	0	each	\$325.00	\$0.00
TOTAL							\$0.00
6.0 SERVICES & UTILITIES							
6.1			Allowance for connection to Potable Water service	0	item	\$ 1,500.00	\$0.00
6.2			Allowance for water meter assembly & backflow prevention device	0	item	\$ 1,600.00	\$0.00
6.3			Allowance for potable water reticulation	0	lin.m.	\$45.00	\$0.00
6.4			Allowance for isolation valve	0	each	250	\$0.00
6.5			Vandal proof hose tap	0	each	650	\$0.00
6.6			Allowance for 150mm dia pipe to existing connection	0	lin.m.	\$50.00	\$0.00
TOTAL							\$0.00
7.0 RETENTION & FENCING							
7.1			Supply and install retaining wall	15.5	lin.m.	\$500.00	\$7,750.00
7.2			Supply and install 1800mm high safety fencing	15.5	lin.m.	\$150.00	\$2,325.00
7.3			Supply and install maintenance access gate	1	item	\$800.00	\$800.00
TOTAL							\$10,075.00
8.0 PARK FURNITURE							
8.1			Supply Parkway Seat	2	item	\$841.00	\$1,682.00
8.2			Freight cost for Gossli Furniture	1	item	\$560.00	\$560.00
8.3			Supply and install of stainless steel hand rails	4	lin. m	\$150.00	\$600.00
TOTAL							\$2,842.00
9.0 SOFTSCAPE							
9.1			Place ameliorated site topsoil to garden bed areas 300mm	95	m2	\$9.00	\$855.00
9.2			Place pine mini nuggets mulch to garden beds areas to 100mm depth	95	m2	\$20.00	\$1,900.00
9.3			Supply and install 200L tree with stakes	0	each	\$350.00	\$0.00
9.4			Supply and install 75L tree with stakes	0	each	\$250.00	\$0.00
9.5			Supply and install 25L tree with stakes	0	each	\$150.00	\$0.00
9.6			Supply & plant 8-10" pots	150	each	\$20.00	\$3,000.00

9.7	Supply and lay Kikuyu turf install 50mm imported turf underlay to any damaged areas	450	each	\$15.00	\$6,750.00
9.8	Plant and turf establishment over 6 weeks	1	item	\$1,000.00	\$1,000.00
TOTAL					\$13,505.00
10.0	PROJECT COMPLETION				
10.1	Site clean up and dis-establishment	1	item	\$5,000.00	\$5,000.00
TOTAL					\$5,000.00
11.0	MAINTENANCE PERIOD				
11.1	Maintenance period (10 weeks)	1	item	\$10,000.00	\$10,000.00
11.2	Submit electronic survey of completed works	1	item	\$500.00	\$500.00
SUBTOTAL					\$10,500.00
TOTAL OF WORKS					\$65,922.00
10% GST					\$6,592.20
10% Contingency					\$6,592.20
TOTAL ESTIMATED COST INC. GST					\$79,106.40



**ENVIRONMENTAL EARTH
SCIENCES**
CONTAMINATION RESOLVED

SOIL CONTAMINATION ASSESSMENT AT MIMOSA PARK, 22 BOX ROAD, CASULA, NSW LIVERPOOL CITY COUNCIL

18 OCTOBER 2021

121070

VERSION 1





18 October 2021

Liverpool City Council

3 Hoxton Park Road
Liverpool NSW 2170

Attention: **Earin Short**
Contaminated Land Officer

Soil Contamination Assessment at Mimosa Park, 22 Box Road, Casula, NSW.

Please find enclosed a copy of our report entitled as above. Thank you for the opportunity to undertake this work. Should you have any queries, please do not hesitate to contact us on (02) 9922 1777.

For and on behalf of
Environmental Earth Sciences NSW

Author / Project Manager

Lachlan Desailly
Environmental Scientist

Project Director / Internal Reviewer

Stephan Pawelczyk
Principal

Co-Author

Karin Azzam
Environmental Scientist

121070_Mimosa Park SCA_V1



Glaeba (02) Pty Ltd trading as Environmental Earth Sciences NSW
82-84 Dickson Avenue, Artarmon, NSW, 2064
PO Box 380 North Sydney, NSW, 2059
P. 61 2 9922 1777 E. info@eesigroup.com
www.eesigroup.com





EXECUTIVE SUMMARY

Introduction and objectives

Environmental Earth Sciences NSW was engaged by Liverpool City Council (LCC) to undertake a soil contamination assessment (SCA) at Mimosa Park located in Casula, NSW and identified as Lot 1103 in Deposited Plan (DP) 1051233, hereafter referred to as the “site” in order to facilitate the proposed children’s playground at the site.

The objectives of the assessment are to evaluate the site’s suitability for recreational open space use and provide information in regard to worker safety and material management during construction.

Scope of work

The scope of work included a review of site history information including aerial photographs, publicly available maps relating to soils, topography, geology, hydrogeology, acid sulfate soils and salinity, a site inspection and intrusive soil investigation and the preparation of this report on the findings of the SCA.

Findings

Based on the results of the soil contamination assessment, the following findings were made:

- The site is a vacant undeveloped parcel of land located in Casula that was initially part of a much larger property that was used for agricultural/ market garden purposes between the mid 1970s and the early 2000s. The broader property was developed for residential purposes from the early 2000s. The site has not been developed.
- During the site inspection, domestic rubbish including empty food cans and plastic pipes and minor building rubble including concrete pieces and minor brick and tile fragments were noted along the western boundary wall. Furthermore, scaffolding was present along the southern boundary to facilitate construction of the neighbouring property. Evidence of gross contamination (including potential ACM) or staining was not evidenced at the site surface.
- The reported concentrations of contaminants of potential concerns were either below the laboratory’s LOR and or investigation criteria.

Conclusion and recommendations

Based upon findings from the desktop study, review of historical information, site observations, intrusive investigation and laboratory results, Environmental Earth Sciences considers that the site presents a LOW risk to human health and the environment. As such further assessment and/or remediation is not considered necessary.



In view of the findings of the assessment and the proposed development, it is recommended that an unexpected finds protocol (UFP) be adopted to manage potential contamination and or hazardous materials which may be encountered.



TABLE OF CONTENTS

1	INTRODUCTION.....	1
2	OBJECTIVES	1
3	STATUTORY GUIDELINES.....	2
4	SCOPE OF WORK.....	2
5	ENVIRONMENTAL SETTING.....	3
5.1	LOCATION AND PROPERTY DESCRIPTION	3
5.2	SURROUNDING FEATURES	3
5.3	SENSITIVE RECEPTORS	3
5.4	GENERAL ENVIRONMENTAL SETTING	4
5.4.1	Geology	4
5.4.2	Soils	4
5.4.3	Topography, drainage and hydrology	4
5.4.4	Vegetation	4
5.4.5	Acid sulfate soil risk	4
5.4.6	Hydrogeology and drainage	5
5.4.7	Nearby groundwater bores	5
5.4.8	Groundwater dependent ecosystems	5
5.5	CLIMATE AND METEOROLOGY	5
6	HISTORICAL REVIEW	6
6.1	HISTORICAL AERIAL PHOTOGRAPH REVIEW	6
6.2	NSW EPA REGULATORY SEARCHES	7
6.2.1	POEO Public Register	7
6.2.2	Contaminated Land Record	8
6.2.3	Contaminated Sites Register	8
6.3	UNDERGROUND PETROLEUM STORAGE SYSTEM REGULATION – SENSITIVE ZONES MAP	8
6.4	SITE HISTORY SUMMARY	8
7	FIELD PROGRAM.....	8
7.1	SITE OBSERVATIONS	8
7.2	INTRUSIVE SOIL INVESTIGATION	9



8	LABORATORY ANALYSIS	10
9	PROCEDURES FOR QUALITY CONTROL AND QUALITY ASSURANCE	10
10	SOIL INVESTIGATION CRITERIA.....	11
10.1	HEALTH INVESTIGATION LEVELS (HILS)	11
10.2	HEALTH SCREENING LEVELS	12
10.3	HEALTH-BASED SCREENING LEVELS (HSLs) - ASBESTOS	12
10.4	ECOLOGICAL INVESTIGATION LEVELS (EILs) FOR SOIL	13
10.5	ECOLOGICAL SCREENING LEVELS (ESLS)	13
11	RESULTS.....	14
11.1	INTRUSIVE SOIL INVESTIGATION	14
11.2	ANALYTICAL RESULTS	15
11.2.1	Chemical analysis	15
11.2.2	Asbestos analysis	15
12	CONCEPTUAL SITE MODEL	15
12.1	INTRODUCTION	15
12.2	SOURCES OF CONTAMINATION	15
12.3	CONTAMINANTS OF POTENTIAL CONCERN	16
12.4	PATHWAYS	16
12.5	RECEPTORS	16
12.6	SOURCE TO RECEPTOR LINKAGES	16
13	CONCLUSIONS	18
14	RECOMMENDATIONS.....	18
15	LIMITATIONS.....	19
16	REFERENCES	19

Table of Figures

Figure 1: Site locality

Figure 2: Site features and test pit locations

Tables

Table 1: Site identification

Table 2: Surrounding site uses

Chart A: Average monthly climate data (2012 to August 2021)



Table 3: Site historical aerial photographs

Table 4: Health investigation levels for soil contaminants

Table 5: Health screening levels

Table 6: Health screening levels for asbestos contamination in soil

Table 7: Ecological investigation level thresholds

Table 8: Ecological screening levels for soil contaminants

Table 9: Source pathway receptor analysis

Appendices

APPENDIX A: Environmental Setting Maps

APPENDIX B: Soil Landscape

APPENDIX C: Historical Aerial Photographs

APPENDIX D: NSW EPA Notice

APPENDIX E: Photo Plates

APPENDIX F: Test Pit Logs

APPENDIX G: Quality Assurance / Quality Control

APPENDIX H: Results Summary Table

APPENDIX I: Laboratory Transcripts and Chain-Of-Custody Documentation

APPENDIX J: Unexpected Finds Protocol



1 INTRODUCTION

Environmental Earth Sciences NSW was engaged by Liverpool City Council (LCC) to undertake a soil contamination assessment (SCA) at Mimosa Park located in Casula, NSW and identified as Lot 1103 in Deposited Plan (DP) 1051233, hereafter referred to as the “site” in order to facilitate the proposed children’s playground at the site. The site location and extent are presented in **Figures 1** and **2**.

In accordance with the requirements of the *National Environment Protection (Assessment of Site Contamination) Measure 1999* (National Environment Protection Council (NEPC) 2013, (ASC NEPM, 2013), this assessment aims to identify potential:

- Sources of contamination, historical contaminating uses and impacted areas;
- Contaminants of concern associated with identified sources of impact or contaminated areas;
- Potentially affected media (i.e. soil); and
- Human and ecological receptors.

The purpose of collecting basic site information is to formulate a conceptual site model (CSM) to assess contamination exposure linkages to identified receptors, following a review of site history, physical setting and site conditions.

Consideration is also given to the continuing land usage for this property (being RE1 – Public recreation). The assessment will inform recommendations for further detailed assessment and/or remediation (if required).

Additionally, included at the end of this report is a waste classification report for surface soils across the site should off-site disposal of surplus material be required during construction of the proposed park upgrade. This has been reported separately.

This report should be read in conjunction with the limitations and appendices contained within the proposal (ref: PO12134_V1 dated 16 July 2021) and the limitations detailed at the end of this report.

2 OBJECTIVES

The objectives of the assessment are to:

- evaluate the site’s suitability for recreational open space use; and
- provide information in regard to worker safety and material management.



3 STATUTORY GUIDELINES

The SCA was conducted in general accordance with the following guidance made or approved by the NSW Environment Protection Authority (EPA) in accordance with the *Contaminated Land Management Act 1997* (CLM Act):

- National Environment Protection Council (NEPC) (2013) - *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013)* (ASC NEPM).
- NSW EPA (2017) - *Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme* (3rd edition).
- NSW EPA (2020) - *Contaminated Guidelines: Consultants reporting on contaminated land*.

4 SCOPE OF WORK

The following scope of work was completed.

- Site history review including:
 - Inspection of current and historical aerial photographs of the site.
 - Review of publicly available maps relating to topography, geology, hydrogeological, and acid sulfate soils.
 - Review of publicly available EPA records including the Contaminated Land Management Record of Notices, the Protection of the Environment Operations Public Register, and List of NSW Contaminated Sites Notified to EPA.
- Site inspection and intrusive investigation including:
 - A detailed site walkover, assessing current site features, potential sources of contamination and contaminated areas, and where possible noted potentially contaminating offsite activities.
 - An intrusive soil investigation of the site to assess the extent of on-site soil contamination and areas of concern. This involved the excavation of ten test pits across the site to inspect ground conditions and collect soil samples for subsequent laboratory analysis of contaminants of potential concern (COPC).
- Preparation of this report on results of the SCA.



5 ENVIRONMENTAL SETTING

5.1 Location and property description

The site is comprised of a rectangular lot situated in a residential area. Site identification details are provided in **Table 1** below.

Table 1: Site identification

Item	Details
Site Owner	Liverpool City Council
Address	22 Box Road, Casula, NSW
Lot & Plan number	Lot 1103 in DP 1051233
Area	565 m ²
Current zoning	RE1 – Public Recreation
Site location and layout	Figure 1 and Figure 2

5.2 Surrounding features

Features of surrounding land uses identified in the immediate vicinity of the site, as observed during fieldwork and from current aerial imagery are summarised in **Table 2** below.

Table 2: Surrounding site uses

Direction	Description
North	Residential premises. The M5 Motorway is located approximately 130 m north of the site.
South	Residential premises. Commercial/ industrial premises are located about 500 m south east of the site.
East	A Sydney water reservoir tank is situated on the other side of Box Road, beyond which are residential premises followed by the ground of Casula High School (approx. 180 m to the east).
West	Residential premises beyond which is Peter Miller park, playing fields and recreational park (approx. 175 m to the west)

5.3 Sensitive receptors

The nearest sensitive human receptors include current and future site users as well as residents of neighbouring properties, occupants of Casula High School, and users of Peter Millar park.

The nearest sensitive environmental receptors include ecological communities which inhabit the soil, groundwater associated with the site itself.



5.4 General environmental setting

Detailed information on the geology, soils, topography, vegetation, and hydrogeology are provided in the reports and maps presented in **Appendix A**.

5.4.1 Geology

The Penrith 1:100 000 Geological series sheet (Herbert and Smith, 1991), describes the lithology of the site as being shale, carbonaceous claystone, laminite, lithic sandstone and occurrences of coal.

5.4.2 Soils

The soils at the site are classified in the Soil Landscapes of the Penrith 1:100 000 Geological series sheet (Herbert and Smith, 1991) as belonging to the Blacktown residual soil landscape. The site is situated upon sedimentary Bringelly shales belonging to the Wianamatta Group of shales. A soil landscape is an area of land that has recognisable and specifiable topographies and soils. The Blacktown soil landscape is characterised by shallow to moderately deep, hard setting mottled texture contrast soil, typically red and brown in colour which corresponds to the natural subsurface soils noted across the site. Limitations of Blacktown landscape soils include Seasonal waterlogging (localised), water erosion hazard (slight to moderate), surface movement potential (localised). Refer to **Appendix B** for the detailed soil landscape.

5.4.3 Topography, drainage and hydrology

Herbert and Smith (1991) describe the regional topography as being characterised by gently undulating rises with a local relief up to 30 m and slopes of >5%. The site is gently sloping downwards towards the west with the eastern portion of the site sitting on a broad crest in the landscape at approximate elevation of 72 meters Australian Heights Datum (mAHD) dipping to ~68 mAHD in the west.

5.4.4 Vegetation

The dominant vegetative species of the Blacktown soil landscape include *Eucalyptus tereticornis* (forest red gum), *E. crebra* (narrow-leaved ironbark), *E. moluccana* (grey box) and *E. maculata* (spotted gum). The region, which once comprised of dry sclerophyll forest, has been historically cleared and is now used for medium and low-density housing. The site is grassed with no trees or shrubs.

5.4.5 Acid sulfate soil risk

The potential acid sulfate soils (PASS) risk maps published in the Liverpool Local Environmental Plan 2008 indicates that the site is not mapped within an acid sulfate soils risk management zone. It is also not within 500 m of any 'Category 1 or 2' PASS risk sites and therefore it is considered low risk at the site.



5.4.6 Hydrogeology and drainage

There are no natural surface water features onsite. The site is covered with grassy vegetation, therefore precipitation will percolate directly into surface soils and into local groundwater. The New South Wales (NSW) Department of Infrastructure, Planning and Natural Resource (DIPNR) (2002), *Salinity Potential in Western Sydney 2002* identifies the site as having a very high salinity potential.

For full reports of salinity and hydrogeological information please see **Map 1.4a** of **Appendix A**.

5.4.7 Nearby groundwater bores

An online search for groundwater bores registered with WaterNSW (<https://realtimedata.watersw.com.au/water.stm>, accessed 27 September 2021) indicates that there are no registered bores located within a 500 m radius of the site.

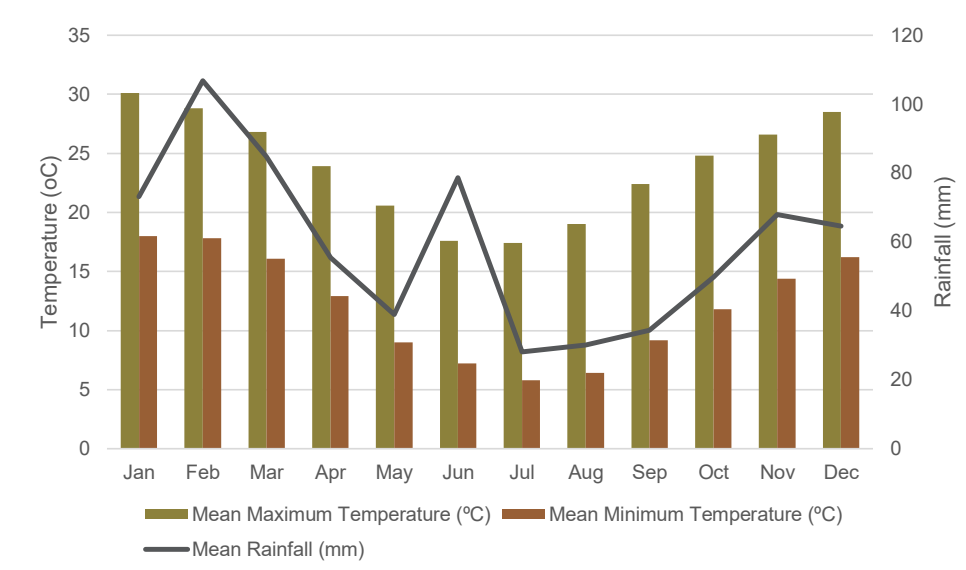
5.4.8 Groundwater dependent ecosystems

A search of the groundwater dependent ecosystems atlas (GDE) (<http://www.bom.gov.au/water/groundwater/gde/map.shtml> accessed 6 August 2021) indicates that there are no ecosystems at or near the site that have potential to rely on site groundwater.

5.5 Climate and meteorology

The site is located within an area of moderate to high rainfall in the centre of the Western Sydney region. Regional meteorological data has been sourced from the Bureau of Meteorology (www.bom.gov.au, accessed 6 August 2021). The rainfall mean, maximum and mean minimum monthly temperature data were received from Holsworthy Aerodrome automatic weather station (AWS) (no. 066161) located approximately 7.3 km to the south east of the site. Average monthly rainfall mean, maximum and minimum monthly temperatures were calculated between 2012 and present and presented in **Chart A** below.

Chart A: Average monthly climate data (2012 to August 2021)



6 HISTORICAL REVIEW

This section includes a review of:

- Available historic aerial photography;
- Records held by the NSW EPA including:
 - POEO Public Register;
 - Contaminated Land Record; and
 - Contaminated Sites Register.
- The underground petroleum storage system (UPSS) regulation sensitive zones map for the area.

6.1 Historical aerial photograph review

A review of aerial photographs and other available imagery of the site is summarised in **Table 3**. Historical aerial photographs are presented in **Appendix C**. The earliest historical photograph available for the site is from 1930.

**Table 3: Site historical aerial photographs**

Year	Colour / B & W	Notes
1930 - 1970	B & W	<p>Site: Historic clearing is evident as the site is sparsely vegetated. The site is undeveloped.</p> <p>Site surrounds: Mostly cleared for grazing/agriculture over the time period with some remnant forest to the sites west. Rural residential properties and open agricultural fields gradually established to the sites north, south and east.</p> <p>Sydney water reservoir constructed in 1965.</p> <p>Greater portion of land to north and south cleared for market gardening in 1970.</p>
1975 - 1998	B & W (’75 to ’78) Colour (’61 to ’98)	<p>Site: Cleared for market gardening (1975) with evidence of usage through to 1978 after which field appear to be fallow or abandoned.</p> <p>Site surrounds: surrounding areas cleared for market gardening and in use until 1978.</p> <p>Urban development begins far to the sites north in 1975 and again to the sites east in 1991 followed by the construction of the M5 motorway in 1994.</p>
2005 - 2021	Colour	<p>Site: Site clear, no construction occurring onsite.</p> <p>Site surrounds: Development of area surrounding the site begins in 2005 and pushes west over the period culminating with the development of Peter Miller Reserve in 2015 after which the area is in its present day state.</p>

Notes: Historical imagery sourced from Land Insight & Resources.

6.2 NSW EPA Regulatory Searches

6.2.1 POEO Public Register

A search of the NSW EPA POEO Public Register for Environment Protection licences, applications, notices, audits or pollution studies and reduction programs in the suburb of Casula was conducted on 26 September 2021.

The search results indicate a clean-up notice was issued on 17 March 2017 to Casula High School, approximately 200 m east of the site, related to the removal of asbestos waste.

The clean-up notice required Council to have the school site remediated including engaging an environmental consultant to prepare a remedial action plan and site validation report (following remediation) as well as engaging an NSW EPA accredited Site Auditor to certify whether the school site was suitable for continued use as a school. It is understood that the remediation was completed by Terra Civil during the December 2017 / January 2018 school holidays. The site validation report was prepared by Douglas Partners and the Site Audit was completed by Ms Rowena Salmon.

Given the distance to the school and the limited mobility of the contaminant (being asbestos), the likelihood of contamination at the school to impact the site is considered to be low.



The location of the school is shown on **Map 3.3 of Appendix A** and a copy of the clean-up notice is provided in **Appendix D**.

6.2.2 Contaminated Land Record

A search of the NSW EPA Contaminated Land Record for the suburb of Casula was conducted on 26 September 2021. The search did not provide any results.

6.2.3 Contaminated Sites Register

The search of the list of notified contaminated sites¹ conducted on 26 September 2021 indicates the site has not been notified as potentially contaminated.

6.3 Underground petroleum storage system regulation – sensitive zones map

Review of the Department of Environment, Climate Change and Water (NSW) (2010) Underground Petroleum Storage System (UPSS) regulation sensitive zones map indicated that the site is not located within a sensitive zone. The above-mentioned map is presented in **Map 2.1 of Appendix A**.

6.4 Site history summary

Based on the results of the site history review, the site had been undeveloped since at least the 1930s until the mid-1970s when it was used for agricultural/ market garden purposes. During the early 2000s, use of the site for agricultural/ market garden purposes stopped as the surrounding land (and site) was developed for residential purposes. The site has been undeveloped since the early 2000s. There is no indication that the site was used for industrial or commercial purposes.

7 FIELD PROGRAM

A site inspection and intrusive soil investigation were undertaken on 17 September 2021 by Environmental Earth Sciences to assess the current site condition and collect representative soil samples. Site features and sampling locations are detailed on **Figure 2** with Photo Plates of site features and representative soil profiles provided in **Appendix E**.

7.1 Site observations

The site is vegetated with long grass and is bounded to the south, west and north by residential properties and to the east by Box Road.

¹ <https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/clm/site-list/contaminated-sites-list-pdf-september-2021.pdf?la=en&hash=262170C939D0AD2BE5DFAE8928B521D093DF4216>



The topography of the site slopes downwards to the west which is consistent with local topography. A retaining wall is located at the western site boundary, the change in elevation to the neighbouring property is approximately three metres.

At the time of the inspection, domestic rubbish including empty food cans and plastic pipes and minor building rubble including concrete pieces and minor brick and tile fragments were noted along the western boundary wall. Scaffolding was present along the southern boundary to facilitate construction of the dwelling to the south. A dumpster (approx. volume of 10 m³), filled with building material, was located in the south eastern corner of the site.

Evidence of gross contamination (including potential asbestos containing materials (ACM) or staining was not evidenced at the site surface. No evidence of potential sources of contamination such as areas fuel/ chemical storage were observed at the site.

7.2 Intrusive soil investigation

Soil sampling was undertaken to assess the nature and extent of potential soil contamination. The recommended minimum number of sampling points required for site characterisation per the *Sampling Design Guidelines* (NSW EPA 1995) for a site with an area of 565 m² is six sampling points. To provide appropriate coverage of the site, sampling was conducted at ten locations based on a judgemental/ grid-based sampling pattern, refer

Figure 2.

The sampling included excavating ten test pits across the site using a 5-tonne excavator. During sampling, the soil characteristics including lithology, extent of lithology, colour, odour, and other inclusions were recorded on test pit logs, which are provided in **Appendix F**.

Representative soil samples were collected, with discrete sampling being undertaken from each identified soil layer. Soil samples were collected from the centre of the excavator bucket with a new pair of gloves were used at each sampling location.

Samples collected for assessment of asbestos soil contamination in accordance with Schedules B1 and B2 of the NEPM were processed on site by sieving approx. 10 L of soil through a 7 mm sieve before collecting a 500 g sample for laboratory analysis.

The samples were placed into laboratory supplied glass jars and transported to the laboratory in a chilled container under full chain-of-custody documentation. The laboratory was accredited with the National Association of Testing Authorities (NATA) for each analytical method used. Sampling of soil was conducted in accordance with the following:

- Standards Australia (1999) - *Guide to the investigation and sampling of sites with potentially contaminated soil, Part 2: Volatile substances* (AS 4482.2), Standards Australia, Homebush, NSW
- Standards Australia (2005) - *Guide to the investigation and sampling of sites with potentially contaminated soil, Part 1: Non-volatile and semi-volatile compounds* (AS 4482.1), Standards Australia, Sydney, NSW
- Environmental Earth Sciences NSW (2010) - *Procedures for field, laboratory and reporting quality assurance and quality control manual*.



- Environmental Earth Sciences (2011) - *Soil, gas and groundwater sampling manual*, 7th Edition (Unpublished).

8 LABORATORY ANALYSIS

Seven soil samples were submitted to Australian Laboratory services (ALS) for chemical testing and Australian Safer Environment and Technology (ASET) for asbestos testing. Both laboratories NATA accredited for the methods used.

The soil samples were submitted to the laboratory for the following analysis:

- Heavy metals (As, Cd, Cu, CrTOTAL, Pb, Hg, Ni, Zn);
- Total Recoverable Hydrocarbons (TRH) (Fractions C₆-C₄₀);
- Benzene, Toluene, Ethylbenzene and Total xylenes (BTEX);
- Polycyclic Aromatic Hydrocarbons (PAH); and
- Asbestos Weight for Weight (w/w) NEPM specification.

9 PROCEDURES FOR QUALITY CONTROL AND QUALITY ASSURANCE

Quality control is achieved by using NATA registered laboratories using American Society for Testing and Materials (ASTM) standard methods supported by internal duplicates, the checking of high, abnormal or otherwise anomalous results against background and other chemical results for the sample concerned.

Quality assurance is achieved by confirming that field results, or anticipated results based upon comparison with field observations, are consistent with laboratory results. Also, that sampling methods are uniform, and decontamination is thorough. In addition, the laboratory undertakes additional duplicate analysis as part of their internal quality assurance program on the basis of one duplicate analysis for every 20 samples analysed.

Field observations are compared with laboratory results when they are not as expected. Confirmation, re-sampling and re-analysis of a sample are undertaken if the results are not consistent with field observations and/or measurements. In addition, field duplicate sample results have to be within the acceptable range of reproducibility. A discussion of the QAQC is presented in **Appendix G**.



10 SOIL INVESTIGATION CRITERIA

10.1 Health investigation levels (HILs)

Appropriate health-based investigation levels (HILs) will be applied to the site for current use as open space purposes and being close to residential premises. These HILs are taken from the ASC NEPM (2013) and are presented for reference in **Table 4**. The applicable HILs for this investigation will include the following:

- HIL C – Public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths.

Table 4: Health investigation levels for soil contaminants

Analyte	Health-based investigation levels (mg/kg) ¹
	Recreational C
Arsenic ²	300
Cadmium	90
Chromium (VI)	300
Copper	17,000
Lead ³	600
Mercury (inorganic)	80
Nickel	1,200
Zinc	30,000
Carcinogenic PAHs (as BaP TEQ) ⁴	3
Total PAHs ⁵	300

Notes:

1. HIL C – Public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths.
2. Arsenic: HIL assumes 70% oral bioavailability. Site-specific bioavailability may be important and should be considered where appropriate (refer Schedule B7).
3. Lead: HIL is based on blood lead models (IEUBK for HILs A, B and C and adult lead model for HIL D where 50% oral bioavailability has been considered. Site-specific bioavailability may be important and should be considered where appropriate.
4. Carcinogenic PAHs: HIL is based on the 8 carcinogenic PAHs and their TEFs (potency relative to B(a)P) adopted by CCME 2008 (refer Schedule B7). The B(a)P TEQ is calculated by multiplying the concentration of each carcinogenic PAH in the sample by its B(a)P TEF, given below, and summing these products.
5. Total PAHs: HIL is based on the sum of the 16 PAHs most commonly reported for contaminated sites (WHO 1998).

PAH species	TEF	PAH species	TEF
Benzo(a)anthracene	0.1	Benzo(g,h,i)perylene	0.01
Benzo(a)pyrene	1	Chrysene	0.01
Benzo(b+j)fluoranthene	0.1	Dibenz(a,h)anthracene	1
Benzo(k)fluoranthene	0.1	Indeno(1,2,3-c,d)pyrene	0.1



10.2 Health screening levels

Health Screening Levels (HSLs) for soils for validation have been adopted from *Table 1A(3)* of ASC NEPM (2013) – *Schedule B1: Investigation Levels for Soil and Groundwater*. The HSLs for volatile organic compound (VOC) contamination are based on vapour intrusion risk associated with soil petroleum hydrocarbon contamination.

HSLs are for assessing human health risk associated with inhalation, and depend on specific soil properties and depths, types of land use and characteristics of buildings for each land use scenario. The material type adopted was clay, which represents the most conservative soil texture for application of the HSLs. Refer to a summary of Tier 1 HSLs in **Table 5**.

Table 5: Health screening levels

Analyte	Soil type	HSL-C threshold concentration (mg/kg)
		0 m to <1 m
F1 (C ₆ -C ₁₀ – BTEX)	Clay	NL
F2 (>C ₁₀ -C ₁₆) – Naphthalene	Clay	NL
Benzene	Clay	NL
Toluene	Clay	NL
Ethylbenzene	Clay	NL
Xylenes	Clay	NL
Naphthalene	Clay	NL

Notes:

mg/kg Milligrams per kilogram

NL No applicable risk-based limit applies

10.3 Health-based Screening Levels (HSLs) - asbestos

Health screening levels for asbestos in soil were adopted from the ASC NEPM (2013) and are outlined in **Table 6**.

Table 6: Health screening levels for asbestos contamination in soil

Form of asbestos	HSL (w/w)
	HSL C
Bonded ACM ¹	0.02% w/w
FA ² and AF ² (friable asbestos)	0.001% w/w
All forms of asbestos	No visible asbestos for surface soil

Notes:

1. ACM – Bonded asbestos containing material;

2. FA – Fibrous asbestos; AF – Asbestos fines



10.4 Ecological investigation levels (EILs) for soil

The ecological investigation levels (EILs) assigned by ASC NEPM (2013) – *Schedule B5a: Guideline on Ecological Risk Assessment* are adopted for this assessment. This guideline presents the methodology for deriving terrestrial EILs using both fresh and aged (i.e. >2 years old) contamination for soil with the following land use types:

- Areas of ecological significance.
- Urban residential/ public open space.
- Commercial / industrial.

The methodology has been developed to protect soil processes, soil biota (flora and fauna) and terrestrial invertebrates and vertebrates. The proposed land use at the site is for residential / open space land use, as such the adopted EILs for this validation will be protective of this scenario

The ACL concentrations were ascertained for representative locations based on site-specific results for either pH alone, or pH and cation exchange capacity (CEC) in accordance with procedures in ASC NEPM (2013) – *Schedule 5c: - EILs for As Cr Cu DDT Pb Naphthalene Ni Zn*. Refer to a summary of site-specific EILs in **Table 7**.

Table 7: Ecological investigation level thresholds

Analyte	EIL for Urban residential and public open space (mg/kg)
Naphthalene	170
Arsenic	100
Chromium (III)	198
DDT	180
Copper	210
Lead	1,200
Nickel	175
Zinc	775

10.5 Ecological screening levels (ESLs)

For petroleum hydrocarbons, ESLs have been derived in ASC NEPM (2013) based upon fraction ranges of hydrocarbons, BTEXN component and benzo(a)pyrene (BaP) together with soil texture classes. These ESLs are of low reliability except for the volatile and semi-volatile hydrocarbon fractions which are of moderate reliability. Nonetheless the ESLs will be adopted for the investigation to be protective of soils in an urban residential and public open space land use scenario.



The adopted ESLs are designed to be protective of soil fauna, soil processes plants. The ASC NEPM (2013) states that these factors only apply within the rhizome (i.e. zone in the top two metres of soil) and as such ESL criteria need not be applied to chemical results below this depth. Criteria are summarised below in **Table 8**.

Table 8: Ecological screening levels for soil contaminants

Analyte	Soil Texture	Management Limits	ESL (mg/kg dry Soil)
			Urban residential and public open space
F1 (C₆- C₁₀)	Coarse	700	180 *
	Fine	800	
F2 (>C₁₀-C₁₆)	Coarse	1,000	120 *
	Fine	1,000	
Benzene	Coarse	----	50
	Fine	----	65
Toluene	Coarse	----	85
	Fine	----	105
Ethyl-benzene	Coarse	----	70
	Fine	----	125
Xylenes	Coarse	----	105
	Fine	----	45
Benzo(a)pyrene	Coarse	----	0.7
	Fine	----	0.7

11 RESULTS

11.1 Intrusive soil investigation

The sample locations assessed are illustrated on **Figure 2** with test pit logs provided in **Appendix F**.

The field conditions can be described as:

- Ground surface to 0.5 m – fill material at locations TP1 to TP8 consisting of firm brown clay and very minor trace inclusions of glass, brick or tile fragment up to 0.5 m in depth in the lower-lying western portion of the site at location TP1 and gradually shallower towards the eastern side with a thickness of approximately 0.15 m at location TP8.
- Underlying natural soil is described as mottled red/orange/ brown and pale grey clay overlaying brown and dark grey shale cobbles and boulders.



Fill material consistent with the above description was not identified at locations TP9 and TP10 as it did not include anthropogenic material. However, the surface soil at TP9 and TP10 included a minor percentage of weathered shale, which should not be anticipated at shallow depths. It is presumed this material is present due to preparatory earthworks as part of the development of the broader area when cut and fill would likely have occurred.

Groundwater was not encountered in any of the test pit excavation. Therefore, the depth to groundwater exceeds 1.8 m deep, which is the depth of the deepest test pit.

11.2 Analytical results

A summary of laboratory results for chemical analysis against adopted site criteria is presented in **Appendix H** and laboratory certificates of analysis is provided in **Appendix I**.

11.2.1 Chemical analysis

The reported concentrations of TRH, BTEX, PAH and Heavy metals were below the laboratory's limit of reporting (LOR) and / or the applicable health and ecologically based criteria.

11.2.2 Asbestos analysis

Asbestos was not identified on the site's surface nor within fill material. No free asbestos fibres or friable asbestos materials were observed or identified during laboratory analysis. Furthermore, asbestos was not detected as part of the asbestos quantification that was conducted as part of the assessment.

12 CONCEPTUAL SITE MODEL

12.1 Introduction

A key component of the investigation/ risk assessment process is the development of a Conceptual Site Model (CSM) as this drives the risk management and remediation process. This identifies potential sources of contamination, potential migration pathways along which identified contaminants could migrate and potential receptors which may become exposed.

The CSM considers all plausible pollutant linkages associated with the identified contamination. By evaluating these linkages proposed controls can be outlined and recommendations developed for appropriate remediation or management.

12.2 Sources of contamination

Based on the findings of the desktop search, site inspection and limited intrusive investigation, the primary source of contamination is considered to be:

- Refuse and debris (consisting of empty food cans, plastic pipes and trace amounts of domestic building rubble) near the western site boundary.



- Shallow fill material up to 0.5 m deep.

12.3 Contaminants of potential concern

Although COPC were identified as part of the desktop review and site history, the reported concentrations of COPC are either below the laboratory's LOR and or investigation criteria.

12.4 Pathways

The potential pathways by which contamination present at the site could reach potential receptors are considered to be:

- Direct contact (dermal);
- Ingestion;
- Inhalation;
- Plant uptake.

12.5 Receptors

Identified potential sensitive receptors are considered to be:

- Current and future site users;
- Adjacent site users;
- Future construction and maintenance workers at the site.
- Site and surrounding flora, fauna and soil processes

12.6 Source to receptor linkages

Based upon the results and findings of this assessment, a source-pathway-receptor risk-linkage analysis is presented in **Table 9**.



Table 9: Source pathway receptor analysis

Potential Source	CoPC	Pathway	Receptor	Risk	Associated Data Gaps / Recommendations
Unverified fill	Heavy metals, BTEX, TRH and PAHs	Direct contact; Ingestion and Inhalation	Human - Current and future site users	LOW	The trace anthropogenic material observed in shallow fill at locations TP1 to TP8 is not suitable from an aesthetic perspective and will be removed as part of the proposed development. The fill material identified in shallow soils in these locations was not found to be impacted by and any of the CoPCs identified for the site.
			Ecological – Site fauna		
			Human - Adjacent site users		
	Asbestos	Plant uptake	Ecological – Site flora	LOW	
		Inhalation of fibres	Human – Current and future site users	LOW	

Notes:

HIGH RISK - desktop review and site inspection have identified potentially contaminating site activities and intrusive works must be carried out to remediate.
MODERATE RISK - desktop review and site inspection cannot rule out the presence of potentially contaminating site activities without undertaking recommended intrusive works
LOW RISK - desktop review and site inspection have not identified any potentially contaminating site activities.



13 CONCLUSIONS

Environmental Earth Sciences was requested by Liverpool City Council to undertake a soil contamination assessment of the site to evaluate its suitability for the proposed development, being the installation of children's playground.

Based on the results of the soil contamination assessment, the following conclusions are made:

- The site is a vacant undeveloped parcel of land located in Casula that was initially part of a much larger property that was used for agricultural/ market garden purposes between the mid-1970s and the early 2000s. The broader property was developed for residential purposes from the early 2000s. The site has not been developed.
- During the site inspection, domestic rubbish including empty food cans and plastic pipes and minor building rubble including concrete pieces and minor brick and tile fragments were noted along the western boundary wall. Furthermore, scaffolding was present along the southern boundary to facilitate construction of the neighbouring property. Evidence of gross contamination (including potential ACM) or staining was not evidenced at the site surface.
- The reported concentrations of contaminants of potential concerns were either below the laboratory's LOR and or investigation criteria.

Based upon findings from the desktop study, review of historical information, site observations, intrusive investigation and laboratory results, Environmental Earth Sciences considers that the site presents a LOW risk to human health and the environment. As such further assessment and/or remediation is not considered necessary. There are general recommendations made for any proposed earthworks in **Section 14**.

14 RECOMMENDATIONS

In view of the findings of the assessment and the proposed development, it is recommended that an unexpected finds protocol (UFP) be adopted to manage potential contamination and or hazardous materials which may be encountered. An example UFP is provided in **Appendix J**.



15 LIMITATIONS

This report has been prepared by Environmental Earth Sciences NSW ACN 109 404 006 in response to and subject to the following limitations:

1. The specific instructions received from Liverpool City Council;
2. The specific scope of works set out in PO121134_V1 issued by Environmental Earth Sciences NSW for and on behalf of Liverpool City Council, is included in **Section 4** of this report;
3. May not be relied upon by any third party not named in this report for any purpose except with the prior written consent of Environmental Earth Sciences NSW (which consent may or may not be given at the discretion of Environmental Earth Sciences NSW);
4. This report comprises the formal report, documentation sections, tables, figures and appendices as referred to in the index to this report and must not be released to any third party or copied in part without all the material included in this report for any reason;
5. The report only relates to the site referred to in the scope of works being located at 22 Box Road, Casula, NSW ("the site");
6. The report relates to the site as at the date of the report as conditions may change thereafter due to natural processes and/or site activities;
7. No warranty or guarantee is made in regard to any other use than as specified in the scope of works and only applies to the depth tested and reported in this report;
8. Fill, soil, groundwater and rock to the depth tested on the site may be fit for the use specified in this report. Unless it is expressly stated in this report, the fill, soil and/or rock may not be suitable for classification as clean fill, excavated natural material (ENM) or virgin excavated natural material (VENM) if deposited off site;
9. This report is not a geotechnical or planning report suitable for planning or zoning purposes; and
10. Our General Limitations set out at the back of the body of this report.

16 REFERENCES

Bureau of Meteorology, Australian Government website (accessed 20 August 2021)

<http://www.bom.gov.au/>

Department of Environment, Climate Change and Water (NSW) 2010, "UPSS environmentally sensitive zone maps" accessed 06 August 2021,

<https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/clm/lqas/liverpool.pdf?la=en&hash=B4DE88686B27BF6A578C8D8CF71E286FA75A7827>



Environmental Earth Sciences NSW (2010) - *Procedures for field, laboratory and reporting quality assurance and quality control manual*.

Environmental Earth Sciences (2011), *Soil, gas and groundwater sampling manual, 7th Edition* (Unpublished).

Herbert, C. and Smith, V. (1991). *Penrith 1:100 000 Geological Sheet 9030, New South Wales Geological Survey, Sydney*.

New South Wales (NSW) Department of Infrastructure, Planning and Natural Resource (DIPNR) (2002). *Salinity Potential in Western Sydney 2002*.

NSW Environmental Protection Agency (EPA) (1995) - *Contaminated Sites: Sampling Design Guidelines*.

National Environment Protection Council (NEPC) (2013) - *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013)* (ASC NEPM, 2013).

NSW EPA (2017) - *Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme* (3rd edition).

NSW EPA (2020) - *Contaminated Guidelines: Consultants reporting on contaminated land*.

NSW EPA Contaminated Land Register (2021), accessed 27 September 2021, <https://apps.epa.nsw.gov.au/prclmapp/searchregister.aspx>

Standards Australia (1999) - *Guide to the investigation and sampling of sites with potentially contaminated soil, Part 2: Volatile substances (AS 4482.2)*, Standards Australia, Homebush, NSW

Standards Australia (2005) - *Guide to the investigation and sampling of sites with potentially contaminated soil, Part 1: Non-volatile and semi-volatile compounds (AS 4482.1)*, Standards Australia, Sydney, NSW

Water NSW Real time water data (<https://realtimedata.waternsw.com.au/water.stm>, accessed 27 September 2021)



ENVIRONMENTAL EARTH SCIENCES GENERAL LIMITATIONS

Scope of services

The work presented in this report is Environmental Earth Sciences response to the specific scope of works requested by, planned with and approved by the client. It cannot be relied on by any other third party for any purpose except with our prior written consent. Client may distribute this report to other parties and in doing so warrants that the report is suitable for the purpose it was intended for. However, any party wishing to rely on this report should contact us to determine the suitability of this report for their specific purpose.

Data should not be separated from the report

A report is provided inclusive of all documentation sections, limitations, tables, figures and appendices and should not be provided or copied in part without all supporting documentation for any reason, because misinterpretation may occur.

Subsurface conditions change

Understanding an environmental study will reduce exposure to the risk of the presence of contaminated soil and or groundwater. However, contaminants may be present in areas that were not investigated, or may migrate to other areas. Analysis cannot cover every type of contaminant that could possibly be present. When combined with field observations, field measurements and professional judgement, this approach increases the probability of identifying contaminated soil and or groundwater. Under no circumstances can it be considered that these findings represent the actual condition of the site at all points.

Environmental studies identify actual sub-surface conditions only at those points where samples are taken, when they are taken. Actual conditions between sampling locations differ from those inferred because no professional, no matter how qualified, and no sub-surface exploration program, no matter how comprehensive, can reveal what is hidden below the ground surface. The actual interface between materials may be far more gradual or abrupt than an assessment indicates. Actual conditions in areas not sampled may differ from that predicted. Nothing can be done to prevent the unanticipated. However, steps can be taken to help minimize the impact. For this reason, site owners should retain our services.

Problems with interpretation by others

Advice and interpretation is provided on the basis that subsequent work will be undertaken by Environmental Earth Sciences NSW. This will identify variances, maintain consistency in how data is interpreted, conduct additional tests that may be necessary and recommend solutions to problems encountered on site. Other parties may misinterpret our work and we cannot be responsible for how the information in this report is used. If further data is collected or comes to light we reserve the right to alter their conclusions.

Obtain regulatory approval

The investigation and remediation of contaminated sites is a field in which legislation and interpretation of legislation is changing rapidly. Our interpretation of the investigation findings should not be taken to be that of any other party. When approval from a statutory authority is required for a project, that approval should be directly sought by the client.

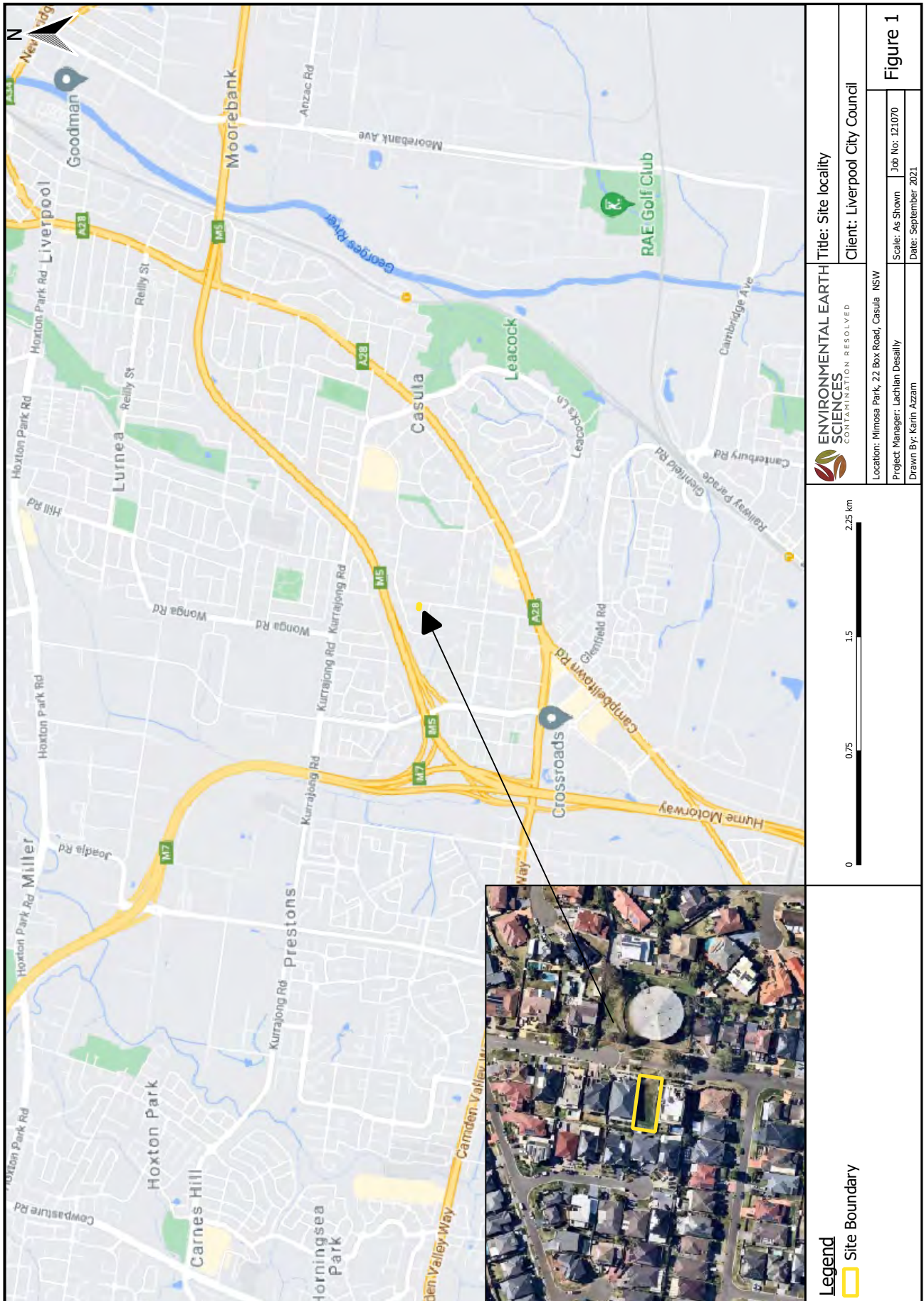
Limit of liability

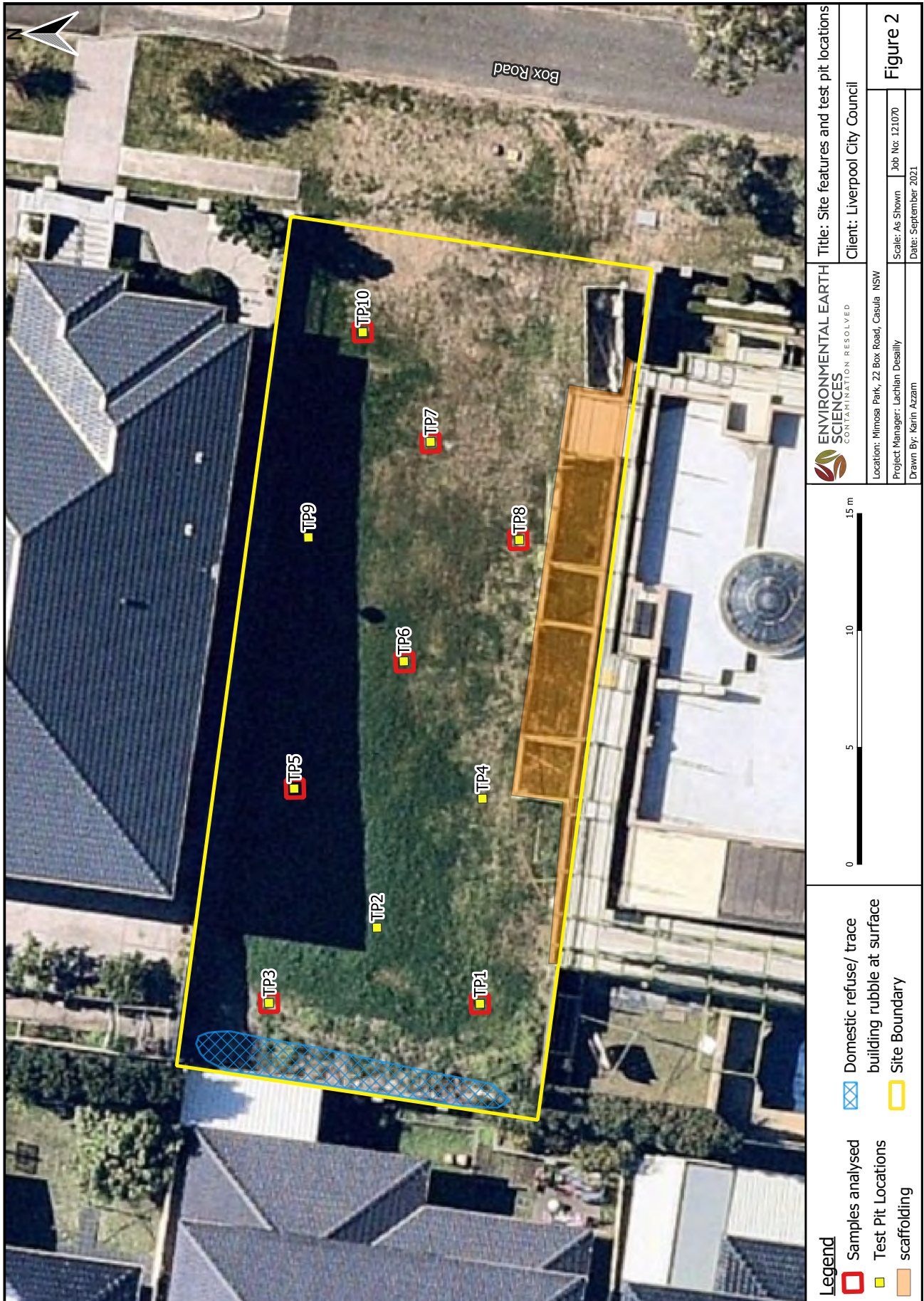
This study has been carried out to a particular scope of works at a specified site and should not be used for any other purpose. This report is provided on the condition that Environmental Earth Sciences NSW disclaims all liability to any person or entity other than the client in respect of anything done or omitted to be done and of the consequence of anything done or omitted to be done by any such person in reliance, whether in whole or in part, on the contents of this report. Furthermore, Environmental Earth Sciences NSW disclaims all liability in respect of anything done or omitted to be done and of the consequence of anything done or omitted to be done by the client, or any such person in reliance, whether in whole or any part of the contents of this report of all matters not stated in the brief outlined in Environmental Earth Sciences NSW's proposal number and according to Environmental Earth Sciences general terms and conditions and special terms and conditions for contaminated sites.

To the maximum extent permitted by law, we exclude all liability of whatever nature, whether in contract, tort or otherwise, for the acts, omissions or default, whether negligent or otherwise for any loss or damage whatsoever that may arise in any way in connection with the supply of services. Under circumstances where liability cannot be excluded, such liability is limited to the value of the purchased service.



FIGURES







APPENDIX A: ENVIRONMENTAL SETTING MAPS



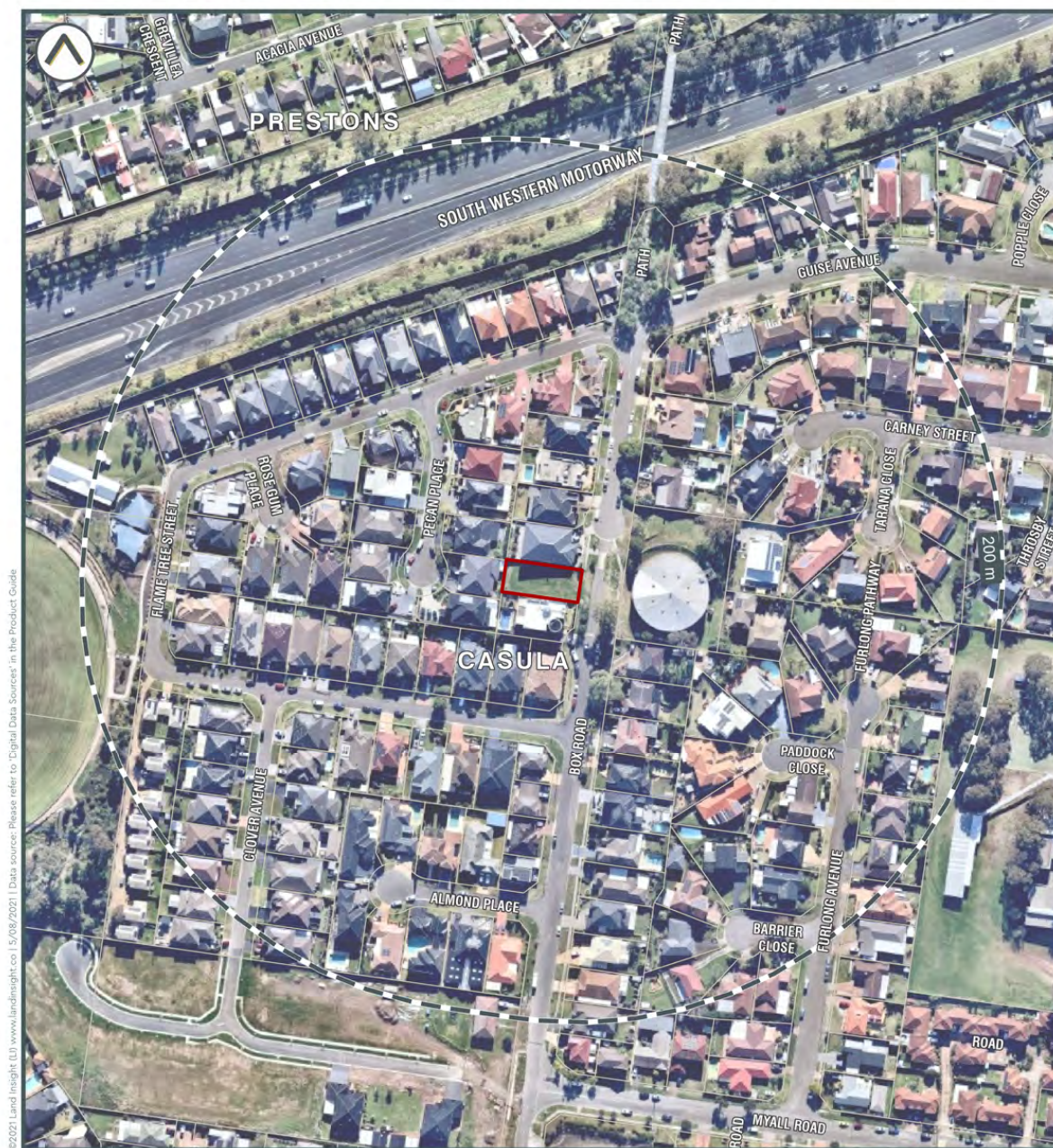
Appendix A

REPORT MAPS



PROPERTY SETTING

MAP 1.1

Subject Area and Sensitive Receptors

 Subject area



Land Insight do not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that this company shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.

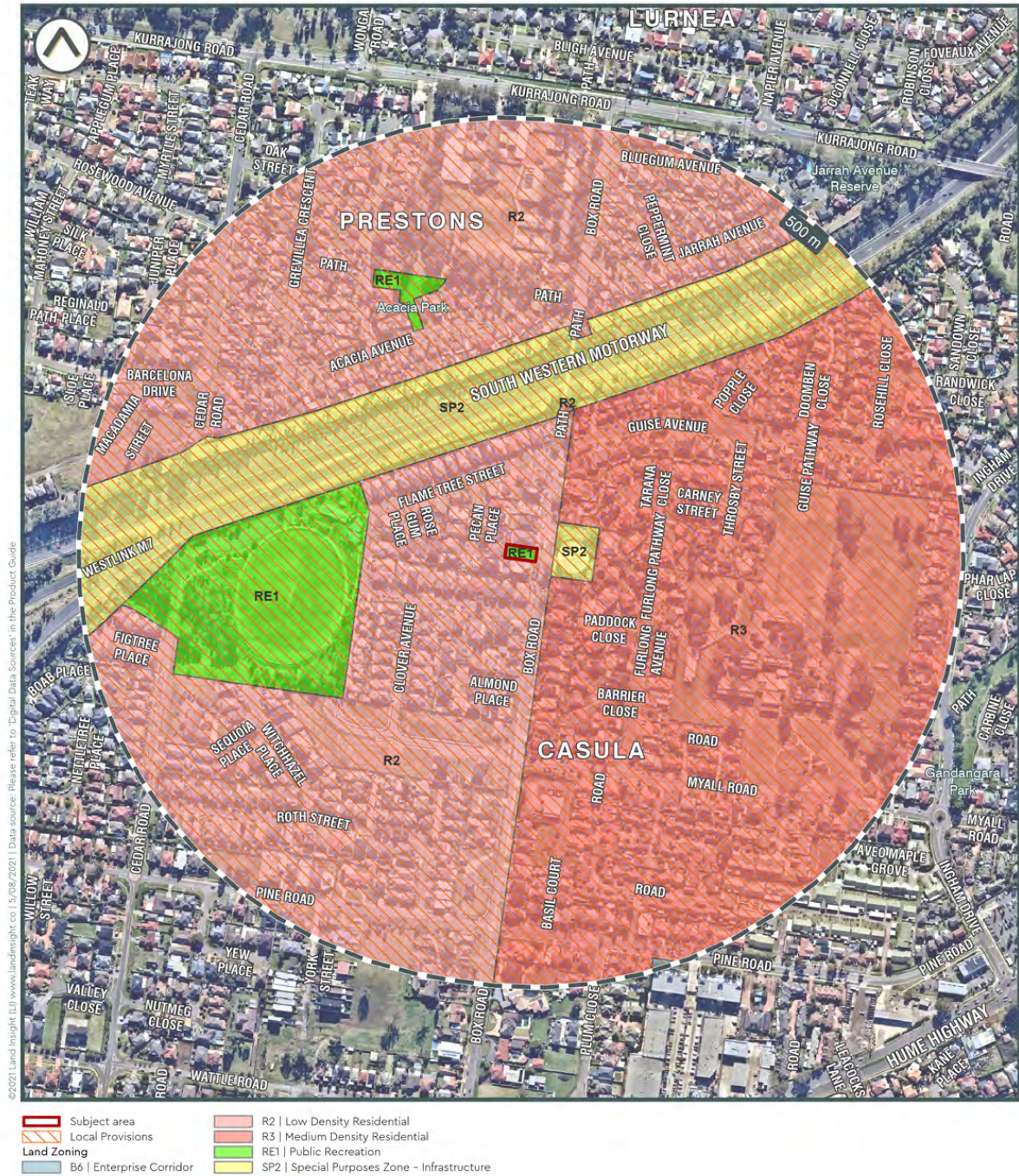




PROPERTY SETTING

MAP 1.2

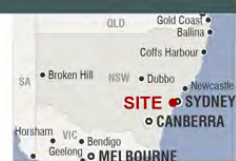
Planning Controls



0 50 100 150 200 250m

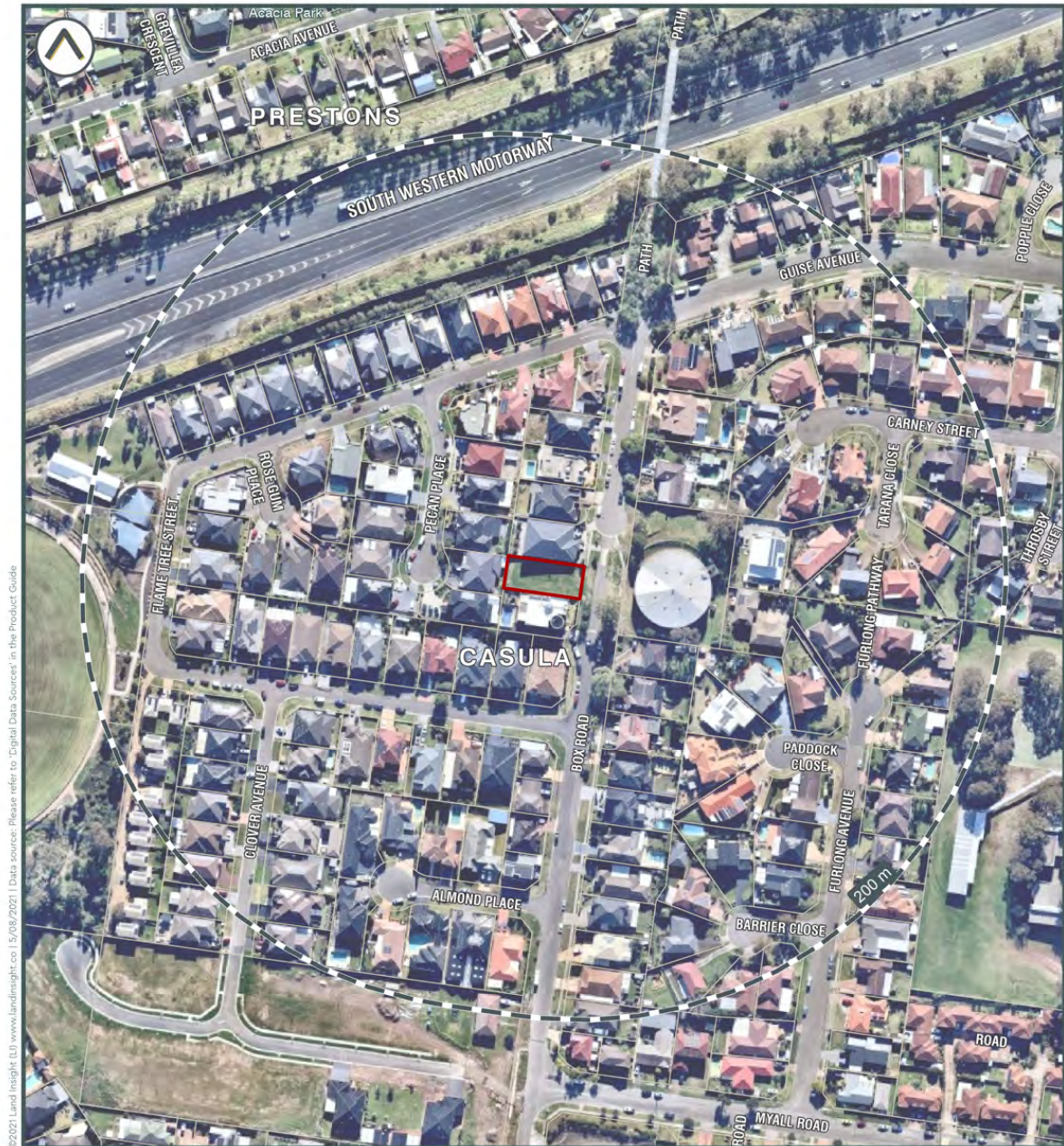


Land Insight do not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that this company shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.





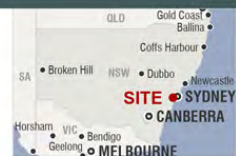
PROPERTY SETTING

Heritage**MAP 1.3**

- | | | |
|--------------|----------------------------------|------------------------------|
| Subject area | Heritage conservation Area (LEP) | National Heritage List (NHL) |
| | State Heritage Register | World Heritage Area (WHA) |
| | Commonwealth Heritage List (CHL) | |



Land Insight do not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that this company shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.





PROPERTY SETTING

MAP 1.4a

Soil Landscape and Salinity



0 50 100 150 200 250m



Land Insight do not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that this company shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.





PROPERTY SETTING

MAP 1.4b

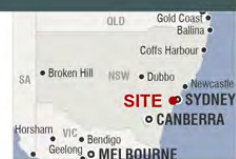
Acid Sulfate Soils



0 50 100 150 200 250m



Land Insight do not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that this company shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.

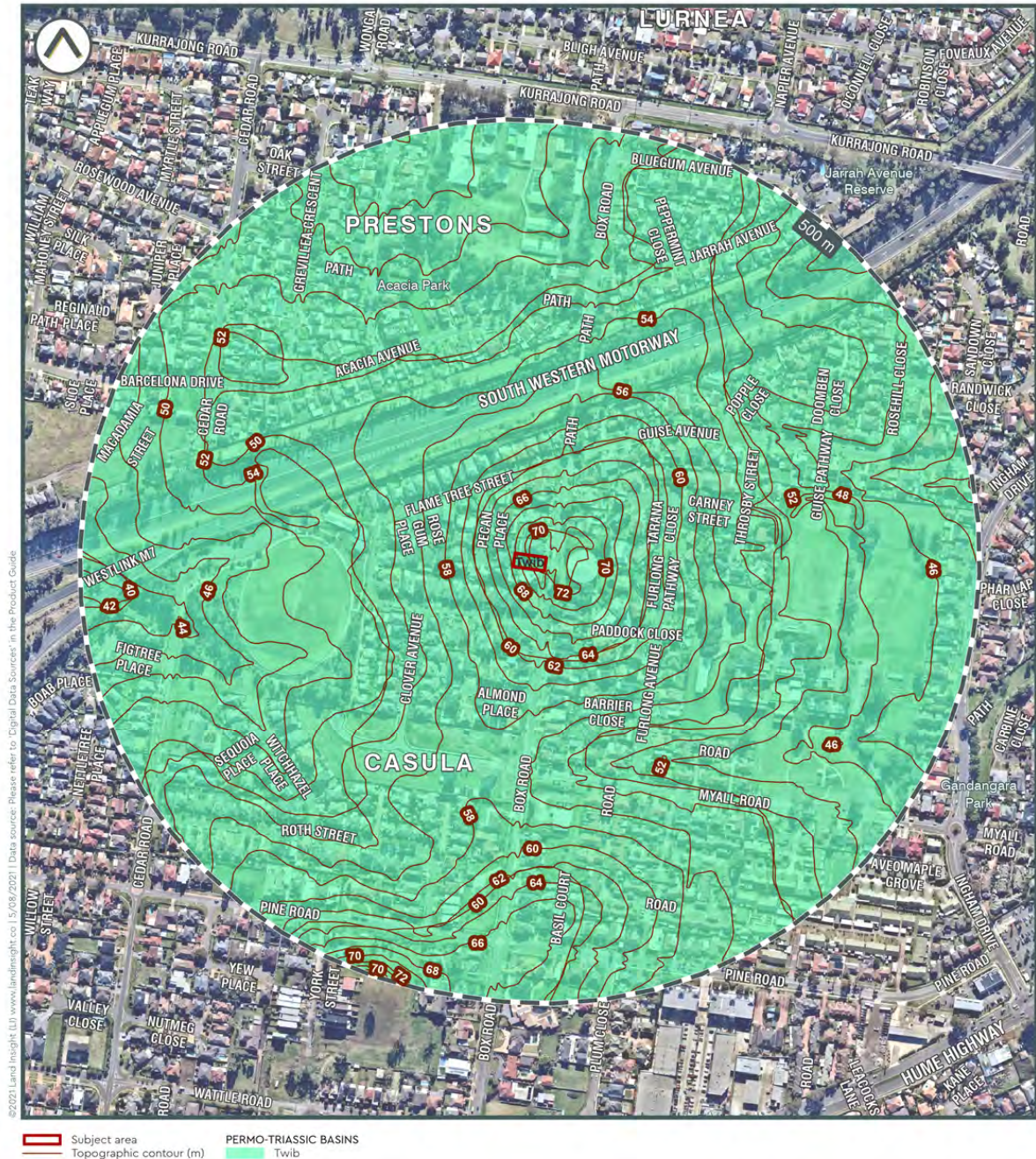




PROPERTY SETTING

MAP 1.5

Geology and Topography



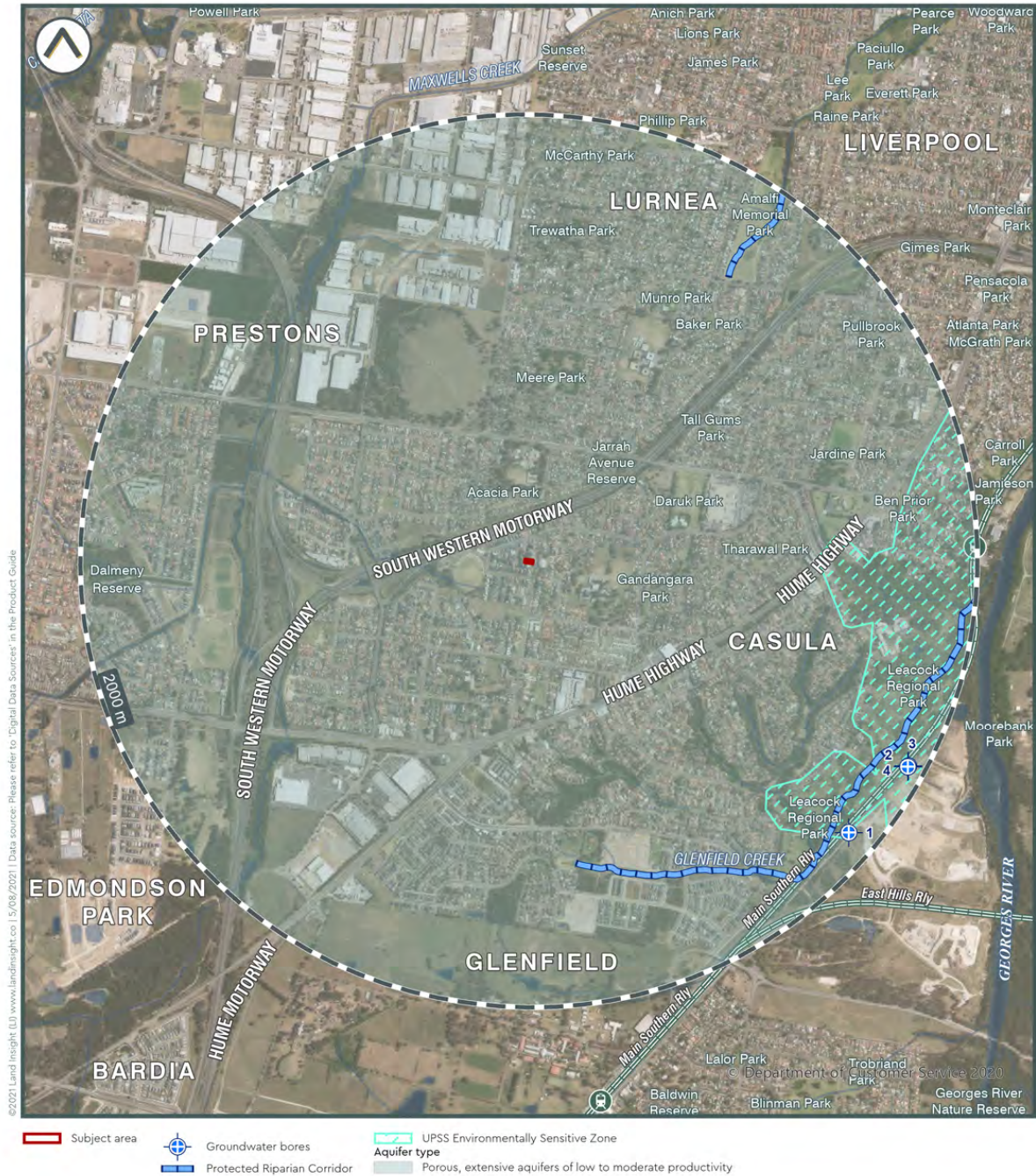
Land Insight do not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that this company shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.





HYDROGEOLOGY

MAP 2.1

Hydrogeology and Groundwater Boreholes

Land Insight do not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that this company shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.



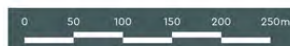


HYDROGEOLOGY

MAP 2.2

Hydrogeology and Other Boreholes

- Subject area
● Other borehole/monitoring well location
 Hydrogeologic Unit
 Late Permian/Triassic sediments (porous media - consolidated)



Land Insight do not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that this company shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.





ENVIRONMENTAL REGISTERS LICENSES AND INCIDENTS

MAP 3.1

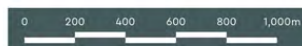
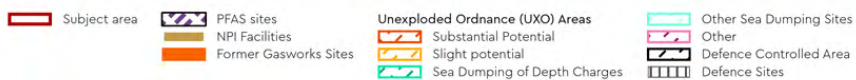
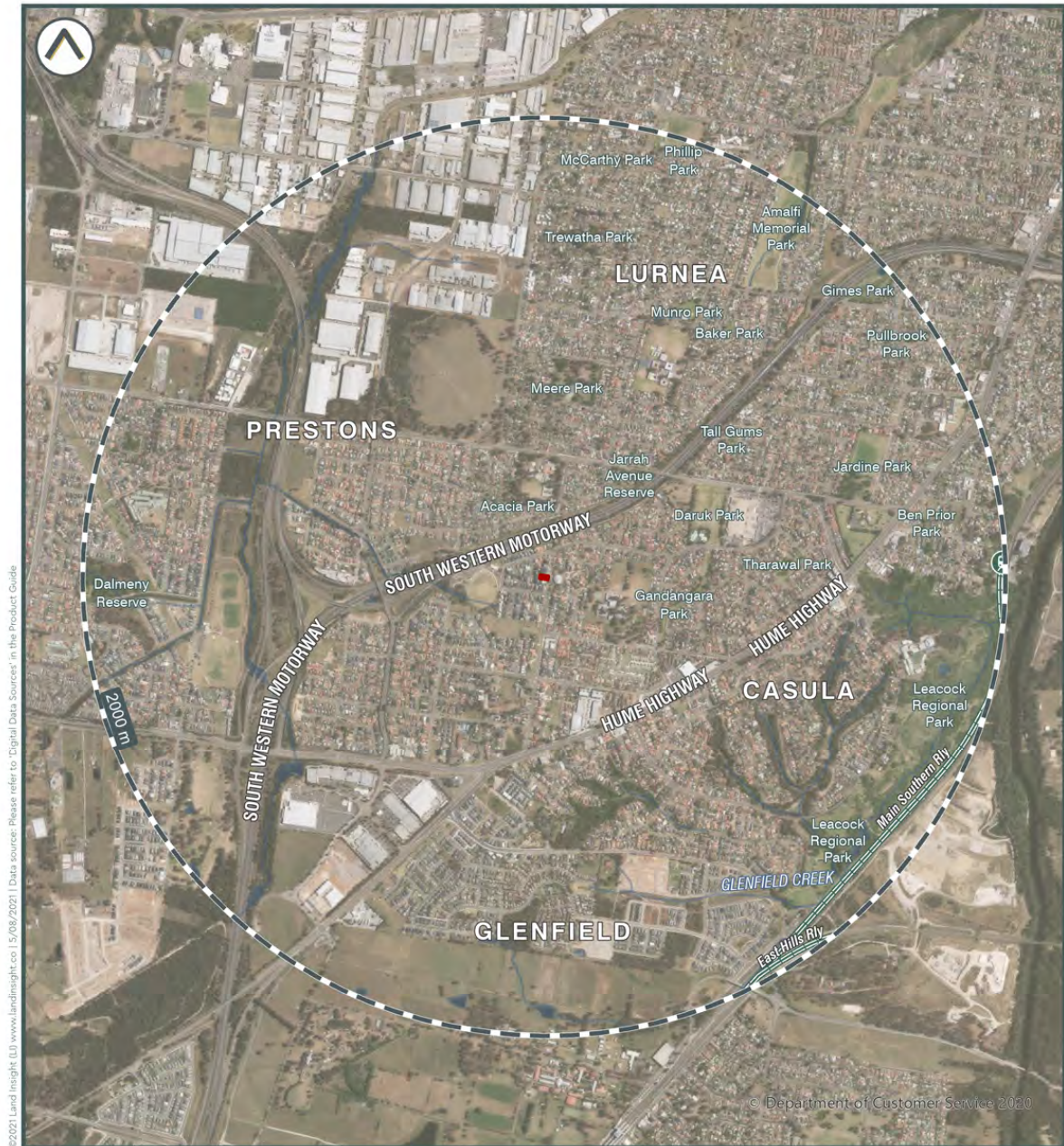
Contaminated Land Public Register





ENVIRONMENTAL REGISTERS LICENSES AND INCIDENTS

MAP 3.2

Sites Regulated by other Jurisdictional Body

Land Insight do not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that this company shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.





ENVIRONMENTAL REGISTERS LICENSES AND INCIDENTS

MAP 3.3

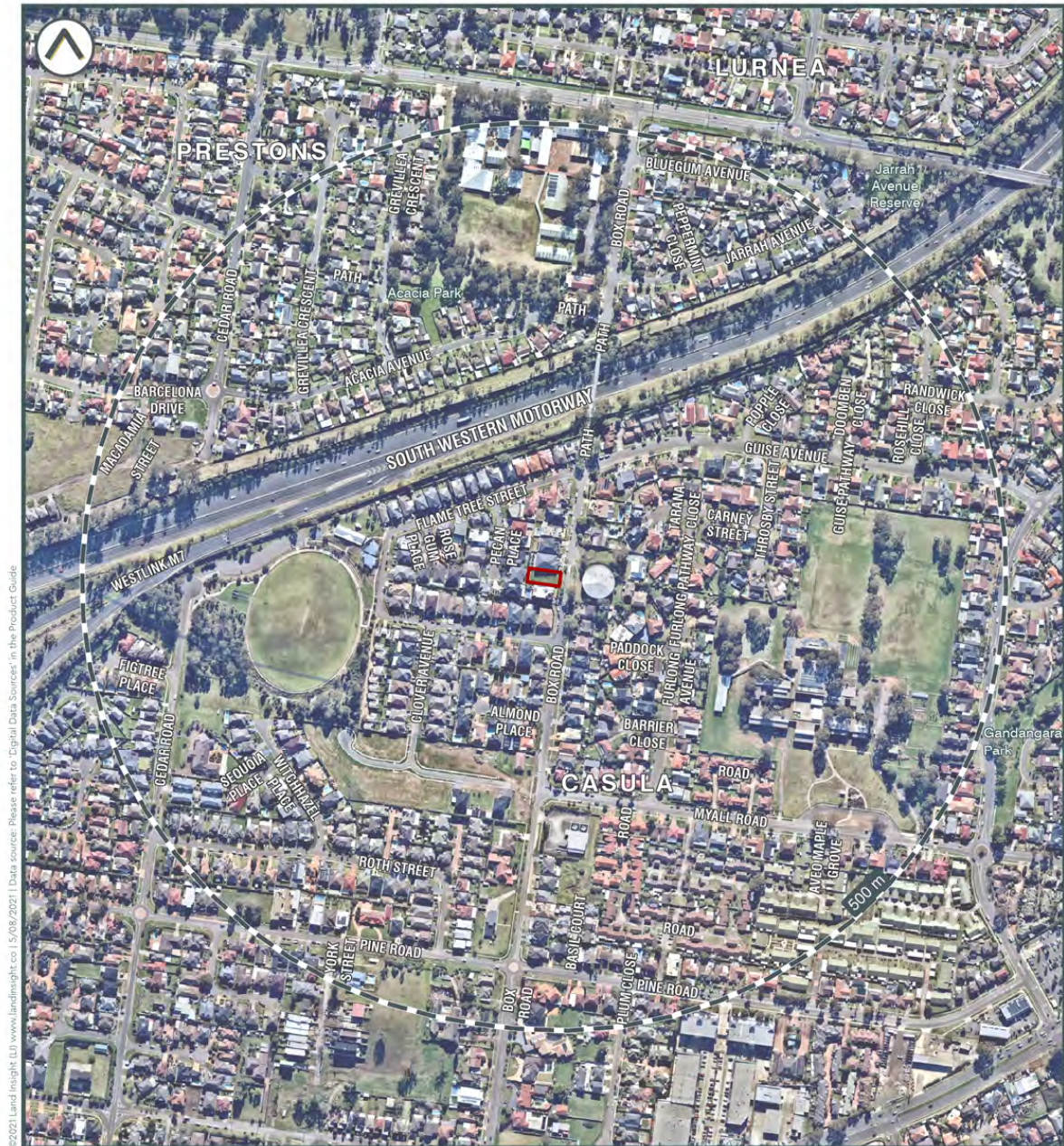
Licensing Under the POEO Act





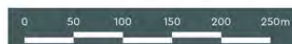
POTENTIALLY CONTAMINATED AREAS

MAP 4.1

Potentially Contaminating Activities (PCAs)

-  Subject area
-  Liquid Fuel Depots
-  Operational Petrol Stations
-  Former Petrol Stations
-  Waste Management Facilities

Data is current as when this report was created. However due to the turnover of business locations, some addresses may be former.



Land Insight do not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that this company shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.





NATURAL HAZARDS

Fire and Flood Hazards**MAP 5.1**

0 50 100 150 200 250m




Land Insight do not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that this company shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.





APPENDIX B: SOIL LANDSCAPE

bt	BLACKTOWN	Residual
		
<p>Landscape—gently undulating rises on Wianamatta Group shales. Local relief to 30 m, slopes usually >5%. Broad rounded crests and ridges with gently inclined slopes. Cleared Eucalypt woodland and tall open-forest (dry sclerophyll forest).</p> <p>Soils—shallow to moderately deep (>100 cm) hardsetting mottled texture contrast soils, Red and Brown Podzolic Soils (Dr3.21, Dr3.31, Db2.11, Db2.21) on crests grading to Yellow Podzolic Soils (Dy2.11, Dy3.11) on lower slopes and in drainage lines.</p> <p>Limitations—localised seasonal waterlogging, localised water erosion hazard, moderately reactive highly plastic subsoil, localised surface movement potential.</p>		

LOCATION

Occurs extensively on the Cumberland Lowlands. Examples include Blacktown, Mount Druitt, Glossodia and Leppington.

Isolated examples are found at Bilpin on the Blue Mountains plateau surface and along the Silverdale Road south of Wallacia.

LANDSCAPE

Geology

Wianamatta Group—Ashfield Shale consisting of laminite and dark grey siltstone, Bringelly Shale which consists of shale with occasional calcareous claystone, laminite and infrequent coal, and Minchinbury Sandstone consisting of fine to medium-grained quartz lithic sandstone.

Topography

Gently undulating rises on Wianamatta Shale with local relief 10–30 m and slopes generally >5% but occasionally up to 10%. Crests and ridges are broad (200–600 m) and rounded with convex upper slopes grading into concave lower slopes. Outcrops of shale do not occur naturally on the surface. They may occur, however, where soils have been removed.

Vegetation

Almost completely cleared open-forest and open-woodland (dry sclerophyll forest). The original woodland and open-forest were dominated by *Eucalyptus tereticornis* (forest red gum), *E. crebra* (narrow-leaved ironbark), *E. moluccana* (grey box) and *E. maculata* (spotted gum) (Benson, 1981).

Further west near Penrith remnant stands of *E. punctata* (grey gum) occur. Between Liverpool and St Marys, the dominant species are *E. globoides* (white stringybark) and *E. fibrosa* (broad-leaved ironbark), with *E. longifolia* (woollybutt) as an understorey species. Individual trees or small stands of *E. sideroxylon* (mugga ironbark) are occasionally found on crests.

Landuse

The dominant landuses are intensive residential (Fairfield, Blacktown and Mt Druitt), horticulture and animal husbandry (Vineyard, Scheyville and Leppington) and light and heavy industry (Yennora and Moorebank).

Existing Erosion

No appreciable erosion occurs on this unit. Minor sheet and gully erosion may be found where surface vegetation is not maintained.

Associated Soil Landscapes

South Creek (**sc**) soil landscape occurs along drainage depressions. Picton (**pn**) soil landscape occurs on steeper south and southeast facing slopes. Small areas of Luddenham (**lu**) soil landscape may also occur.

SOILS

Dominant Soil Materials

bt1—Friable brownish black loam.

This is a friable brownish black loam to clay loam with moderately pedal subangular blocky structure and rough-faced porous ped fabric. This material occurs as topsoil (A horizon).

Peds are well defined subangular blocky and range in size from 2–20 mm. Surface condition is friable. Colour is brownish black (10YR 2/2) but can range from dark reddish brown (5YR 3/2) to dark yellowish brown (10YR 3/4). The pH varies from moderately acid (pH 5.5) to neutral (pH 7.0). Rounded iron indurated fine gravel-sized shale fragments and charcoal fragments are sometimes present. Roots are common.

bt2—Hardsetting brown clay loam.

This is a brown clay loam to silty clay loam which is hardsetting on exposure or when completely dried out. It has apedal massive to weakly pedal structure and slowly porous earthy fabric. It occurs as an A2 horizon.

Peds when present are weakly developed, subangular blocky and are rough faced and porous. They range in size between 20–50 mm. This material is water repellent when extremely dry.

Colour is dark brown (7.5YR 4/3) but can range from dark reddish brown (2.5YR 3/3) to dark brown (10YR 3/3). The pH varies from moderately acid (pH 5.0) to slightly acid (pH 6.5). Platy, iron indurated gravel-sized shale fragments are common. Charcoal fragments and roots are rarely present.

bt3—Strongly pedal, mottled brown light clay.

This is a brown light to medium clay with strongly pedal polyhedral or sub-angular to blocky structure and smooth-faced dense ped fabric. This material usually occurs as subsoil (B horizon).

Texture often increases with depth. Peds range in size from 5–20 mm. Colour is brown (7.5YR 4/6) but may range from reddish brown (2.5YR 4/6) to brown (10YR 4/6). Frequent red, yellow or grey mottles occur often becoming more numerous with depth. The pH varies from strongly acid (pH 4.5) to slightly acid (pH 6.5). Fine to coarse gravel-sized shale fragments are common and often occur in stratified bands. Both roots and charcoal fragments are rare.

bt4—Light grey plastic mottled clay.

This is a plastic light grey silty clay to heavy clay with moderately pedal polyhedral to subangular blocky structure and smoothfaced dense ped fabric. This material usually occurs as deep subsoil above shale bedrock (B3 or C horizon).

Peds range in size from 2–20 mm. Colour is usually light grey (10YR 7/1) or, less commonly, greyish yellow (2.5YR 6/2). Red, yellow or grey mottles are common. The pH varies from strongly acid (pH 4.0) to moderately acid (pH 5.5). Strongly weathered ironstone concretions and rock fragments are common. Gravel-sized shale fragments and roots are occasionally present. Charcoal fragments are rare.

Occurrence and Relationships

Crests. On crests and ridges up to 30 cm of friable brownish black loam (**bt1**) overlies 10–20 cm of hardsetting brown clay loam (**bt2**) and up to 90 cm of strongly pedal, brown mottled light clay (**bt3**) [red podzolic soils (Dr3.21, 3.11) and brown podzolic soils (Db2.11)]. **bt1** is occasionally absent. Boundaries between the soil materials are usually clear. Total soil depth is <100 cm.

Upper slopes and Midslopes. Up to 30 cm of **bt1** overlies 10–20 cm of **bt2** and 20–50 cm of **bt5**. This in turn overlies up to 100 cm of a light grey plastic mottled clay (**bt4**) [Red Podzolic Soils (Dr3.21), Brown Podzolic Soils (Db2.21)]. Occasionally **bt1** is absent. The boundaries between the soil materials are usually clear. Total soil depth is <200 cm.

Lower sideslopes. Up to 30 cm of **bt1** overlies 10–30 cm of **bt2** and 40–100 cm of **bt3**. Below **bt3** there is usually >100 cm of **bt4** [Yellow Podzolic Soils (Dy2.11, Dy3.11)]. The boundaries between the soil materials are clear. Total soil depth is >200 cm.

LIMITATIONS TO DEVELOPMENT

Soil Limitations

- bt1** Strongly acid
- bt2** Hardsetting
Low fertility
Strongly acid
High aluminium toxicity
- bt3** High shrink-swell (localised)
Low wet strength
Low permeability

Low available water capacity
 Salinity (localised)
 Sodicity (localised)
 Very low fertility
 Very strongly acid
 Very high aluminium toxicity

bt4 High shrink-swell (localised)
 Low wet strength
 Stoniness
 Low available water capacity
 Low permeability
 Salinity (localised)
 Sodicity (localised)
 Low fertility
 Strongly acid
 Very high aluminium toxicity
 High erodibility (localised)

Fertility

General fertility is low to moderate. Soil materials have low to moderate available water capacity, low CEC values, hardsetting surfaces (**bt2**), very low phosphorus and low to very low nitrogen levels. The subsoils (**bt3**, **bt4**) may be locally sodic with low permeability. When **bt1** is present its higher organic matter content and moderate nitrogen levels result in higher general fertility.

Erodibility

Blacktown soil materials have moderate erodibility. The topsoils (**bt1**, **bt2**) are often hardsetting and they have high fine sand and silt content, but they also have high to moderate organic matter content. The subsoils (**bt3**, **bt4**) are very low in organic matter. Where they are also highly dispersible and occasionally sodic the erodibility is high.

Erosion Hazard

The erosion hazard for non-concentrated flows is slight to moderate but ranges from low to very high. Calculated soil loss during the first twelve months of urban development for topsoil and exposed subsoil tends to be low (7–11 t/ha). Soil erosion hazard for concentrated flows is moderate to high.

Surface Movement Potential

The deep clay soils are moderately reactive. These are generally found on side-slopes and footslopes. Shallower soils on forests are slightly reactive.

Landscape Limitations

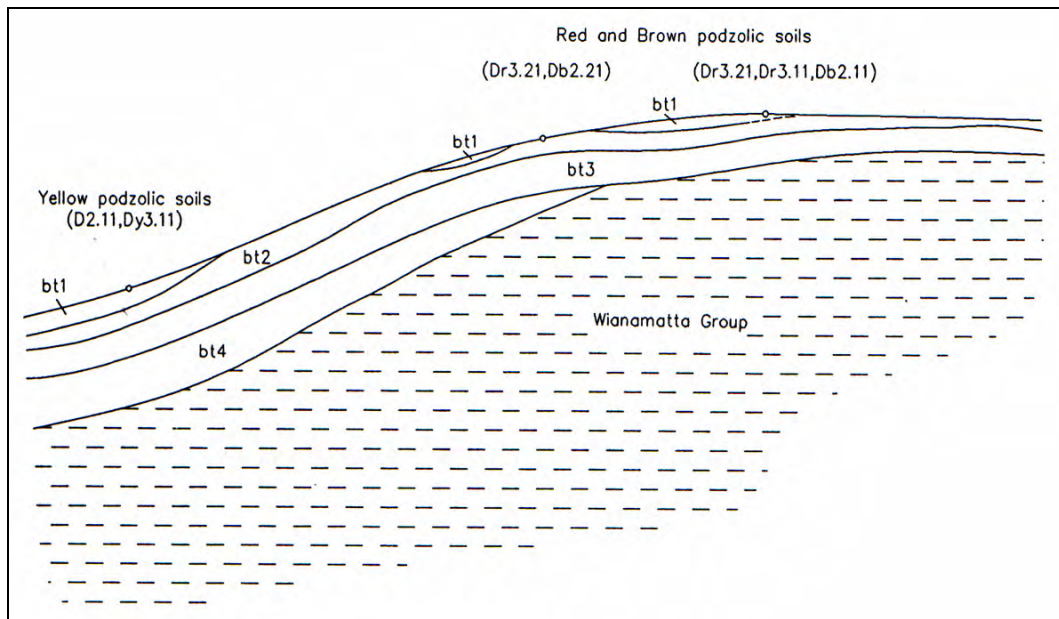
Seasonal waterlogging (localised), water erosion hazard (localised), surface movement potential (localised).

Urban Capability

High capability for urban development with appropriate foundation design.

Rural Capability

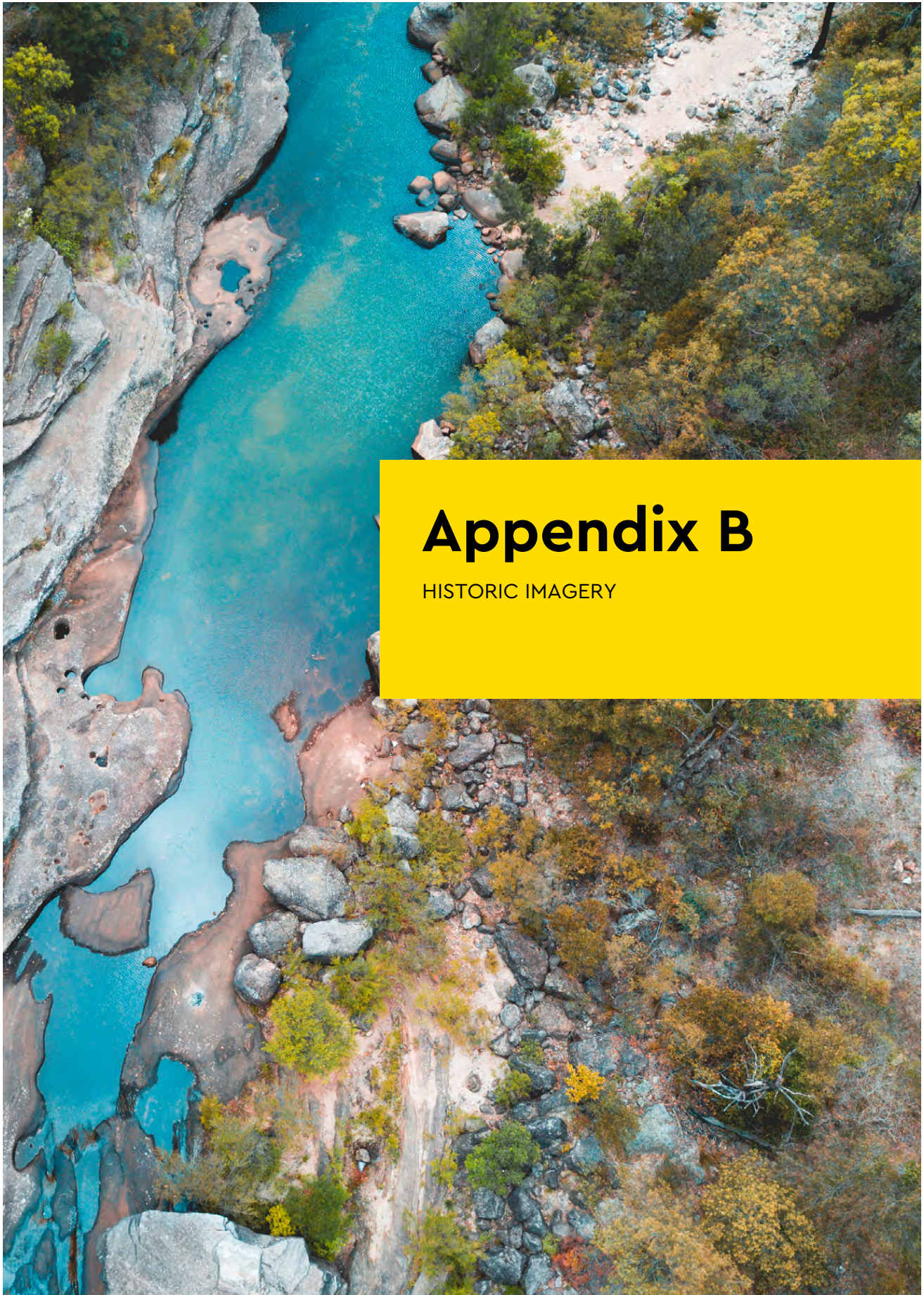
Small portions of this soil landscape which have not been urbanised are capable of sustaining regular cultivation and grazing.



Distribution diagram of the Blacktown soil landscape showing the occurrence and relationship of dominant soil materials.



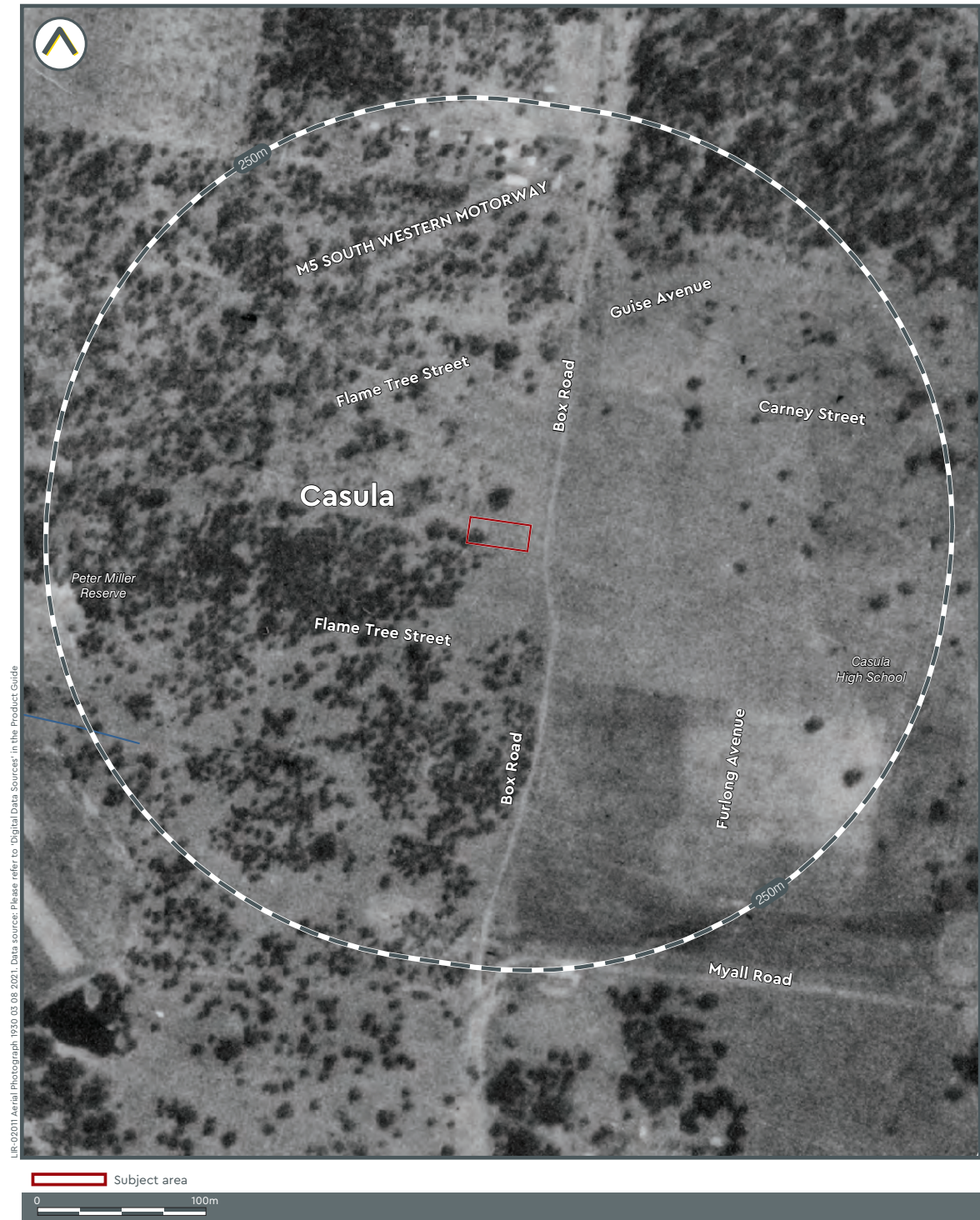
APPENDIX C: HISTORICAL AERIAL PHOTOGRAPHS



IMAGERY INSIGHT

MAP B1

Historic Aerial Photograph - 1930



IMAGERY INSIGHT

MAP B2

Historic Aerial Photograph - 1947



IMAGERY INSIGHT

MAP B3

Historic Aerial Photograph - 1955



IMAGERY INSIGHT

MAP B4

Historic Aerial Photograph - 1965



IMAGERY INSIGHT

MAP B5

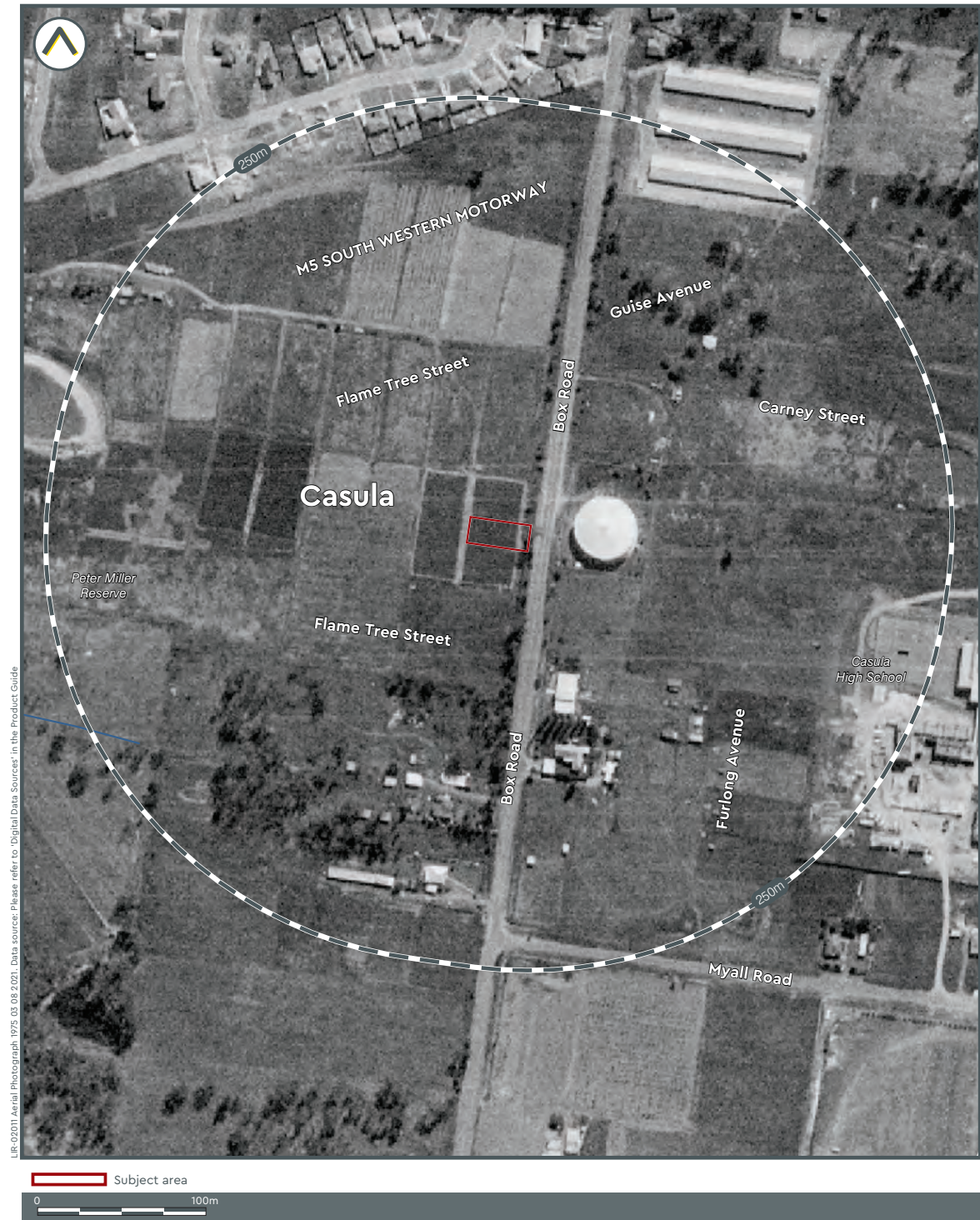
Historic Aerial Photograph - 1970



IMAGERY INSIGHT

MAP B6

Historic Aerial Photograph - 1975



IMAGERY INSIGHT

MAP B7

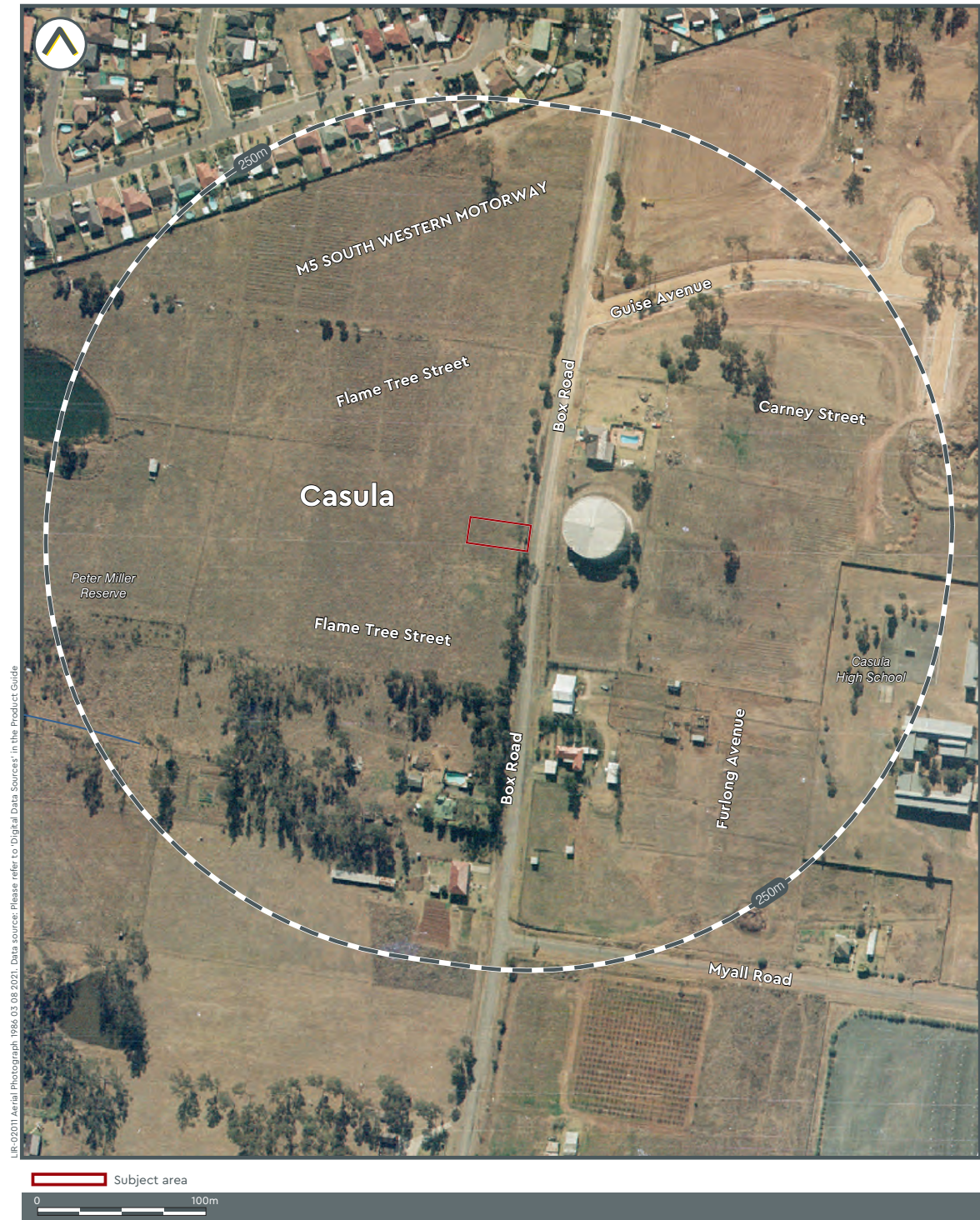
Historic Aerial Photograph - 1978



IMAGERY INSIGHT

MAP B8

Historic Aerial Photograph - 1986



Land Insight & Resources do not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that this company shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.



IMAGERY INSIGHT

MAP B9

Historic Aerial Photograph - 1991



IMAGERY INSIGHT

MAP B10

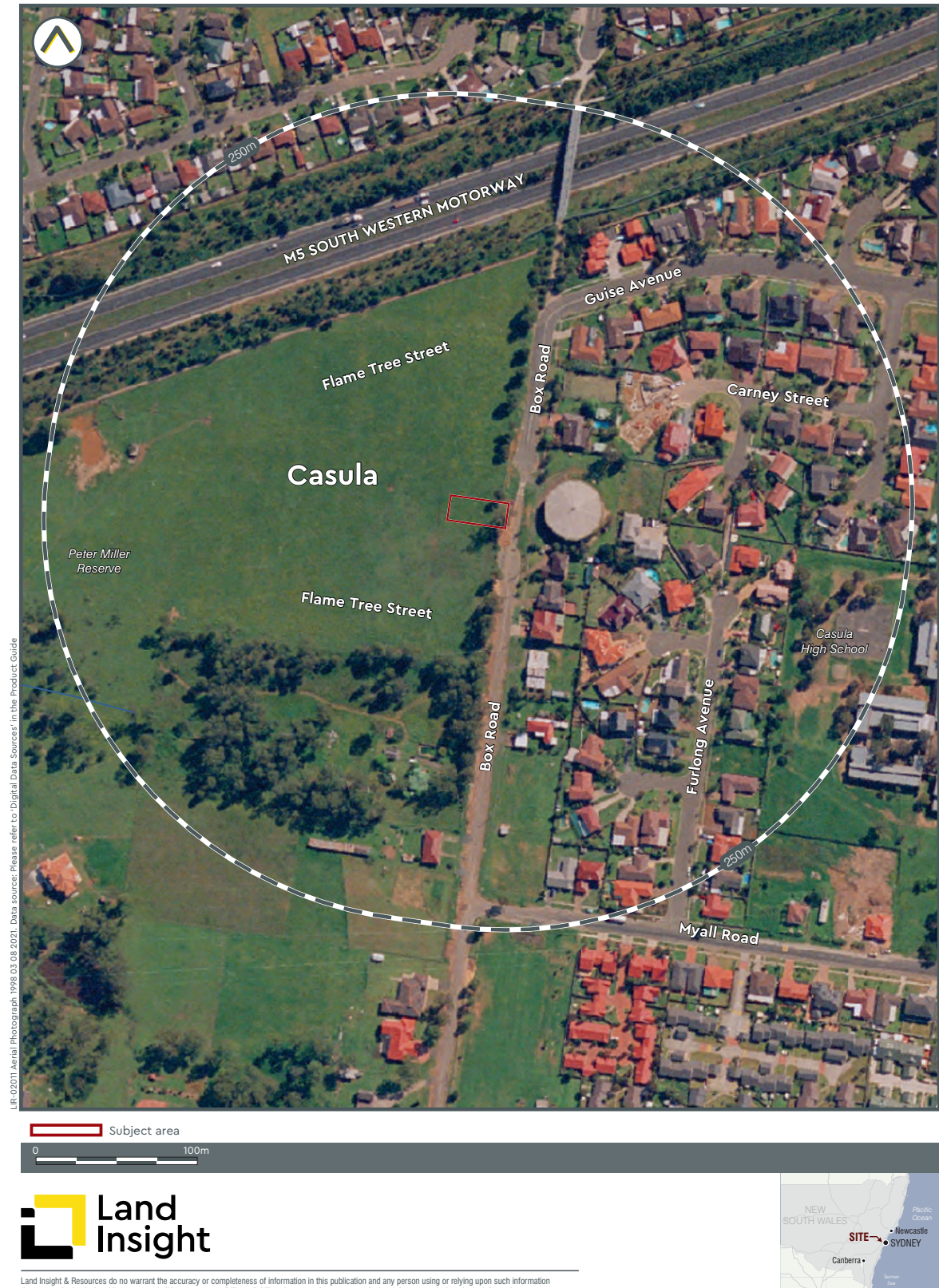
Historic Aerial Photograph - 1994



IMAGERY INSIGHT

MAP B11

Historic Aerial Photograph - 1998



IMAGERY INSIGHT

MAP B12

Historic Aerial Photograph - 2005



Land Insight & Resources do not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that this company shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.



IMAGERY INSIGHT

MAP B13

Historic Aerial Photograph - 2008



IMAGERY INSIGHT

MAP B14

Historic Aerial Photograph - 2012



LIR-02011 Aerial Photograph 2012.03.08 2021. Data source: Please refer to 'Digital Data Sources' in the Product Guide



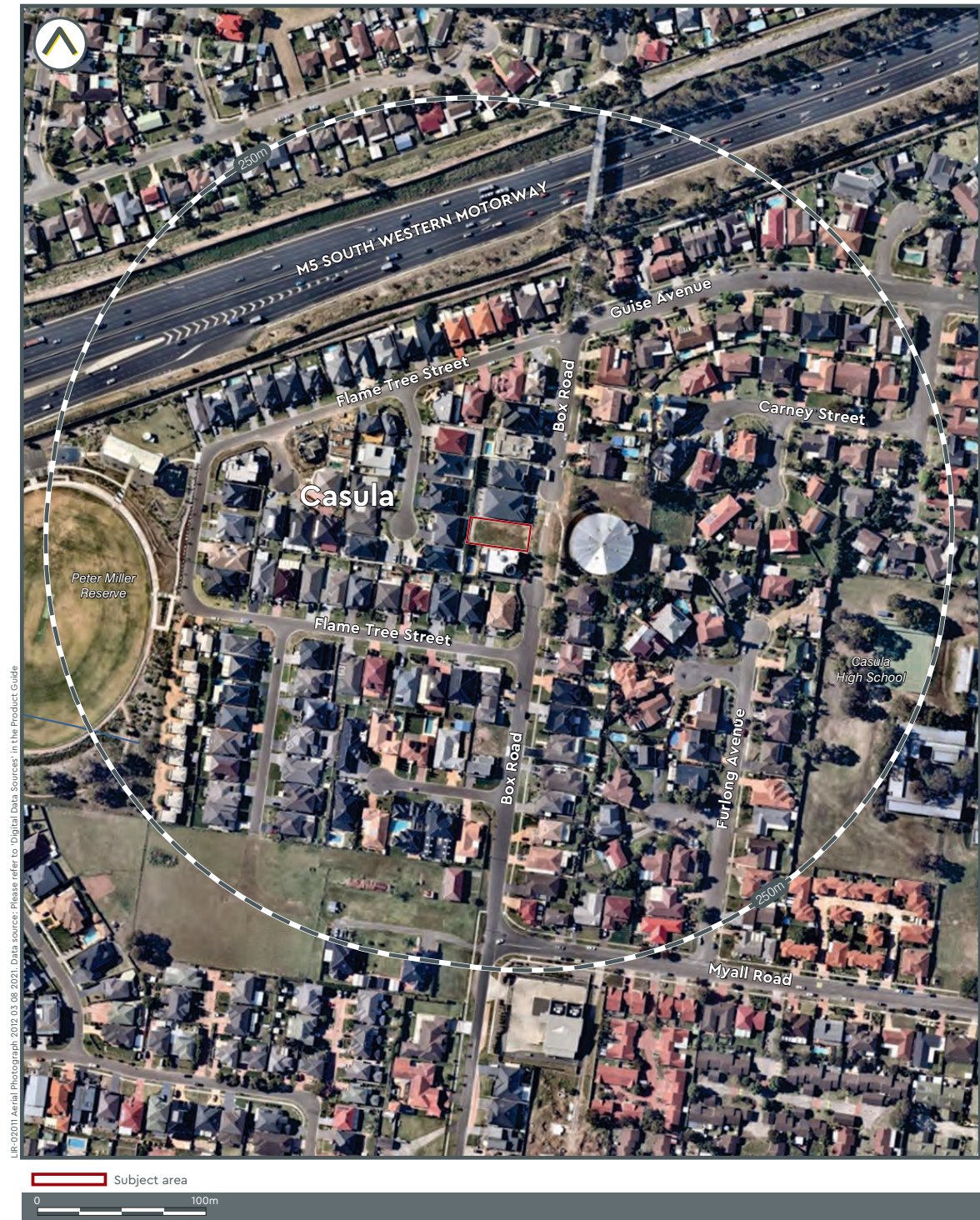
Land Insight & Resources do not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that this company shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.



IMAGERY INSIGHT

MAP B15

Historic Aerial Photograph - 2015



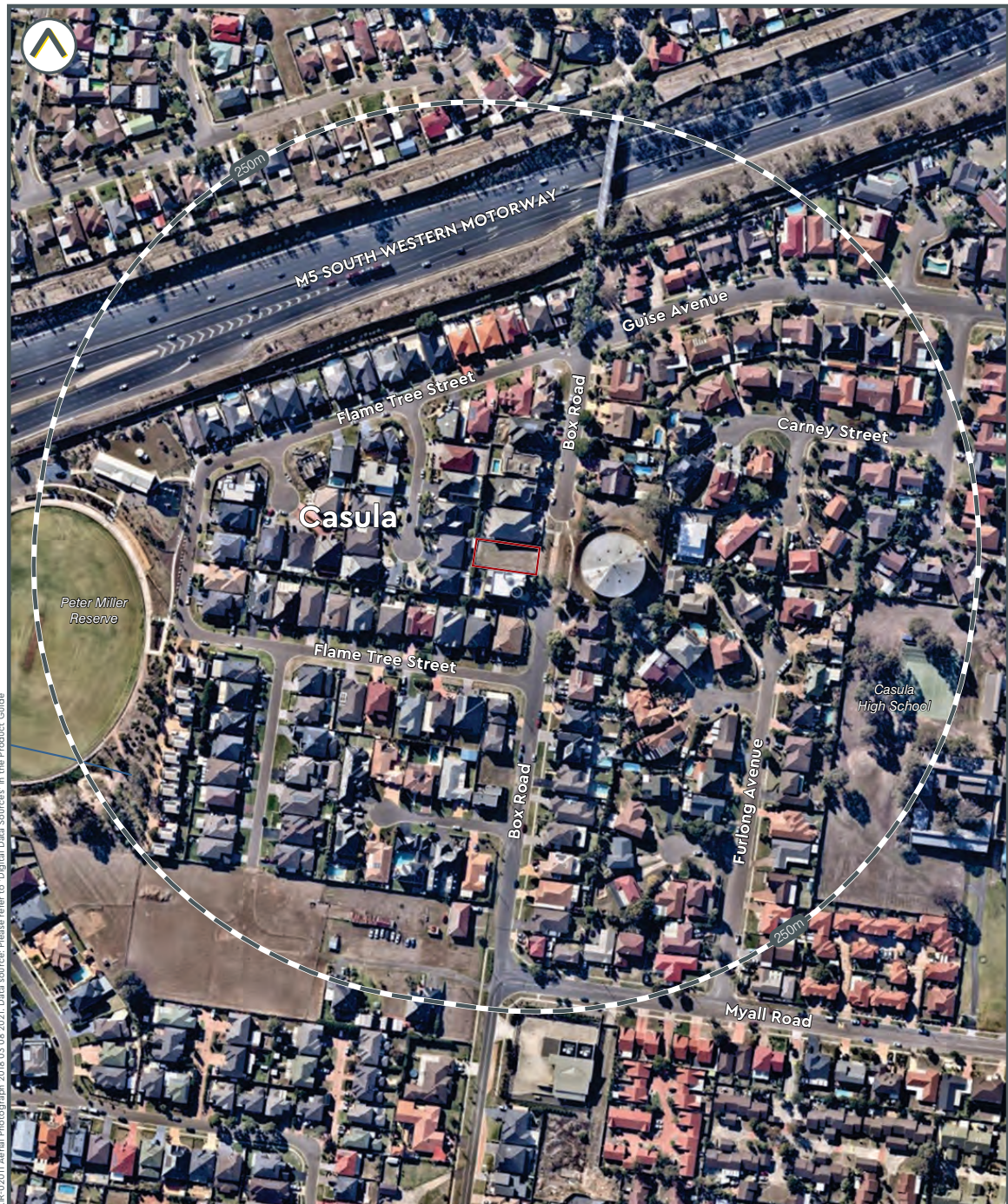
Land Insight & Resources do not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that this company shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.



IMAGERY INSIGHT

MAP B16

Historic Aerial Photograph - 2018



Subject area

0 100m



Land Insight & Resources do not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that this company shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.



IMAGERY INSIGHT

MAP B17

Historic Aerial Photograph - 2021



LR-02011 Aerial Photograph 2021 03 08 2021. Data source: Please refer to 'Digital Data Sources' in the Product Guide

Subject area

0 100m



Land Insight & Resources do not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that this company shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.





APPENDIX D: NSW EPA NOTICE

Section 91 Protection of the Environment Operations Act 1997

Clean-Up Notice



LIVERPOOL CITY COUNCIL
ABN 84 181 182 471
Locked Bag 7064
LIVERPOOL BC NSW 1871

Attention: Rajendra Autar

Notice Number 1549298
File Number EF14/11084
Date 17-Mar-2017

NOTICE OF CLEAN-UP ACTION

BACKGROUND

1. The Environment Protection Authority ("**the EPA**") is responsible for the administration and enforcement of the *Protection of the Environment Operations Act 1997* ("**the Act**"), including the processing, transport and disposal of waste.
2. The Act defines "waste" to include:
 - a. any substance (whether solid, liquid or gaseous) that is discharged, emitted or deposited in the environment in such volume, constituency or manner as to cause an alteration in the environment, or
 - b. any discarded, rejected, unwanted, surplus or abandoned substance, or
 - c. any otherwise discarded, rejected, unwanted, surplus or abandoned substance intended for sale or for recycling, processing, recovery or purification by a separate operation from that which produced the substance, or
 - d. any processed, recycled, re-used or recovered substance produced wholly or partly from waste that is applied to land, or used as fuel, but only in the circumstances prescribed by the regulations, or
 - e. any substance prescribed by the regulations to be waste.

A substance is not precluded from being waste for the purposes of the Act merely because it is or may be processed, recycled, re-used or recovered.

3. The Act provides that any waste that contains asbestos is "asbestos waste".
4. The application of special waste (asbestos waste) to land is a scheduled activity under Schedule 1 of the Act.
5. The EPA understands that asbestos waste from the Western Depot was transported to the Casula High School ("**the Premises**") by Liverpool City Council ("**Council**") in the course of undertaking works at the Premises.

Section 91 Protection of the Environment Operations Act 1997

Clean-Up Notice



6. The EPA notes that there are asbestos impacted soils at the Premises not associated with Council's works described above.
7. The Premises does not hold an Environment Protection Licence for the scheduled activity of waste application to land.
8. Fragments of fibrous cement boarding found in the material at the Premises have been analysed and confirmed to contain asbestos.
9. Clause 109 of the *Protection of the Environment Operations (General) regulation 2009* prescribes that placing more than 10 tonnes of asbestos waste onto land is land pollution.
10. Investigations carried out by the EPA to date indicate that Council caused the application of asbestos waste to land at the Premises.
11. Land Pollution or pollution of land means placing in or on, or otherwise introducing into or onto, the land (whether through an act or omission) any matter, whether solid, liquid or gaseous:
 - a) that causes or is likely to cause degradation of the land, resulting in actual or potential harm to the health or safety of human beings, animals or other terrestrial life or ecosystems, or actual or potential loss or property damage, that is not trivial, or
 - b) that is of a prescribed nature, description or class that does not comply with any standard prescribed in respect of that matter.
12. The EPA reasonably believes that the application of waste to land at the Premises is causing land pollution as it:
 - a) is prescribed as land pollution (as set out in 9.) and,
 - b) has potential human health and environmental impacts caused by the asbestos waste.
13. The EPA requires Council to take the clean-up actions as set out below.

DIRECTION TO TAKE CLEAN-UP ACTION

The Environment Protection Authority directs Council, to take the following clean-up action:

- A. Council must cause a Remediation Action Plan ("RAP") to be drafted that sets out the actions that will be taken by Council. The RAP must be to a standard that is satisfactory to the EPA and the Site Auditor and provided to the EPA at least thirty (30) days prior to the remediation works commencing.
- B. The RAP must address the asbestos waste that was caused to be land applied by Council.
- C. Council must remediate the area where the asbestos containing material was caused to be land applied, in accordance with the RAP as stated above.
- D. All asbestos impacted material that is excavated during the remediation works must be transported to a suitably licensed landfill unless otherwise stated in the RAP.
- E. The remediation works must be undertaken by a suitably qualified and licensed contractor.

Section 91 Protection of the Environment Operations Act 1997

Clean-Up Notice



- F. Council must nominate, in writing, a time/s and date/s that the remediation works will be conducted at least five (5) business days prior to undertaking the any remediation works.
- G. All remediation works must be completed by no later than **5:00 p.m. on Sunday 31 December 2017**.
- H. A Validation Report for the remediation and a Site Management Plan for the on-going management of the remediation area, must be supplied to the EPA within sixty (60) days of the remediation works being completed.
- I. A Site Audit Statement issued by a NSW EPA accredited Site Auditor certifying whether in the Auditor's opinion the remediation area is suitable for continuing use as a school subject to the implementation of a specified Site Management Plan, must be supplied to the EPA within sixty (60) days of the Validation Report and Site Management Plan being supplied to the EPA.
- J. The Site Audit Statement must be provided to the EPA by no later than one hundred and twenty (120) days after the remediation works have are completed.
- K. Information required by this notice must be provided electronically to waste.operations@epa.nsw.gov.au or in hard copy to PO Box A290 Sydney South NSW 1232 and must be addressed to:

GREG SHEEHY
Director Waste Compliance

FEE TO BE PAID

- You are required by law to pay a fee of \$520 for the administrative costs of issuing this notice. An invoice for the fee has been attached to this notice.
- It is an offence not to pay this fee. However you can apply for an extension of time to pay the fee or for the fee to be waived. At the end of this notice there is information about how and when to pay the fee and how to apply for an extension or a waiver of the fee.

.....
Greg Sheehy
Director Waste Compliance
Waste & Resource Recovery
(by Delegation)

INFORMATION ABOUT THIS CLEAN-UP NOTICE

- This notice is issued under section 91 of the Protection of the Environment Operations Act 1997.

Section 91 Protection of the Environment Operations Act 1997

Clean-Up Notice



- It is an offence against the Act not to comply with a clean-up notice unless you have a reasonable excuse.

Penalty for not complying with this notice

- The maximum penalty for a corporation is \$1,000,000 and a further \$120,000 for each day the offence continues. The maximum penalty for an individual is \$250,000 and a further \$60,000 for each day the offence continues.

Cost recovery from the person who caused the incident

- If you comply with this clean-up notice but you are not the person who caused the pollution incident to which the notice relates, you have a right to go to court to recover your costs of complying with the notice from the person who caused the incident.

Deadline for paying the fee

- The fee must be paid by **no later than 30 days after the date of this notice**, unless the EPA extends the time to pay the fee, or waives the fee.

How to pay the fee

- Possible methods of payment are listed on the last page of the attached invoice/statement.
- Please include the payment slip from the attached invoice/statement with your payment.

How to apply for an extension of time to pay/waive the fee

- Any application for an extension of time to pay the fee or for the fee to be waived should be made in writing to the EPA. The application should set out clearly why you think your application should be granted.

Other costs

- The Protection of the Environment Operations Act allows the EPA to recover from you reasonable costs and expenses it incurs in monitoring action taken under this notice, ensuring the notice is complied with and associated matters. (If you are going to be required to pay these costs and expenses you will later be sent a separate notice called a "Notice Requiring Payment of Reasonable Costs and Expenses").

Continuing obligation

- Under section 319A of the Act, your obligation to comply with the requirements of this notice continues until the notice is complied with, even if the due date for compliance has passed.

Variation of this notice

- This notice may only be varied by subsequent notices issued by the EPA.



APPENDIX E: PHOTO PLATES



Mimosa Park, Box Road – 17 September 2021



Photo Plate 1: The site, Mimosa Park – facing west from Box Road.



Photo Plate 2: Facing east from south western corner of the site.



Photo Plate 3: Test pit TP1



Photo Plate 4: Test pit TP1 – Natural mottled red and beige clay from ~0.5 mBGL.



Photo Plate 5: Test pit TP1 – Natural dark brown/ grey shale cobbles from 0.9 mBGL.



Photo Plate 6: Test pit TP2 – Shallow fill overlaying natural mottle orange and grey clay with shale cobbles from ~1.0 mBGL.



Photo Plate 7: Test pit TP3 - Pieces of asphalt and road base material at surface.



Photo Plate 8: Test pit TP3 – Brown clay from 0 – 0.5 mBGL with inclusions of trace brick and tile fragments and metal rod.



Photo Plate 9: Test pit TP3 – Orange and grey mottled clay from ~1.0 mBGL



Photo Plate 10: Test pit TP3 – Brown and dark grey shale cobbles from ~1.4 mBGL.



Photo Plate 11: Test pit TP5 – Shallow fill overlaying orange and grey mottled clay with shale cobbles at depth



Photo Plate 12: Test pit TP5 – Piece of metal ribbon within shallow fill.



Photo Plate 13: Test pit TP5 – dark grey shale cobbles from 1.4 mBGL.



Photo Plate 14: Test pit TP7



Photo Plate 15: Test pit TP7 – Trace inclusion of tile fragment within shallow fill.



Photo Plate 16: Test pit TP7 – Large, brown and dark grey shale cobbles from ~1.4 mBGL.



Photo Plate 17: Test pit TP10 – Shale cobbles and boulders from 0.15 mBGL.



Photo Plate 18: Test pit TP10 – Excavated, large shale cobbles and boulders from 0.15 mBGL with quantity and size increasing with depth.



Photo Plate 19: Western boundary wall, with neighbouring property to the left in the photograph – facing north.



Photo Plate 20: Western boundary wall, with domestic refuse at surface including food cans and plastic and corrugated tubing – facing north.



APPENDIX F: TEST PIT LOGS

Geological Borelog



LOCATION: Mimosa Park, 22 Box Road, Casula NSW		Borehole Log: TP1	Logged by: KA
SURFACE ELEVATION: N/A	JOB NUMBER: 121070		
GROUNDWATER: Not encountered	DATUM:	PROJECT: Mimosa Park DSI	Proj. Manager: LD
DRILL METHOD: Mechanical Excavation	DATE DRILLED: 17/09/2021		

STRATIGRAPHY	GRAPHIC LOG	Depth (metres)	Sample Depth	Sample ID	Moisture Content	Comments
FILL Soft, brown CLAY with very minor trace inclusions of concrete, terracotta tile and glass fragments.		0.2 0.4		TP1_0.3	D	
NATURAL Firm, red CLAY with pale grey mottles and minor inclusions of dark grey shale gravels.		0.6 0.8			D	
NATURAL Brown, firm CLAY with 60 % shale cobbles and boulders		1.0 1.2 1.4 1.6 1.8				
EOH @ 1.8 mBGL		1.8				
		2.0				

NOTE: This bore log is for environmental purposes only and is not intended to provide geotechnical information.

Geological Borelog



LOCATION: Mimosa Park, 22 Box Road, Casula NSW		Borehole Log: TP2	Logged by: KA
SURFACE ELEVATION: N/A	JOB NUMBER: 121070		
GROUNDWATER: Not encountered	DATUM:	PROJECT: Mimosa Park DSI	Proj. Manager: LD
DRILL METHOD: Mechanical Excavation	DATE DRILLED: 17/09/2021		

STRATIGRAPHY	GRAPHIC LOG	Depth (metres)	Sample Depth	Sample ID	Moisture Content	Comments
FILL Soft, brown CLAY with very minor trace inclusions of concrete and terracotta tile fragments.		0.2 0.4		TP2_0.3	D	
NATURAL Firm, red/ orange and pale grey mottled CLAY.		0.6 0.8 1.0			D	
NATURAL Firm, grey and beige mottled CLAY with 50 % dark grey shale cobbles.		1.2 1.4			D	
EOH @ 1.5 mBGL		1.6 1.8 2.0				

NOTE: This bore log is for environmental purposes only and is not intended to provide geotechnical information.

Geological Borelog



LOCATION: Mimosa Park, 22 Box Road, Casula NSW		Borehole Log: TP3	Logged by: KA
SURFACE ELEVATION: N/A	JOB NUMBER: 121070	PROJECT: Mimosa Park DSI	Proj. Manager: LD
GROUNDWATER: Not encountered	DATUM:		
DRILL METHOD: Mechanical Excavation	DATE DRILLED: 17/09/2021		

STRATIGRAPHY	GRAPHIC LOG	Depth (metres)	Sample Depth	Sample ID	Moisture Content	Comments
FILL Soft, brown CLAY with grey shale cobbles (~5%) and minor trace inclusions of concrete and terracotta tile fragments, one metal rod and a metal wire.		0.2 0.4		TP3_0.4	D	Domestic refuse and minor building rubble including bricks and concrete cobbles visible along western site boundary.
NATURAL Firm, brown CLAY with 30% dark grey shale gravels and cobbles.		0.6 0.8 1.0			D	
NATURAL Firm, brown and pale grey CLAY with red mottles. Minor inclusions of grey shale cobbles.		1.2 1.4			D	
NATURAL Dark grey and brown shale cobbles and boulders.						
EOH @ 1.5 mBGL		1.6 1.8 2.0				

NOTE: This bore log is for environmental purposes only and is not intended to provide geotechnical information.

Geological Borelog



LOCATION: Mimosa Park, 22 Box Road, Casula NSW		Borehole Log: TP4	Logged by: KA
SURFACE ELEVATION: N/A	JOB NUMBER: 121070		
GROUNDWATER: Not encountered	DATUM:	PROJECT: Mimosa Park DSI	Proj. Manager: LD
DRILL METHOD: Mechanical Excavation	DATE DRILLED: 17/09/2021		

STRATIGRAPHY	GRAPHIC LOG	Depth (metres)	Sample Depth	Sample ID	Moisture Content	Comments
FILL Soft brown CLAY with 5% grey shale cobbles and singular inclusion of glass fragment and one concrete cobble.		0.2		TP4_0.2	D	
NATURAL Very firm, red CLAY with minor pale grey mottles.		0.4				
		0.6				
		0.8			D	
NATURAL Very firm, red CLAY with pale grey mottles and grey shale cobbles increasing with depth.		1.0				
EOH @ 1.0 mBGL						
		1.2			D	
		1.4				
		1.6				
		1.8				
		2.0				

NOTE: This bore log is for environmental purposes only and is not intended to provide geotechnical information.

Geological Borelog



LOCATION: Mimosa Park, 22 Box Road, Casula NSW		Borehole Log: TP5	Logged by: KA
SURFACE ELEVATION: N/A	JOB NUMBER: 121070		
GROUNDWATER: Not encountered	DATUM:	PROJECT: Mimosa Park DSI	Proj. Manager: LD
DRILL METHOD: Mechanical Excavation	DATE DRILLED: 17/09/2021		

STRATIGRAPHY	GRAPHIC LOG	Depth (metres)	Sample Depth	Sample ID	Moisture Content	Comments
FILL Soft brown CLAY with ~5% grey shale cobbles and singular inclusion of rusty metal ribbon (length: ~20 cm)		0.2		TP5_0.2	D	
NATURAL Very firm, orange and pale grey mottled CLAY with black and dark grey shale gravels.		0.4				
		0.6				
		0.8			D	
NATURAL Firm, grey CLAY with ~50% dark grey shale gravels and cobbles.		1.0				
EOH @ 1.0 mBGL						
		1.2			D	
		1.4				
		1.6				
		1.8				
		2.0				

NOTE: This bore log is for environmental purposes only and is not intended to provide geotechnical information.

Geological Borelog



LOCATION: Mimosa Park, 22 Box Road, Casula NSW		Borehole Log: TP6	Logged by: KA
SURFACE ELEVATION: N/A	JOB NUMBER: 121070		
GROUNDWATER: Not encountered	DATUM:	PROJECT: Mimosa Park DSI	Proj. Manager: LD
DRILL METHOD: Mechanical Excavation	DATE DRILLED: 17/09/2021		

STRATIGRAPHY	GRAPHIC LOG	Depth (metres)	Sample Depth	Sample ID	Moisture Content	Comments
FILL Firm, brown CLAY with minor trace inclusion of brick fragments and singular plastic fragment.		0.2		TP6_0.1	D	
NATURAL Firm, brown CLAY with brown and grey shale cobbles (20%)		0.4			D	
NATURAL Firm, grey CLAY with ~50% dark grey shale gravels and cobbles.		0.6				
NATURAL Firm, brown and orange CLAY with ~60% brown and grey shale cobbles and boulders.		0.8			D	
EOH @ 0.9 mBGL		1.0				
		1.2				
		1.4				
		1.6				
		1.8				
		2.0				

NOTE: This bore log is for environmental purposes only and is not intended to provide geotechnical information.

Geological Borelog



LOCATION: Mimosa Park, 22 Box Road, Casula NSW		Borehole Log: TP7	Logged by: KA
SURFACE ELEVATION: N/A	JOB NUMBER: 121070		
GROUNDWATER: Not encountered	DATUM:	PROJECT: Mimosa Park DSI	Proj. Manager: LD
DRILL METHOD: Mechanical Excavation	DATE DRILLED: 17/09/2021		

STRATIGRAPHY	GRAPHIC LOG	Depth (metres)	Sample Depth	Sample ID	Moisture Content	Comments
FILL Soft, brown CLAY with ~5% grey shale cobbles with singular tile fragment.		0.2		TP7_0.2	D	
NATURAL Firm, brown CLAY with ~5% black / dark grey shale gravels.		0.4			D	
NATURAL Firm, brown and grey CLAY with ~70% grey and brown shale cobbles and boulders.		0.6				
		0.8			D	
		1.0				
EOH @ 1.0 mBGL						
		1.2				
		1.4				
		1.6				
		1.8				
		2.0				

NOTE: This bore log is for environmental purposes only and is not intended to provide geotechnical information.

Geological Borelog



LOCATION: Mimosa Park, 22 Box Road, Casula NSW		Borehole Log: TP8	Logged by: KA
SURFACE ELEVATION: N/A	JOB NUMBER: 121070		
GROUNDWATER: Not encountered	DATUM:	PROJECT: Mimosa Park DSI	Proj. Manager: LD
DRILL METHOD: Mechanical Excavation	DATE DRILLED: 17/09/2021		

STRATIGRAPHY	GRAPHIC LOG	Depth (metres)	Sample Depth	Sample ID	Moisture Content	Comments
FILL Soft, brown CLAY with minor trace inclusions of brick and terracotta fragments.		0.2		TP8_0.15	D	
NATURAL Stiff red CLAY with minor pale yellow mottles.		0.4			D	
		0.6				
NATURAL Firm, brown CLAY with ~75% black / dark grey shale cobbles / boulders		0.8			D	
		1.0				
		1.2				
EOH @ 1.2 mBGL						
		1.4				
		1.6				
		1.8				
		2.0				

NOTE: This bore log is for environmental purposes only and is not intended to provide geotechnical information.

Geological Borelog



LOCATION: Mimosa Park, 22 Box Road, Casula NSW		Borehole Log: TP9	Logged by: KA
SURFACE ELEVATION: N/A	JOB NUMBER: 121070		
GROUNDWATER: Not encountered	DATUM:	PROJECT: Mimosa Park DSI	Proj. Manager: LD
DRILL METHOD: Mechanical Excavation	DATE DRILLED: 17/09/2021		

STRATIGRAPHY	GRAPHIC LOG	Depth (metres)	Sample Depth	Sample ID	Moisture Content	Comments
FILL Soft, brown CLAY with brown, black and dark grey shale gravels and cobbles.		0.2		TP9_0.15	D	
NATURAL Firm, orange, brown and grey mottled CLAY with ~10% black shale gravels and cobbles.		0.4			D	
Firm, brown CLAY with ~40% dark grey shale gravels and cobbles.		0.6			D	
NATURAL Firm, brown CLAY with ~70% dark grey shale cobbles.		0.8			D	
		1.0				
		1.2				
EOH @ 1.3 mBGL						
		1.4				
		1.6				
		1.8				
		2.0				

NOTE: This bore log is for environmental purposes only and is not intended to provide geotechnical information.

Geological Borelog



LOCATION: Mimosa Park, 22 Box Road, Casula NSW		Borehole Log: TP10	Logged by: KA
SURFACE ELEVATION: N/A	JOB NUMBER: 121070		
GROUNDWATER: Not encountered	DATUM:	PROJECT: Mimosa Park DSI	Proj. Manager: LD
DRILL METHOD: Mechanical Excavation	DATE DRILLED: 17/09/2021		

STRATIGRAPHY	GRAPHIC LOG	Depth (metres)	Sample Depth	Sample ID	Moisture Content	Comments
FILL Firm brown CLAY with ~30% black shale gravels.				TP10_0.05	D	
NATURAL Firm, brown CLAY with ~50% black shale gravels and cobbles.		0.2			D	
		0.4			D	
~80% dark grey shale cobbles and boulders with <20% brown clay.		0.6				
		0.8			D	
EOH @ 0.9 mBGL						
		1.0				
		1.2				
		1.4				
		1.6				
		1.8				
		2.0				

NOTE: This bore log is for environmental purposes only and is not intended to provide geotechnical information.



APPENDIX G: QUALITY ASSURANCE / QUALITY CONTROL



TABLE OF CONTENTS

1	INTRODUCTION AND BACKGROUND.....	2
1.1	INTRODUCTION	2
1.2	BACKGROUND	3
2	DATA QUALITY OBJECTIVES	4
3	QUALITY CONTROL AND QUALITY ASSURANCE	6
3.1	MEASUREMENT DATA QUALITY OBJECTIVES	6
3.2	FIELD QA/QC	7
3.2.1	Details of sampling team	7
3.2.2	Sampling controls	7
3.3	LABORATORY QA/QC	10
3.3.1	Holding times	10
3.3.2	Limits of reporting	10
3.4	QA/QC DATA EVALUATION	10
4	QA/QC APPENDIX REFERENCES	11

Tables

Table 1: Data quality objectives

Table 2: Measurement data quality indicators (MDQIS)

Table 3: Field intra and inter duplicate results



1 INTRODUCTION AND BACKGROUND

1.1 Introduction

The aim of quality control and quality assurance (QA/QC) is to deliver data that is:

- representative of what is sampled;
- precise;
- accurate; and
- reproducible.

As investigations involve both field and laboratory QA/QC, these are similarly divided. The objective of this document is to evaluate and identify the data quality objectives (DQOs) and the data quality indicators (DQIs), which are used to assess whether the DQOs have been met.

All soil sampling procedures to be followed are described in full in our Soil, gas and groundwater sampling manual (Environmental Earth Sciences Pty Ltd 2011). This document should be referred to for field procedures for sampling and conveyance. Copies are available for inspection if required.

The NSW guideline documents used in the evaluation of the data set for this investigation are:

- National Environment Protection Council (NEPC) (2013) - *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013)* (ASC NEPM, 2013).
- NSW EPA (2017). *Contaminated Land Management: Guidelines for NSW Site Auditor Scheme (3rd edition)*.
- NSW Environment Protection Authority (EPA) (1995). *Contaminated Sites: Sampling design guidelines*.
- NSW EPA (2020). *Contaminated Land: Guidelines: Consultants Reporting on Contaminated Sites*.
- Standards Australia (1999). Guide to the investigation and sampling of sites with potentially contaminated soil, Part 2: Volatile substances (AS4482.2).
- Standards Australia (2005). Guide to the investigation and sampling of sites with potentially contaminated soil, Part 1: Non-volatile and semi-volatile compounds (AS 4482.1).

Data quality is typically discussed in terms of precision, accuracy, representativeness, comparability and completeness. These are referred to as the PARCC parameters. The PARCC (and additional QA) parameters are discussed within this report.



The following items form part of the QA/QC appendix:

- repeatability;
- precision;
- accuracy;
- representativeness;
- completeness;
- comparability;
- sensitivity;
- holding times;
- blanks; and
- procedures for anomalous samples and confirmation checking.

1.2 Background

Quality Assurance (QA) is “a set of activities intended to establish confidence that quality requirements will be met” (AS/NZS ISO 9000:2005).

This encompasses all actions, procedures, checks and decisions undertaken to ensure the accuracy and reliability of analysis results. It includes routine procedures which ensure proper sample control, data transfer, instrument calibration, the decisions required to select and properly train staff, select equipment and analytical methods, and the day-to-day judgements resulting from regular scrutiny and maintenance of the laboratory system.

Quality Control (QC) is “a set of activities intended to ensure that quality requirements are actually being met” (AS/NZS ISO 9000:2005). In other words, the operational techniques and activities used to fulfil the requirements for quality.

These are the components of QA which serve to monitor and measure the effectiveness of other QA procedures by comparison with previously decided objectives. They include measurement of the quality of reagents, cleanliness of apparatus, accuracy and precision of methods and instrumentation, and reliability of all of these factors as implemented in a given laboratory from day to day.

A complete discussion of either of these terms or the steps for implementing them is beyond the scope of this document. It is widely recognised, however, that adoption of sound laboratory QA and QC procedures is essential and readers are referred to documentation available from the National Association of Testing Authorities (NATA), if further information is required.



2 DATA QUALITY OBJECTIVES

Development of data quality objectives (DQOs) for each project is a requirement of the NEPC (2013). This is based on a DQO process formulated by the USEPA for contaminated land assessment and remediation and provides sound guidance for a consistent approach in understanding site assessment and remediation.

The DQOs are defined in a series of seven steps. **Table 1** outlines the seven steps and refers to the sections of the report which address these quality objectives.

Table 1: Data quality objectives

Step	Description	Comment	Location in main report
1	State the problem	The problem will be addressed directly by scientists from Environmental Earth Sciences NSW. The problem is that the site will be used for future recreational and public use and Liverpool City Council wish to determine if there is the potential for soil contamination to have occurred due to past land uses. The purpose of this investigation is to collect basic site information to identify potential contaminants, potentially affected media and potential areas of contamination by reviewing the site history, physical setting including local geology and hydrogeology and site conditions.	Section 1
2	Identify the decision	A detailed environmental site investigation (DSI) was commissioned to determine if the past or present site activities have adversely impacted the site or environment. If required, Environmental Earth Sciences NSW will provide guidance on actions required to ensure the site becomes suitable for continued or future use.	Sections 1 and 2
3	Identify the inputs for the decision	The study inputs include historical site information including aerial photographs for the site and reference to published guidelines to assist the decision-making process.	Sections 4 and 5
4	Define the boundaries for the study	The site location and physical boundaries are shown on Figure 1 and Figure 2 and defined in the report. The temporal boundary of the project is restricted to the timing of the investigation.	Section 4, Figures 1 and 2
5	Develop a decision rule	All analytical data will be compared and evaluated against appropriate published criteria. The NEPC (2013) will be used as the primary guidance document in decision making on action levels. Dependent upon the sampling and analysis design, statistical parameters such as arithmetic mean, standard deviation and 95% upper confidence limits (95% UCLs) may be applied to designated soil populations for particular analytes. In the event that action levels are exceeded, a management plan, remedial action plan, and/or qualitative risk assessment (with modelling of potential groundwater impacts on the local receiving environment) will be required. These procedures constitute the alternative action plan.	Section 7



Step	Description	Comment	Location in main report
6	Specify tolerable limits on decision error	Acceptable limits for field data analysis (relative percent differences for primary and duplicate results) are between 50 and 150 percent (depending on the origin of the sample and volatility of the chemicals present). Acceptable limits for laboratory duplicate analysis may be affected by the heterogeneity of soil and will be set based on site specific information such as background concentrations. These are summarised in Table 2 as the measurement data quality indicators (MDQIs), which will be used to establish whether the DQOs have been met. Most of the procedures in the Standards Australia AS 4482.1 (2005) <i>Guide to the investigation and sampling of sites with potentially contaminated soil. Part 1: Non-volatile and semi-volatile compounds</i> and NEPC (2013) have risk probabilities associated with allowable error margins incorporated into them. It is therefore proposed that no further "tolerable limits" be investigated at this stage of the project.	Section 7, QA/QC Appendix (G).
7	Optimise the design for obtaining data	The sample design will be undertaken with reference to AS4482.1. As well as a statistically justifiable <i>systematic</i> sampling design, this sampling pattern has also taken into account targeted areas of concern on the site (i.e. <i>judgemental</i> sampling locations). Environmental Earth Sciences NSW believes that the sampling design is optimal considering temporal limitations and access constraints. The density of the sampling pattern and the quality of the data set are suitable for determination of the suitability of the site for its proposed current and future use.	Sections 6

Based on the DQOs the following measurement data quality indicators (MDQIs) are provided in **Table 2** below.

Table 2: Measurement data quality indicators (MDQIS)

Parameter	Procedure	Minimum Frequency	Criteria	
			(5 to 10x LOR ⁴)	>10x LOR
Precision	Field Duplicates	1 in 20 - metals	<80 RPD	<50 RPD
		1 in 20 - semi-volatiles	<100 RPD	<80 RPD
		1 in 20 - volatiles	<150 RPD	<130 RPD
	Lab Replicate*	1 in 20	<50 RPD	<30 RPD
Accuracy*	Reference Material	1 in 10	60% to 140%R	80% to 120%R
	Matrix spikes			
	Surrogate spikes			
Representativeness*	Reagent Blanks	1 per batch	No detection	
	Holding Times*	Every sample	-	
Blanks**	Trip Blank	1 per batch	No detection	
	Rinsate Blanks			
Sensitivity	Limit of Reporting	Every sample	LOR < ½ site criteria	

**Notes:**

1. RPD – relative percentage difference;
2. %R – percent recovery;
3. LOR – limit of reporting;
4. no limit at <5x LOR;
5. * the MDQI is usually specified in the standard method. If not, use the default values set out in this table; and
6. ** only necessary when measuring dissolved metals and volatile organic compounds in water samples.

It should be noted that Standards Australia (AS4482.1) specify that typical MDQIs for precision should be $\leq 50\%$ RPD, however also acknowledge that low concentrations and organic compounds in particular can be acceptably outside this range. The standard suggests that $\leq 50\%$ RPD be used as a 'trigger' and values above this level of repeatability need to be noted and explained.

Our adopted MDQIs for precision acknowledge the intrinsic heterogeneity of metal and semi volatile chemical concentrations in disturbed soil that may potentially cause large variations in results between laboratory subsamples (although all efforts are made to homogenise non-volatile duplicate samples). Similarly, large variations in volatile chemical concentrations between duplicates may be unavoidable even when using best practice sampling methodology, especially as we seek to minimise the disturbance to the sample while splitting it which means a high degree of inherent heterogeneity is expected.

As such, our adopted RPD criteria are considered to be a suitable measure for the reproducibility of results within a naturally heterogeneous media such as soil. A $\leq 50\%$ RPD trigger value will be used, with any exceedance discussed and assessed for acceptability.

3 QUALITY CONTROL AND QUALITY ASSURANCE

3.1 Measurement data quality objectives

Step 7 of the DQO process (**Section 2.0**) is a focus on the quality of the information by measurement, that is, measurement data quality objectives (MDQOs). The aim of a quality control and quality assurance (QA/QC) is to deliver data that is representative of what is sampled, precise, accurate and reproducible. As investigations involve both field and laboratory QA/QC, these are similarly divided. The objective of this section is to provide the MDQOs and the measurement data quality indicators (MDQIs), which will be used to establish whether the DQOs have been met.

All surface water, groundwater and soil sampling procedures need to be undertaken according to a standard procedure, for example those procedures set out in:

- NSW Environment Protection Authority (EPA) (1995). *Contaminated sites: Sampling design guidelines*;
- NSW EPA (2020). *Contaminated Land Guidelines: Consultants reporting on contaminated sites*;



- Standards Australia (1999). Guide to the investigation and sampling of sites with potentially contaminated soil, Part 2: Volatile substances, (AS 4482.2). Homebush, NSW; and
- Standards Australia (2005). Guide to the investigation and sampling of sites with potentially contaminated soil, Part 1: Non-volatile and semi-volatile compounds, (AS 4482.1). Homebush, NSW

3.2 Field QA/QC

3.2.1 Details of sampling team

Fieldwork was conducted on 17 September 2021 by a competent environmental scientist.

3.2.2 Sampling controls

Decontamination procedures carried out between sampling events included the following.

All sampling equipment that was re-used which came into contact with soil samples, were thoroughly washed with detergent (Decon 90 or similar) water, then rinsed with clean water and dried before the collection of each sample. Any items accidentally contaminated were similarly washed before re-use.

Soil samples were collected from soil profiles removed from excavator bucket. New nitrile gloves were used at each sampling location. During this process the field scientist would also determine the colour and texture of the soil sample.

Sample notation details

The chemical analyses performed on each sample are presented on the chain of custody documentation (**Appendix I**) which also identified for each sample – the sampler, nature of the sample, collection date, analyses to be performed, sample preservation method (if any), departure time from the site and dispatch courier.

Site observations and weather conditions during sampling are described in **Sections 5.5** and **7.1** of the main report. Primary and intra (blind) duplicate samples for this project was completed by ALS.

Intra (blind) duplicate sampling

The intra (blind) duplicate sample was collected at a rate of one duplicate per twenty samples collected (5%). For this project one intra (blind) duplicate sample was collected for analysis. The summary of the relative percentage differences (RPDs) of the collected intra duplicate sample is presented in **Table 3**.

Duplicate samples were split evenly distributing the soil sample between two clean glass jars. The field scientists typically attempt to disturb soils as little as possible.

The scope of this project did not include analysis of trip and field blanks, background samples, rinsate samples or laboratory prepared trip spikes for the soil sampling program.



3.3 Field Duplicate RPD assessment

Analysis of the relative percentage difference (RPD) between the field duplicate and a primary sample resulted in strong agreement between the samples with all values below measurement data quality indicators (MDQIS) RPD thresholds or below the laboratory's level of reporting.

Table 3: Calculable RPDs

Sample ID	TP10	FD1	RPD %
Sample Date	17/09/2021	17/09/2021	
Analyte group/ Analyte			
Heavy metals			
Arsenic	<5	<5	NC
Cadmium	<1	<1	NC
Chromium	12	14	15.39
Copper	36	41	12.99
Lead	14	14	0
Nickel	18	19	48.28
Zinc	76	69	9.66
Mercury	<0.1	<0.1	NC
Total Petroleum Hydrocarbons			
C6 - C9 Fraction	<10	<10	NC
C10 - C14 Fraction	<50	<50	NC
C15 - C28 Fraction	<100	<100	NC
C29 - C36 Fraction	<100	<100	NC
C10 - C36 Fraction (sum)	<50	<50	NC
Total Recoverable Hydrocarbons			
C6 - C10 Fraction	<10	<10	NC
C6 - C10 Fraction minus BTEX (F1)	<10	<10	NC
>C10 - C16 Fraction	<50	<50	NC
>C16 - C34 Fraction	<100	<100	NC
>C34 - C40 Fraction	<100	<100	NC
>C10 - C40 Fraction (sum)	<50	<50	NC
>C10 - C16 Fraction minus Naphthalene (F2)	<50	<50	NC



Sample ID	TP10	FD1	RPD %
Sample Date	17/09/2021	17/09/2021	
Analyte group/ Analyte			
BTEX			
Benzene	<0.2	<0.2	NC
Toluene	<0.5	<0.5	NC
Ethylbenzene	<0.5	<0.5	NC
meta- & para-Xylene	<0.5	<0.5	NC
ortho-Xylene	<0.5	<0.5	NC
Total Xylenes	<0.5	<0.5	NC
Sum of BTEX	<0.2	<0.2	NC

Notes:

- Values heightened in green are within acceptable RPD limits as outlined in **Table 2**.



3.4 Laboratory QA/QC

Laboratory analysis of primary and intra (blind) duplicate samples for this project were completed by ALS and SAL, who are accredited by NATA for the methods used, details of this accreditation can be viewed at <http://www.nata.asn.au/>, while details of the samples sent to each laboratory and the analysis requested are contained in the chain of custody documentation held in **Appendix I**. The analytical methods are noted on the laboratory transcripts.

3.4.1 Holding times

The collection date of samples, laboratory extraction date and allowable holding times are presented in the laboratory quality reports. All analysis was completed within the allowable holding times.

3.4.2 Limits of reporting

Acceptable limits of reporting (LOR) were mostly provided by the analytical laboratory to allow the results to be compared against the soil investigation levels with the exception of few analytes (list analytes) that were considered not be a chemical of concern.

3.5 QA/QC data evaluation

The general “rule of thumb” is that one intra-laboratory duplicate samples should be taken for every 20 samples taken (5%). The relative percentage differences (RPD) of the primary and duplicate sample for all contaminants were reported within the accepted ranges (refer to **Table 2** in this appendix). An assessment of the data collected indicated that appropriate rate of QA/QC samples were collected as part of the fieldwork program.

Field observations and measurements are comparable to laboratory data. The presence (and absence) of odours noted by olfactory senses correspond to the detected concentration of volatile chemicals at those locations.

Extraction and analysis of samples were all within the relevant prescribed holding times. The internal laboratory control results (blanks, duplicates and spikes) are considered to be acceptable.



4 QA/QC APPENDIX REFERENCES

American Public Health Association (APHA) 2012, *Standard methods for the examination of water and waste-water*, 22nd edition, APHA, Washington DC.

Australian/New Zealand Standard (AS/NZS) 2008, *Quality management systems - Requirements (AS/NZS ISO 9001:2008)*, Standards Australia/Standards New Zealand, Sydney/Wellington.

Environmental Earth Sciences Pty Ltd 2011, *Soil, gas and groundwater sampling manual*, 7th Edition (Unpublished).

International Organisation for Standardisation 2005, *Quality management systems – Fundamentals and vocabulary* (ISO 9000:2005).

National Environment Protection Council (NEPC) (2013) – *National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013)* (ASC NEPM, 2013).

NSW EPA (1995) — *Contaminated sites: Sampling Design Guidelines* (EPA, 1995) (the “Sampling Design Guidelines”).

NSW EPA (2017) — *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme 3rd Edition* (the “Site Auditor Guidelines”).

NSW EPA (2020) – *Contaminated Land Guidelines: Consultants Reporting on Contaminated Land*.

Rayment, GE and Lyon, DJ 2011, *Soil chemical methods – Australasia*, CSIRO Publishing.

Rayment, GE and Higginson, FR 1992, *Australian laboratory handbook of soil and water chemical methods*, Inkarta Press, Melbourne.

Standards Australia 1999, *Guide to the investigation and sampling of sites with potentially contaminated soil*, Part 2: Volatile substances (AS4482.2).

Standards Australia 2005, *Guide to the investigation and sampling of sites with potentially contaminated soil*, Part 1: Non-volatile and semi-volatile compounds (AS 4482.1).



APPENDIX H: RESULTS SUMMARY TABLE



Table A: Laboratory Results Summary Table - Beneficial re-use

Location: Sample Date:						Mimosa Park, Box Road, Casula							
						TP1_0.3	TP3_0.4	TP5_0.2	TP6_0.1	TP7_0.2	TP8_0.15	TP10_0.05	
						17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	17/09/2021	
Analyte Group / Name	Units	LOR	HIL C	HSL C (Asbestos)	HSL C (Vapour)								
Asbestos													
Asbestos presence / absence	Yes/No	-	---	No visible asbestos on the ground surface	---	No	No	No	No	No	No	No	
Asbestos present as free fibres	Yes/No	-	---	---	---	No	No	No	No	No	No	No	
Moisture Content													
Moisture Content	%	1	---	---	---	11.9	11.1	11.5	10	13.8	8.2	8.7	
BTEX													
Benzene	mg/kg	0.2	---	---	3000	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Toluene	mg/kg	0.5	---	---	NL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Ethylbenzene	mg/kg	0.5	---	---	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
meta- & para-Xylene	mg/kg	0.5	---	---	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
ortho-Xylene	mg/kg	0.5	---	---	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Total Xylenes	mg/kg	0.5	---	---	NL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Sum of BTEX	mg/kg	0.2	---	---	---	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Metals													
Arsenic	mg/kg	5	300	---	---	6	<5	<5	5	<5	<5	<5	
Cadmium	mg/kg	1	90	---	---	<1	<1	<1	<1	<1	<1	<1	
Chromium	mg/kg	2	300	---	---	17	11	13	15	14	12	12	
Copper	mg/kg	5	17,000	---	---	30	36	37	33	30	21	36	
Lead	mg/kg	5	600	---	---	20	18	13	14	16	11	14	
Mercury	mg/kg	0.1	80	---	---	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
Nickel	mg/kg	2	1200	---	---	11	15	18	16	13	11	18	
Zinc	mg/kg	5	30,000	---	---	51	70	73	73	58	43	76	
PAH													
Naphthalene	mg/kg	0.5	---	---	NL	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Acenaphthylene	mg/kg	0.5	---	---	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Acenaphthene	mg/kg	0.5	---	---	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Fluorene	mg/kg	0.5	---	---	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Phenanthrene	mg/kg	0.5	---	---	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Anthracene	mg/kg	0.5	---	---	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Fluoranthene	mg/kg	0.5	---	---	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Pyrene	mg/kg	0.5	---	---	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Benzo(a)anthracene	mg/kg	0.5	---	---	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Chrysene	mg/kg	0.5	---	---	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Benzo(b)fluoranthene	mg/kg	0.5	---	---	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Benzo(k)fluoranthene	mg/kg	0.5	---	---	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Benzo(a)pyrene	mg/kg	0.5	3	---	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Indeno(1,2,3-cd)pyrene	mg/kg	0.5	---	---	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Dibenzo(a,h)anthracene	mg/kg	0.5	---	---	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Benzo(g,h,i)perylene	mg/kg	0.5	---	---	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Sum of polycyclic aromatic hydrocarbons	mg/kg	0.5	300	---	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Benzo(a)pyrene TEQ (zero)	mg/kg	0.5	3	---	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Benzo(a)pyrene TEQ (half LOR)	mg/kg	0.5	3	---	---	0.6	0.6	0.6	0.6	0.6	0.6	0.6	
Benzo(a)pyrene TEQ (LOR)	mg/kg	0.5	3	---	---	1.2	1.2	1.2	1.2	1.2	1.2	1.2	
TPH Fractions													
C6 - C9 Fraction	mg/kg	10	---	---	---	<10	<10	<10	<10	<10	<10	<10	
C10 - C14 Fraction	mg/kg	50	---	---	---	<50	<50	<50	<50	<50	<50	<50	
C15 - C28 Fraction	mg/kg	100	---	---	---	<100	<100	<100	<100	<100	<100	<100	
C29 - C36 Fraction	mg/kg	100	---	---	---	<100	<100	<100	<100	<100	<100	<100	
C10 - C36 Fraction (sum)	mg/kg	50	---	---	---	<50	<50	<50	<50	<50	<50	<50	
TRI - NEPM 2013 Fractions													
C6 - C10 Fraction	mg/kg	10	---	---	---	<10	<10	<10	<10	<10	<10	<10	
C6 - C10 Fraction minus BTEX (F1)	mg/kg	10	---	---	NL	<10	<10	<10	<10	<10	<10	<10	
<C10 - C16 Fraction	mg/kg	50	---	---	---	<50	<50	<50	<50	<50	<50	<50	
<C16 - C34 Fraction	mg/kg	100	---	---	---	<100	<100	<100	<100	<100	<100	<100	
<C34 - C40 Fraction	mg/kg	100	---	---	---	<100	<100	<100	<100	<100	<100	<100	
<C10 - C40 Fraction (sum)	mg/kg	50	---	---	---	<50	<50	<50	<50	<50	<50	<50	
<C10 - C16 Fraction minus Naphthalene (F2)	mg/kg	50	---	---	NL	<50	<50	<50	<50	<50	<50	<50	

Notes:

LOR: Limit Of Reporting

HIL C: Health Investigation Level for open space / recreational land use scenario "C" (ASC NEPM, 2013)

HSL C: Health Screening levels for open space / recreational land use scenario "C" (ASC NEPM, 2013)

denotes friable asbestos as soft fibre plaster and/ or highly weathered ACM that will easily crumble.

* denotes loose fibres of relevant asbestos types detected in soil/dust.

**No criteria for loose fibres within soil (only friable or asbestos fines which must be gravimetrically analysed)



APPENDIX I: LABORATORY TRANSCRIPTS AND CHAIN-OF-CUSTODY DOCUMENTATION

CHAIN OF CUSTODY - ANALYSIS REQUEST FORM

Project Manager: LD

Sampler: KA

Job No: 121070

Laboratory: ALS

Site Location: Box Rd, Casula

Sheet: 1 of 1

No. of samples	Sample ID/Depth	Anticipated Result (PID)/EC reading	Date sampled	Time sampled	Sample Matrix			Analysis Required	Sample-specific instructions/notes
					Soil	Water	Sediment		
1	TP1-0.3		17/9/21						
2	TP3-0.4								
3	TP5-0.2								
4	TP6-0.1								
5	TP2-0.2								
6	TP8-0.15								
7	TP10-0.05								
8	FD1								
9	TP1-0.7								
10	TP6-0.5								
11	TP5-0.5								
TOTAL									

Environmental Division
Sydney
Work Order Reference
ES2133888



Telephone: +61-2-8784 8551

Turn Around (circle): **NORMAL / 3 DAYS / 48 HRS / 24 HRS** (confirm with lab in advance if quick turn-around is required)

Lab Quotation No. (if applicable):

Comments/Instructions:

Send report to (email address): kazzam@eesigroup.com
Cc: report to (email address): test@eesigroup.com
Cc: invoice to (email address): accounts@eesigroup.com

ENVIRONMENTAL EARTH SCIENCES
CONTAMINATION RESOLVED
Phone: (02) 9922 1777
Fax: (02) 9922 1010
PO Box 380 North Sydney NSW 2059
Email: eesnsw@eesigroup.com

Name: Karin Azzam
Signature: [Signature]
Date: 17/9/21
Time: 2pm

Sent off Site/Office by:
Receiving Lab:
Receiving Lab:



Environmental

SAMPLE RECEIPT NOTIFICATION (SRN)

Work Order : ES2133888
Amendment : 1

Client : ENVIRONMENTAL EARTH SCIENCES
Contact : LACHLAN DESAILLY
Address : PO 380 North Sydney
2056

Laboratory : Environmental Division Sydney
Contact : Christopher Redford
Address : 277-289 Woodpark Road Smithfield
NSW Australia 2164

E-mail : LDesailly@eesigroup.com
Telephone : ----
Facsimile : ----

E-mail : Christopher.Redford@ALSGlobal.com
Telephone : +61 2 8784 8555
Facsimile : +61-2-8784 8500

Project : 121070
Order number : ----
C-O-C number : ----
Site : BOX RD, CASULA
Sampler : KARIN AZZAM

Page : 1 of 2
Quote number : ES2020ENVEAR0009 (EN/010/20)
QC Level : NEPM 2013 B3 & ALS QC Standard

Dates

Date Samples Received : 17-Sep-2021 15:00
Client Requested Due Date : 07-Oct-2021

Issue Date : 30-Sep-2021
Scheduled Reporting Date : 07-Oct-2021

Delivery Details

Mode of Delivery : Pickup
No. of coolers/boxes : 1
Receipt Detail :

Security Seal : Not Available
Temperature : 2.6° C
No. of samples received / analysed : 11 / 8

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The laboratory will process these samples unless instructions are received from you indicating you do not wish to proceed. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months ± 1 week) from receipt of samples.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results. Refer to ALS EnviroMail 85 for ALS recommendations of the best practice for chilling samples after sampling and for maintaining a cool temperature during transit.



All comparisons are made against pretreatment/preservation AS. APHA, USEPA standards

- No sample container / preservation non-compliance exists.

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: SOIL

Laboratory sample ID	Sampling date / time	Sample ID	(On Hold No analysis)	SOIL - E Leachate	Moisture	SOIL - S Heavy metals
ES2133888-001	17-Sep-2021 00:00	TP1_0.3		✓		✓
ES2133888-002	17-Sep-2021 00:00	TP3_0.4		✓		✓
ES2133888-003	17-Sep-2021 00:00	TP5_0.2		✓		✓
ES2133888-004	17-Sep-2021 00:00	TP6_0.1		✓		✓
ES2133888-005	17-Sep-2021 00:00	TP7_0.2		✓		✓
ES2133888-006	17-Sep-2021 00:00	TP8_0.15		✓		✓
ES2133888-007	17-Sep-2021 00:00	TP10_0.05		✓		✓
ES2133888-008	17-Sep-2021 00:00	FD1		✓		✓
ES2133888-009	17-Sep-2021 00:00	TP1_0.7	✓			
ES2133888-010	17-Sep-2021 00:00	TP6_0.5	✓			
ES2133888-011	17-Sep-2021 00:00	TP5_0.5	✓			

Sample(s) have been received within the recommended holding times for the requested analysis.

ACCOUNTS EESI GROUP

- A4 - AU Tax Invoice (INV)

Email accounts@eesigroup.com

KARIN AZZAM

- *AU Certificate of Analysis - NATA (COA)

Email kazzam@eesigroup.com

- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)

Email kazzam@eesigroup.com

- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)

Email kazzam@eesigroup.com

- A4 - AU Sample Receipt Notification - Environmental HT (SRN)

Email kazzam@eesigroup.com

- Chain of Custody (CoC) (COC)

Email kazzam@eesigroup.com

- EDI Format - ENMRG (ENMRG)

Email kazzam@eesigroup.com

- EDI Format - ESDAT (ESDAT)

Email kazzam@eesigroup.com

LACHLAN DESAILLY

- *AU Certificate of Analysis - NATA (COA)

Email LDesailly@eesigroup.com

- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI)

Email LDesailly@eesigroup.com

- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC)

Email LDesailly@eesigroup.com

- A4 - AU Sample Receipt Notification - Environmental HT (SRN)

Email LDesailly@eesigroup.com

- Chain of Custody (CoC) (COC)

Email LDesailly@eesigroup.com

- EDI Format - ENMRG (ENMRG)

Email LDesailly@eesigroup.com

- EDI Format - ESDAT (ESDAT)

Email LDesailly@eesigroup.com



CERTIFICATE OF ANALYSIS

Work Order	: ES2133888	Page	: 1 of 9
Amendment	: 1		
Client	: ENVIRONMENTAL EARTH SCIENCES	Laboratory	: Environmental Division Sydney
Contact	: LACHLAN DESAILLY	Contact	: Christopher Redford
Address	: PO 380 North Sydney 2056	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: ----	Telephone	: +61 2 8784 8555
Project	: 121070	Date Samples Received	: 17-Sep-2021 15:00
Order number	: ----	Date Analysis Commenced	: 21-Sep-2021
C-O-C number	: ----	Issue Date	: 06-Oct-2021 12:35
Sampler	: KARIN AZZAM		
Site	: BOX RD, CASULA		
Quote number	: EN/010/20		
No. of samples received	: 11		
No. of samples analysed	: 8		



Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW



Page : 2 of 9
Work Order : ES2133888 Amendment 1
Client : ENVIRONMENTAL EARTH SCIENCES
Project : 121070

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

Λ = This result is computed from individual analyte detections at or above the level of reporting

Ø = ALS is not NATA accredited for these tests.

~ = Indicates an estimated value.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+f) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1,2,3-cd)pyrene (0.1), Dibenz(a,h)anthracene (1.0), Benzo(g,h,i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.
- EG005T: Poor precision was obtained for Mn on sample ES2133888 #4. Confirmed by re-digestion and reanalysis.
- Amendment (30/09/2021): This report has been amended and re-released to allow the reporting of additional analytical data as per Lachlan Desailly to sample FD1.



Page : 3 of 9
Work Order : ES2133888 Amendment 1
Client : ENVIRONMENTAL EARTH SCIENCES
Project : 121070

Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID						
Compound	CAS Number	Sampling date / time		TP1_0.3	TP3_0.4	TP5_0.2	TP6_0.1	TP7_0.2		
		LOR	Unit						Result	Result
EA055: Moisture Content (Dried @ 105-110°C)										
Moisture Content	----	1.0	%	11.9	11.1	11.5	10.0	13.8		
EG005(ED093)T: Total Metals by ICP-AES										
Arsenic	7440-38-2	5	mg/kg	6	<5	<5	5	<5		
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1		
Chromium	7440-47-3	2	mg/kg	17	11	13	15	14		
Copper	7440-50-8	5	mg/kg	30	36	37	33	30		
Lead	7439-92-1	5	mg/kg	20	18	13	14	16		
Nickel	7440-02-0	2	mg/kg	11	15	18	16	13		
Zinc	7440-66-6	5	mg/kg	51	70	73	73	58		
EG035T: Total Recoverable Mercury by FIMS										
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1		
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons										
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5		
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5		
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5		
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5		
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5		
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5		
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5		
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5		
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5		
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5		
Benz(b+)]fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5		
Benz(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5		
Benz(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5		
Indeno(1,2,3-cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5		
Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5		
Benz(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5		
^ Sum of polycyclic aromatic hydrocarbons			----	0.5	mg/kg	<0.5	<0.5	<0.5		
^ Benz(a)pyrene TEQ (zero)			----	0.5	mg/kg	<0.5	<0.5	<0.5		
^ Benz(a)pyrene TEQ (half LOR)			----	0.5	mg/kg	0.6	0.6	0.6		
^ Benz(a)pyrene TEQ (LOR)			----	0.5	mg/kg	1.2	1.2	1.2		
EP080/071: Total Petroleum Hydrocarbons										
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10		



Page : 4 of 9
Work Order : ES2133888 Amendment 1
Client : ENVIRONMENTAL EARTH SCIENCES
Project : 121070

Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Compound	CAS Number	LOR	Sampling date / time	Unit	TP1_0.3	TP3_0.4	TP5_0.2	TP6_0.1	TP7_0.2
					Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued									
C10 - C14 Fraction	---	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	---	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	---	100	mg/kg		<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	---	50	mg/kg		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10	<10
>C10 - C16 Fraction	---	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	---	100	mg/kg		<100	<100	<100	<100	<100
>C34 - C40 Fraction	---	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	---	50	mg/kg		<50	<50	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	---	50	mg/kg		<50	<50	<50	<50	<50
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	---	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	---	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg		<1	<1	<1	<1	<1
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		88.2	84.8	82.8	85.8	78.0
2-Chlorophenol-D4	93951-73-6	0.5	%		89.1	85.1	83.2	86.1	78.8
2,4,6-Tribromophenol	118-79-6	0.5	%		72.4	64.8	64.8	68.6	61.4
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		99.9	96.5	93.4	95.6	88.1
Anthracene-d10	1719-06-8	0.5	%		100	96.8	94.4	96.6	88.1
4-Terphenyl-d14	1718-51-0	0.5	%		86.5	83.4	81.1	83.2	76.0
EP080S: TPH(V)BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		109	108	107	108	99.8
Toluene-D8	2037-26-5	0.2	%		80.9	80.8	81.2	81.4	88.5



Page : 5 of 9
 Work Order : ES2133888 Amendment 1
 Client : ENVIRONMENTAL EARTH SCIENCES
 Project : 121070

Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Compound	CAS Number	LOR	Sample ID		Unit	Sampling date / time	TP1_0.3	TP3_0.4	TP5_0.2	TP6_0.1	TP7_0.2
4-Bromofluorobenzene	460-00-4	0.2	%			17-Sep-2021 00:00	ES2133888-001	ES2133888-002	ES2133888-003	ES2133888-004	ES2133888-005
EP080S: TPH(V)/BTEX Surrogates - Continued							Result	Result	Result	Result	Result
							78.9	78.9	77.9	77.9	80.4



Page : 6 of 9
Work Order : ES2133888 Amendment 1
Client : ENVIRONMENTAL EARTH SCIENCES
Project : 121070

Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Sub-Matrix: SOIL (Matrix: SOIL)		Sample ID		TP8_0.15	TP10_0.05	FD1		
Sampling date / time		Unit						
Compound	CAS Number			LOR		Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content		---	%	8.2	8.7	9.0		
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5		
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1		
Chromium	7440-47-3	2	mg/kg	12	12	14		
Copper	7440-50-8	5	mg/kg	21	36	41		
Lead	7439-92-1	5	mg/kg	11	14	14		
Nickel	7440-02-0	2	mg/kg	11	18	19		
Zinc	7440-66-6	5	mg/kg	43	76	69		
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1		
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5		
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	<0.5		
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5		
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5		
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	<0.5		
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5		
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	<0.5		
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	<0.5		
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	<0.5		
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	<0.5		
Benzo(b)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	<0.5		
Benz(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	<0.5		
Benz(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	<0.5		
Indeno(1,2,3-cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	<0.5		
Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5		
Benz(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	<0.5		
^ Sum of polycyclic aromatic hydrocarbons				<0.5	<0.5	<0.5		
^ Benzo(a)pyrene TEQ (zero)				<0.5	<0.5	<0.5		
^ Benzo(a)pyrene TEQ (half LOR)				<0.5	<0.5	<0.5		
^ Benzo(a)pyrene TEQ (LOR)				0.6	0.6	0.6		
EP080/071: Total Petroleum Hydrocarbons				1.2	1.2	1.2		
C6 - C9 Fraction				<10	<10	<10		



Page : 7 of 9
Work Order : ES2133888 Amendment 1
Client : ENVIRONMENTAL EARTH SCIENCES
Project : 121070

Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Compound	CAS Number	LOR	Sampling date / time	Unit	TP8_0.15	TP10_0.05	FD1	Result
EP080/071: Total Petroleum Hydrocarbons - Continued								
C10 - C14 Fraction		50		mg/kg	<50	<50	<50	
C15 - C28 Fraction		100		mg/kg	<100	<100	<100	
C29 - C36 Fraction		100		mg/kg	<100	<100	<100	
^ C10 - C36 Fraction (sum)		50		mg/kg	<50	<50	<50	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10		mg/kg	<10	<10	<10	
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10		mg/kg	<10	<10	<10	
>C10 - C16 Fraction		50		mg/kg	<50	<50	<50	
>C16 - C34 Fraction		100		mg/kg	<100	<100	<100	
>C34 - C40 Fraction		100		mg/kg	<100	<100	<100	
^ >C10 - C40 Fraction (sum)		50		mg/kg	<50	<50	<50	
^ >C10 - C16 Fraction minus Naphthalene (F2)		50		mg/kg	<50	<50	<50	
EP080: BTEXN								
Benzene	71-43-2	0.2		mg/kg	<0.2	<0.2	<0.2	
Toluene	108-88-3	0.5		mg/kg	<0.5	<0.5	<0.5	
Ethylbenzene	100-41-4	0.5		mg/kg	<0.5	<0.5	<0.5	
meta- & para-Xylene	108-38-3 106-42-3	0.5		mg/kg	<0.5	<0.5	<0.5	
ortho-Xylene	95-47-6	0.5		mg/kg	<0.5	<0.5	<0.5	
^ Sum of BTEX		0.2		mg/kg	<0.2	<0.2	<0.2	
^ Total Xylenes		0.5		mg/kg	<0.5	<0.5	<0.5	
Naphthalene	91-20-3	1		mg/kg	<1	<1	<1	
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5		%	84.0	80.1	95.2	
2-Chlorophenol-D4	93951-73-6	0.5		%	84.1	79.9	88.8	
2,4,6-Tribromophenol	118-79-6	0.5		%	64.0	61.5	69.8	
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5		%	94.1	91.2	103	
Anthracene-d10	1719-06-8	0.5		%	95.3	90.7	98.8	
4-Terphenyl-d14	1718-51-0	0.5		%	82.2	78.8	93.4	
EP080S: TPH(V)BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.2		%	111	112	94.3	
Toluene-D8	2037-26-5	0.2		%	81.6	85.0	104	



Page : 8 of 9
 Work Order : ES2133888 Amendment 1
 Client : ENVIRONMENTAL EARTH SCIENCES
 Project : 121070

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Sample ID							
Compound	CAS Number	LOR	Sampling date / time	Unit	TP8_0.15	TP10_0.05	FD1		
			17-Sep-2021 00:00		ES2133888-006	ES2133888-007	ES2133888-008		
				Result	Result	Result	Result		
EP080S: TPH(V)/BTX Surrogates - Continued									
4-Bromofluorobenzene	460-00-4	0.2	%		77.8	79.7	90.6		



Page : 9 of 9
 Work Order : ES2133888 Amendment 1
 Client : ENVIRONMENTAL EARTH SCIENCES
 Project : 121070

Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2,4,6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130



QUALITY CONTROL REPORT

Work Order : **ES2133888**

Amendment : **1**

Page : 1 of 11

Client : **ENVIRONMENTAL EARTH SCIENCES**

Contact : **LACHLAN DESAILLY**

Address : **PO 380 North Sydney**

2056

Telephone

Project : **121070**

Order number

C-O-C number

Sampler : **KARIN AZZAM**

Site : **BOX RD, CASULA**

Quote number : **EN/010/20**

No. of samples received : **11**

No. of samples analysed : **8**

Laboratory : **Environmental Division Sydney**

Contact : **Christopher Redford**

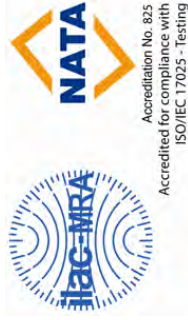
Address : **277-289 Woodpark Road Smithfield NSW Australia 2164**

Telephone : **+61 2 8784 8555**

Date Samples Received : **17-Sep-2021**

Date Analysis Commenced : **21-Sep-2021**

Issue Date : **06-Oct-2021**



Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW



Page : 2 of 11
Work Order : ES2133888 Amendment 1
Client : ENVIRONMENTAL EARTH SCIENCES
Project : 121070

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot

CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

RPD = Relative Percentage Difference

= Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Sample ID	Method/Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 3917309)									
ES2133703-001	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	4	6	44.6	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	5	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	<5	<5	0.0	No Limit
ES2133888-004	TP6_0.1	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	15	15	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	16	16	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	33	32	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	14	34	79.3	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	73	68	6.4	0% - 50%
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 3937149)									
ES2133888-008	FD1	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	14	15	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	19	24	27.1	0% - 50%
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	41	44	7.1	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	14	17	17.5	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	69	91	27.2	0% - 50%
ES2134449-028	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	21	31	38.1	0% - 50%



Page : 3 of 11
 Work Order : ES2133888 Amendment 1
 Client : ENVIRONMENTAL EARTH SCIENCES
 Project : 121070

Sub-Matrix: SOIL		Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EG005(ED093)T: Total Metals by ICP-AES (QC Lot: 3937149) - continued										
ES2134449-028	Anonymous	EG005T: Nickel	7440-02-0	2	mg/kg	4	4	0.0	No Limit	
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	5	0.0	No Limit	
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.0	No Limit	
		EG005T: Lead	7439-92-1	5	mg/kg	11	12	0.0	No Limit	
		EG005T: Zinc	7440-66-6	5	mg/kg	<5	<5	0.0	No Limit	
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3917313)										
ES2133795-002	Anonymous	EA055: Moisture Content	----	0.1	%	46.6	46.8	0.5	0% - 20%	
ES2133888-007	TP10_0.05	EA055: Moisture Content	----	0.1	%	8.7	9.1	5.4	No Limit	
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 3932940)										
ES2133888-008	FD1	EA055: Moisture Content	----	0.1	%	9.0	8.8	2.2	No Limit	
ES2135379-001	Anonymous	EA055: Moisture Content	----	0.1	%	14.8	14.9	1.0	0% - 50%	
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3917310)										
ES2133703-001	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit	
ES2133888-004	TP6_0.1	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit	
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 3937150)										
ES2133888-008	FD1	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit	
ES2134449-028	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.0	No Limit	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3914286)										
ES2133888-004	TP6_0.1	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Benzo(b,j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
			205-82-3							
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Indeno(1,2,3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Dibenzo(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit	
		ES2133872-001	Anonymous	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0



Page : 4 of 11
Work Order : ES2133888 Amendment 1
Client : ENVIRONMENTAL EARTH SCIENCES
Project : 121070

Sub-Matrix: SOIL		Laboratory Duplicate (DUP) Report							
Laboratory sample ID	Sample ID	Method/Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3914286) - continued									
ES2133872-001	Anonymous	EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	0.6	0.7	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	0.7	0.7	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b+h)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
			205-82-3						
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1,2,3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenzo(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	1.3	1.4	7.4	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)							
	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit		
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 3933193)									
ES2133888-008	FD1	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(b+h)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
			205-82-3						
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Indeno(1,2,3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Dibenzo(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
EP075(SIM): Benzo(a)pyrene TEQ (zero)									
	----	0.5	mg/kg	<0.5	<0.5	0.0	No Limit		



Page : 5 of 11
 Work Order : ES2133888 Amendment 1
 Client : ENVIRONMENTAL EARTH SCIENCES
 Project : 121070

Sub-Matrix: soil									
Laboratory sample ID	Sample ID	Method/Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3913161)									
ES2133666-038	Anonymous	EP080: C6 - C9 Fraction	---	10	mg/kg	<10	<10	0.0	No Limit
ES2133888-003	TP5_0.2	EP080: C6 - C9 Fraction	---	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3914287)									
ES2133888-004	TP6_0.1	EP071: C15 - C28 Fraction	---	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	---	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	---	50	mg/kg	<50	<50	0.0	No Limit
ES2133872-001	Anonymous	EP071: C15 - C28 Fraction	---	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	---	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	---	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3932845)									
ES2135298-001	Anonymous	EP080: C6 - C9 Fraction	---	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 3933194)									
ES2133888-008	FD1	EP071: C15 - C28 Fraction	---	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	---	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	---	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3913161)									
ES2133666-038	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
ES2133888-003	TP5_0.2	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3914287)									
ES2133888-004	TP6_0.1	EP071: >C16 - C34 Fraction	---	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	---	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	---	50	mg/kg	<50	<50	0.0	No Limit
ES2133872-001	Anonymous	EP071: >C16 - C34 Fraction	---	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	---	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	---	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3932845)									
ES2135298-001	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QC Lot: 3933194)									
ES2133888-008	FD1	EP071: >C16 - C34 Fraction	---	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	---	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	---	50	mg/kg	<50	<50	0.0	No Limit
EP080: BTEXN (QC Lot: 3913161)									
ES2133666-038	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		106-42-3	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit
		EP080: ortho-Xylene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit



Page : 6 of 11
 Work Order : ES2133888 Amendment 1
 Client : ENVIRONMENTAL EARTH SCIENCES
 Project : 121070

Sub-Matrix: SOIL		Laboratory Duplicate (DUP) Report									
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Acceptable RPD (%)		
EP080: BTEXN (QC Lot: 3913161) - continued ES2133888-003	TP5_0.2	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit		
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit		
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit		
		EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit		
			106-42-3								
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit		
EP080: BTEXN (QC Lot: 3932845) ES2135298-001	Anonymous	EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit		
		EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.0	No Limit		
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit		
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.0	No Limit		
		EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	<0.5	0.0	No Limit		
			106-42-3								
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.0	No Limit		
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.0	No Limit		



Page : 7 of 11
Work Order : ES213388 Amendment 1
Client : ENVIRONMENTAL EARTH SCIENCES
Project : 121070

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **soil**

Sub-Matrix: SOIL	Method: Compound			CAS Number	LOR	Unit	Method Blank (MB) Report		Laboratory Control Spike (LCS) Report			
							Result	Spike Concentration	Spike Recovery (%)		Acceptable Limits (%)	
									LCS	Low	High	
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3917309)												
EG005T: Arsenic		7440-38-2	5	mg/kg	<5	121.1 mg/kg	95.4	88.0	113			
EG005T: Cadmium		7440-43-9	1	mg/kg	<1	0.74 mg/kg	93.1	70.0	130			
EG005T: Chromium		7440-47-3	2	mg/kg	<2	19.6 mg/kg	102	68.0	132			
EG005T: Copper		7440-50-8	5	mg/kg	<5	52.9 mg/kg	107	89.0	111			
EG005T: Lead		7439-92-1	5	mg/kg	<5	60.8 mg/kg	96.6	82.0	119			
EG005T: Nickel		7440-02-0	2	mg/kg	<2	15.3 mg/kg	93.1	80.0	120			
EG005T: Zinc		7440-66-6	5	mg/kg	<5	139.3 mg/kg	90.6	66.0	133			
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3937149)												
EG005T: Arsenic		7440-38-2	5	mg/kg	<5	121.1 mg/kg	101	88.0	113			
EG005T: Cadmium		7440-43-9	1	mg/kg	<1	0.74 mg/kg	84.0	70.0	130			
EG005T: Chromium		7440-47-3	2	mg/kg	<2	19.6 mg/kg	115	68.0	132			
EG005T: Copper		7440-50-8	5	mg/kg	<5	52.9 mg/kg	107	89.0	111			
EG005T: Lead		7439-92-1	5	mg/kg	<5	60.8 mg/kg	94.9	82.0	119			
EG005T: Nickel		7440-02-0	2	mg/kg	<2	15.3 mg/kg	106	80.0	120			
EG005T: Zinc		7440-66-6	5	mg/kg	<5	139.3 mg/kg	88.8	66.0	133			
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3917310)												
EG035T: Mercury		7439-97-6	0.1	mg/kg	<0.1	0.087 mg/kg	113	70.0	125			
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3937150)												
EG035T: Mercury		7439-97-6	0.1	mg/kg	<0.1	0.087 mg/kg	97.1	70.0	125			
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3914286)												
EP075(SIM): Naphthalene		91-20-3	0.5	mg/kg	<0.5	6 mg/kg	114	77.0	125			
EP075(SIM): Acenaphthylene		208-96-8	0.5	mg/kg	<0.5	6 mg/kg	108	72.0	124			
EP075(SIM): Acenaphthene		83-32-9	0.5	mg/kg	<0.5	6 mg/kg	119	73.0	127			
EP075(SIM): Fluorene		86-73-7	0.5	mg/kg	<0.5	6 mg/kg	113	72.0	126			
EP075(SIM): Phenanthrene		85-01-8	0.5	mg/kg	<0.5	6 mg/kg	111	75.0	127			
EP075(SIM): Anthracene		120-12-7	0.5	mg/kg	<0.5	6 mg/kg	114	77.0	127			
EP075(SIM): Fluoranthene		206-44-0	0.5	mg/kg	<0.5	6 mg/kg	110	73.0	127			
EP075(SIM): Pyrene		129-00-0	0.5	mg/kg	<0.5	6 mg/kg	111	74.0	128			
EP075(SIM): Benz(a)anthracene		56-55-3	0.5	mg/kg	<0.5	6 mg/kg	90.0	69.0	123			
EP075(SIM): Chrysene		218-01-9	0.5	mg/kg	<0.5	6 mg/kg	105	75.0	127			
EP075(SIM): Benzo(b+j)fluoranthene		205-99-2	0.5	mg/kg	<0.5	6 mg/kg	87.9	68.0	116			
EP075(SIM): Benzo(k)fluoranthene		205-82-3										
EP075(SIM): Benzo(a)pyrene		207-08-9	0.5	mg/kg	<0.5	6 mg/kg	104	74.0	126			
EP075(SIM): Benzo(a)pyrene		50-32-8	0.5	mg/kg	<0.5	6 mg/kg	104	70.0	126			



Page : 8 of 11
 Work Order : ES213388 Amendment 1
 Client : ENVIRONMENTAL EARTH SCIENCES
 Project : 121070

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report		Spike Recovery (%)		Laboratory Control Spike (LCS) Report	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3914286) - continued									
EP075(SIM): Indeno(1,2,3-cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	97.0	61.0	121	
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	100	62.0	118	
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	94.6	63.0	121	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3933193)									
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	119	77.0	125	
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	109	72.0	124	
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	112	73.0	127	
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	109	72.0	126	
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	103	75.0	127	
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	104	77.0	127	
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	99.4	73.0	127	
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	100	74.0	128	
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	97.7	69.0	123	
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	110	75.0	127	
EP075(SIM): Benzo(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	6 mg/kg	93.8	68.0	116	
EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	108	74.0	126	
EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	104	70.0	126	
EP075(SIM): Indeno(1,2,3-cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	96.9	61.0	121	
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	102	62.0	118	
EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	96.8	63.0	121	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3913161)									
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	96.5	68.4	128	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3914287)									
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	89.7	75.0	129	
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	90.8	77.0	131	
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	89.8	71.0	129	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3932845)									
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	106	68.4	128	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3933194)									
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	103	75.0	129	
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	101	77.0	131	
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	102	71.0	129	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3913161)									
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	97.1	68.4	128	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3914287)									
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	91.8	77.0	125	
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	89.0	74.0	138	



Page : 9 of 11
Work Order : ES213388 Amendment 1
Client : ENVIRONMENTAL EARTH SCIENCES
Project : 121070

Sub-Matrix: **SOIL**

Sub-Matrix: SOIL				Method Blank (MB) Report	Spike Concentration	Laboratory Control Spike (LCS) Report	
Method: Compound	CAS Number	LOR	Unit	Result		Spike Recovery (%)	Acceptable Limits (%)
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3914287) - continued							
EP071: >C34 - C40 Fraction	---	100	mg/kg	<100	225 mg/kg	85.9	63.0 131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3932845)							
EP080: C6 - C10 Fraction	C6, C10	10	mg/kg	<10	31 mg/kg	107	68.4 128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3933194)							
EP071: >C10 - C16 Fraction	---	50	mg/kg	<50	375 mg/kg	106	77.0 125
EP071: >C16 - C34 Fraction	---	100	mg/kg	<100	525 mg/kg	99.5	74.0 138
EP071: >C34 - C40 Fraction	---	100	mg/kg	<100	225 mg/kg	100	63.0 131
EP080: BTEXN (QCLot: 3913161)							
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	95.6	62.0 116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	98.2	67.0 121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	96.3	65.0 117
EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	2 mg/kg	94.1	66.0 118
	106-42-3						
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	92.8	68.0 120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	106	63.0 119
EP080: BTEXN (QCLot: 3932845)							
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	105	62.0 116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	100	67.0 121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	98.2	65.0 117
EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	2 mg/kg	94.7	66.0 118
	106-42-3						
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	97.0	68.0 120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	88.5	63.0 119

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID		Sample ID	Method: Compound	Matrix Spike (MS) Report					
				Spike		SpikeRecovery(%)		Acceptable Limits (%)	
				Concentration	MS	Low	High		
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3917309)									
ES2133703-001	Anonymous		EG005T: Arsenic	50 mg/kg	85.4	70.0	130		
		7440-38-2	EG005T: Cadmium	50 mg/kg	91.2	70.0	130		
		7440-43-9	EG005T: Chromium	50 mg/kg	91.0	68.0	132		
		7440-47-3	EG005T: Copper	250 mg/kg	90.4	70.0	130		
		7440-50-8	EG005T: Lead	250 mg/kg	93.6	70.0	130		
		7439-92-1	EG005T: Nickel	50 mg/kg	87.3	70.0	130		
		7440-02-0							



Page : 10 of 11
Work Order : ES2133888 Amendment 1
Client : ENVIRONMENTAL EARTH SCIENCES
Project : 121070

Sub-Matrix: **soil**

Sub-Matrix: SOIL						
Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report		
				Spike Concentration	MS	Acceptable Limits (%)
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3917309) - continued						
ES2133703-001	Anonymous	EG005T: Zinc	7440-66-6	250 mg/kg	90.5	66.0 133
EG005(ED093)T: Total Metals by ICP-AES (QCLot: 3937149)						
ES2133888-008	FD1	EG005T: Arsenic	7440-38-2	50 mg/kg	94.9	70.0 130
		EG005T: Cadmium	7440-43-9	50 mg/kg	92.2	70.0 130
		EG005T: Chromium	7440-47-3	50 mg/kg	98.0	68.0 132
		EG005T: Copper	7440-50-8	250 mg/kg	100	70.0 130
		EG005T: Lead	7439-92-1	250 mg/kg	92.9	70.0 130
		EG005T: Nickel	7440-02-0	50 mg/kg	95.1	70.0 130
		EG005T: Zinc	7440-66-6	250 mg/kg	85.2	66.0 133
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3917310)						
ES2133703-001	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	97.6	70.0 130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 3937150)						
ES2133888-008	FD1	EG035T: Mercury	7439-97-6	5 mg/kg	110	70.0 130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3914286)						
ES2133872-001	Anonymous	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	106	70.0 130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	111	70.0 130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 3933193)						
ES2133888-008	FD1	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	102	70.0 130
		EP075(SIM): Pyrene	129-00-0	10 mg/kg	116	70.0 130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3913161)						
ES2133666-038	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	102	70.0 130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3914287)						
ES2133872-001	Anonymous	EP071: C10 - C14 Fraction	----	480 mg/kg	106	73.0 137
		EP071: C15 - C28 Fraction	----	3100 mg/kg	110	53.0 131
		EP071: C29 - C36 Fraction	----	2060 mg/kg	114	52.0 132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3932845)						
ES2135298-001	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	99.7	70.0 130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 3933194)						
ES2133888-008	FD1	EP071: C10 - C14 Fraction	----	480 mg/kg	111	73.0 137
		EP071: C15 - C28 Fraction	----	3100 mg/kg	100	53.0 131
		EP071: C29 - C36 Fraction	----	2060 mg/kg	111	52.0 132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3913161)						
ES2133666-038	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	104	70.0 130
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3914287)						
ES2133872-001	Anonymous	EP071: >C10 - C16 Fraction	----	860 mg/kg	106	73.0 137



Page : 11 of 11
Work Order : ES2133888 Amendment 1
Client : ENVIRONMENTAL EARTH SCIENCES
Project : 121070

Sub-Matrix: **soil**

Sub-Matrix: SOIL		Laboratory sample ID	Sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report					
						Spike Concentration	MS	Acceptable Limits (%)	Low	High	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3914287) - continued											
ES2133872-001	Anonymous	EP071: >C16 - C34 Fraction	----			4320 mg/kg	114		53.0	131	
		EP071: >C34 - C40 Fraction	----			890 mg/kg	95.2		52.0	132	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3932845)											
ES2135298-001	Anonymous	EP080: C6 - C10 Fraction			C6_C10	37.5 mg/kg	99.2		70.0	130	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 3933194)											
ES2133888-008	FD1	EP071: >C10 - C16 Fraction	----			860 mg/kg	98.4		73.0	137	
		EP071: >C16 - C34 Fraction	----			4320 mg/kg	105		53.0	131	
		EP071: >C34 - C40 Fraction	----			890 mg/kg	103		52.0	132	
EP080: BTEXN (QCLot: 3913161)											
ES2133666-038	Anonymous	EP080: Benzene			71-43-2	2.5 mg/kg	97.3		70.0	130	
		EP080: Toluene			108-88-3	2.5 mg/kg	91.4		70.0	130	
		EP080: Ethylbenzene			100-41-4	2.5 mg/kg	80.5		70.0	130	
		EP080: meta- & para-Xylene			108-38-3	2.5 mg/kg	93.5		70.0	130	
		EP080: ortho-Xylene			106-42-3	2.5 mg/kg	93.5		70.0	130	
		EP080: Naphthalene			91-20-3	2.5 mg/kg	83.5		70.0	130	
EP080: BTEXN (QCLot: 3932845)											
ES2135298-001	Anonymous	EP080: Benzene			71-43-2	2.5 mg/kg	90.9		70.0	130	
		EP080: Toluene			108-88-3	2.5 mg/kg	89.7		70.0	130	
		EP080: Ethylbenzene			100-41-4	2.5 mg/kg	91.2		70.0	130	
		EP080: meta- & para-Xylene			108-38-3	2.5 mg/kg	91.1		70.0	130	
		EP080: ortho-Xylene			106-42-3	2.5 mg/kg	92.4		70.0	130	
		EP080: Naphthalene			91-20-3	2.5 mg/kg	84.8		70.0	130	



QA/QC Compliance Assessment to assist with Quality Review

Work Order : **ES2133888**
Amendment : **1**

Page : 1 of 5

Client : **ENVIRONMENTAL EARTH SCIENCES**
Contact : **LACHLAN DESAILLY**
Project : **121070**
Site : **BOX RD, CASULA**
Sampler : **KARIN AZZAM**
Order number : **----**

Laboratory : **Environmental Division Sydney**
Telephone : **+61 2 8784 8555**
Date Samples Received : **17-Sep-2021**
Issue Date : **06-Oct-2021**
No. of samples received : **11**
No. of samples analysed : **8**

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- **NO** Matrix Spike outliers occur.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist.



Page : 2 of 5
Work Order : ES213388 Amendment 1
Client : ENVIRONMENTAL EARTH SCIENCES
Project : 121070

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results. This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein. Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters. Holding times for **VOC in soils** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method	Sample Date	Extraction / Preparation		Analysis
Container / Client Sample ID(s)		Date extracted	Due for extraction	Due for analysis
EA055: Moisture Content (Dried @ 105-110°C)				
Soil Glass Jar - Unpreserved (EA055) TP3_0.4, TP6_0.1, TP8_0.15, TP10_0.05	17-Sep-2021	----	----	22-Sep-2021 01-Oct-2021
Soil Glass Jar - Unpreserved (EA055) FD1	17-Sep-2021	----	----	30-Sep-2021 01-Oct-2021
EG005(ED093)T: Total Metals by ICP-AES				
Soil Glass Jar - Unpreserved (EG005T) FD1	17-Sep-2021	05-Oct-2021	16-Mar-2022	05-Oct-2021 16-Mar-2022
Soil Glass Jar - Unpreserved (EG005T) TP1_0.3, TP6_0.1, TP7_0.2, TP10_0.05	17-Sep-2021	23-Sep-2021	16-Mar-2022	23-Sep-2021 16-Mar-2022
EG035T: Total Recoverable Mercury by FIMS				
Soil Glass Jar - Unpreserved (EG035T) FD1	17-Sep-2021	05-Oct-2021	15-Oct-2021	05-Oct-2021 15-Oct-2021
Soil Glass Jar - Unpreserved (EG035T) TP1_0.3, TP5_0.2, TP7_0.2, TP10_0.05	17-Sep-2021	23-Sep-2021	15-Oct-2021	24-Sep-2021 15-Oct-2021
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons				
Soil Glass Jar - Unpreserved (EP075(SIM)) FD1	17-Sep-2021	01-Oct-2021	01-Oct-2021	01-Oct-2021 10-Nov-2021
Soil Glass Jar - Unpreserved (EP075(SIM)) TP1_0.3, TP5_0.2, TP7_0.2, TP10_0.05	17-Sep-2021	22-Sep-2021	01-Oct-2021	23-Sep-2021 01-Nov-2021



Page : 3 of 5
 Work Order : ES2133888 Amendment 1
 Client : ENVIRONMENTAL EARTH SCIENCES
 Project : 121070

Matrix: **SOIL** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method	Sample Date		Extraction / Preparation		Analysis	
Container / Client Sample ID(s)	Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EP080/071: Total Petroleum Hydrocarbons						
Soil Glass Jar - Unpreserved (EP071) FD1	17-Sep-2021	01-Oct-2021	✓	01-Oct-2021	10-Nov-2021	✓
Soil Glass Jar - Unpreserved (EP080) TP1_0.3, TP3_0.4, TP5_0.2, TP6_0.1, TP7_0.2, TP8_0.15, TP10_0.05	17-Sep-2021	21-Sep-2021	✓	01-Oct-2021	01-Oct-2021	✓
Soil Glass Jar - Unpreserved (EP071) TP1_0.3, TP3_0.4, TP5_0.2, TP6_0.1, TP7_0.2, TP8_0.15, TP10_0.05	17-Sep-2021	22-Sep-2021	✓	01-Oct-2021	01-Nov-2021	✓
Soil Glass Jar - Unpreserved (EP080) FD1	17-Sep-2021	30-Sep-2021	✓	01-Oct-2021	01-Oct-2021	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions						
Soil Glass Jar - Unpreserved (EP071) FD1	17-Sep-2021	01-Oct-2021	✓	01-Oct-2021	10-Nov-2021	✓
Soil Glass Jar - Unpreserved (EP080) TP1_0.3, TP3_0.4, TP5_0.2, TP6_0.1, TP7_0.2, TP8_0.15, TP10_0.05	17-Sep-2021	21-Sep-2021	✓	01-Oct-2021	01-Oct-2021	✓
Soil Glass Jar - Unpreserved (EP071) TP1_0.3, TP3_0.4, TP5_0.2, TP6_0.1, TP7_0.2, TP8_0.15, TP10_0.05	17-Sep-2021	22-Sep-2021	✓	01-Oct-2021	01-Nov-2021	✓
Soil Glass Jar - Unpreserved (EP080) FD1	17-Sep-2021	30-Sep-2021	✓	01-Oct-2021	01-Oct-2021	✓
EP080: BTEXN						
Soil Glass Jar - Unpreserved (EP080) TP1_0.3, TP3_0.4, TP5_0.2, TP6_0.1, TP7_0.2, TP8_0.15, TP10_0.05	17-Sep-2021	21-Sep-2021	✓	01-Oct-2021	01-Oct-2021	✓
Soil Glass Jar - Unpreserved (EP080) FD1	17-Sep-2021	30-Sep-2021	✓	01-Oct-2021	01-Oct-2021	✓



Page : 4 of 5
Work Order : ES2133888 Amendment 1
Client : ENVIRONMENTAL EARTH SCIENCES
Project : 121070

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL** Evaluation: * = Quality Control frequency not within specification : ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Method	Count		Rate (%)		Quality Control Specification	
Analytical Methods			QC	Regular	Actual	Expected	Evaluation	
Laboratory Duplicates (DUP)								
Moisture Content		EA055	4	33	12.12	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)		EP075(SIM)	3	19	15.79	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS		EG035T	4	39	10.26	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES		EG005T	4	40	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction		EP071	3	24	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX		EP080	3	25	12.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)								
PAH/Phenols (SIM)		EP075(SIM)	2	19	10.53	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS		EG035T	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES		EG005T	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction		EP071	2	24	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX		EP080	2	25	8.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)								
PAH/Phenols (SIM)		EP075(SIM)	2	19	10.53	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS		EG035T	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES		EG005T	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction		EP071	2	24	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX		EP080	2	25	8.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)								
PAH/Phenols (SIM)		EP075(SIM)	2	19	10.53	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS		EG035T	2	39	5.13	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES		EG005T	2	40	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction		EP071	2	24	8.33	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX		EP080	2	25	8.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard



Page : 5 of 5
Work Order : ES2133888 Amendment 1
Client : ENVIRONMENTAL EARTH SCIENCES
Project : 121070

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM Schedule B(3).
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120: USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM Schedule B(3)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015. Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM Schedule B(3).
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM Schedule B(3)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260. Extracts are analysed by Purge and Trap. Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM Schedule B(3) amended.
Preparation Methods	Method	Matrix	Method Descriptions
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion - 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM Schedule B(3).
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na ₂ SO ₄ and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

CHAIN OF CUSTODY - ANALYSIS REQUEST FORM

Project Manager: LD Sampler: KA Laboratory: ASET Job No: 121070 Site Location: Box Rd, Casula Sheet: 1 of 1

No. of samples	Sample ID/ Depth	Anticipated Result (PID/EC reading)			Date sampled	Time sampled	Sample Matrix			Analysis Required	Sample-specific instructions/ notes
		Soil	Water	Sediment			Asbestos	NERM	Asbestos		
1	TP1-0.3	X									ASET96265799445/1-7
2	TP3-0.4	X									
3	TP5-0.2	X									
4	TP6-0.1	X									
5	TP7-0.2	X									
6	TP8-0.15	X									
7	TP10-0.05	X									
TOTAL											

21 SEP 2021

Lab Quotation No. (if applicable):
 Send report to (email address): kazam@eesigroup.com
 Cc: report to (email address): ldesaully@eesigroup.com
 Cc: invoice to (email address): accounts@eesigroup.com

NORMAL / 3 DAYS / 48 HRS / 24 HRS (confirm with lab in advance if quick turn-around is required)

Turn Around (circle):
 Comments/ Instructions:

ENVIRONMENTAL EARTH
 SCIENCES
 CONTAMINATION RESOLVED
 Phone (02) 9522 1777
 Fax (02) 9522 1010
 PO Box 380 North Sydney NSW 2059
 Email eesnsw@eesigroup.com

Name: Karin Kazam Signature: [Signature] Date: 21/9/2021 Time: 9.20am
 Receiving Lab: [Signature] Date: 21/9/21 Time: 1pm

**AUSTRALIAN SAFER ENVIRONMENT & TECHNOLOGY PTY LTD**

ABN 36 088 095 112

Our ref : ASET96265 / 99445 / 1 - 7
 Your ref : 121070 – Box Road Casula
NATA Accreditation No: 14484

22 September 2021

Environmental Earth Sciences
 PO Box 380
 North Sydney NSW 2059

**Attn: Ms Karin Azzam****Accredited for compliance with ISO/IEC 17025 - Testing.**

Dear Karin

Asbestos Identification

This report presents the results of seven samples, forwarded by Environmental Earth Sciences on 21 September 2021, for analysis for asbestos.

1.Introduction:Seven samples forwarded were examined and analysed for the presence of asbestos on 22 September 2021.

2. Methods : The samples were examined under a Stereo Microscope and selected fibres were analysed by Polarized Light Microscopy in conjunction with Dispersion Staining method (**Australian Standard AS 4964 - 2004 and Safer Environment Method 1 as the supplementary work instruction**) (**Qualitative Analysis only**).

The report also provides approximate weights and percentages, categories of asbestos forms appearing in the sample, such as **AF**(Asbestos Fines), **FA**(Friable Asbestos) and **ACM** (Asbestos Containing Material), also satisfying the requirements of the WA/ NEPM Guidelines).

3. Results : Sample No. 1. ASET96265 / 99445 / 1. 121070 - TP1_0.3.

Approx dimensions 10.0 cm x 10.0 cm x 6.0 cm

Approximate total dry weight of soil = 598.0g.

The sample consisted of a mixture of clayish sandy soil, organic fibres, stones, fragments of cement, wood chips, plant matter.

No asbestos detected.**Sample No. 2. ASET96265 / 99445 / 2. 121070 - TP3_0.4.**

Approx dimensions 10.0 cm x 10.0 cm x 6.9 cm

Approximate total dry weight of soil = 693.0g.

The sample consisted of a mixture of clayish sandy soil, organic fibres, stones, fragments of cement and plant matter.

No asbestos detected.**Sample No. 3. ASET96265 / 99445 / 3. 121070 - TP5_0.2.**

Approx dimensions 10.0 cm x 10.0 cm x 7.4 cm

Approximate total dry weight of soil = 735.0g.

The sample consisted of a mixture of clayish sandy soil, organic fibres, stones, fragments of cement and plant matter.

No asbestos detected.

SUITE 710 / 90 GEORGE STREET, HORNSBY NSW 2077 – P.O. BOX 1644 HORNSBY WESTFIELD NSW 1635

PHONE: (02) 99872183 FAX: (02)99872151 EMAIL: info@ausset.com.au WEBSITE: www.Ausset.com.au

OCCUPATIONAL HEALTH & SAFETY STUDIES • INDOOR AIR QUALITY SURVEYS • HAZARDOUS MATERIAL SURVEYS • RADIATION SURVEYS • ASBESTOS SURVEYS
 ASBESTOS DETECTION & IDENTIFICATION • REPAIR & CALIBRATION OF SCIENTIFIC EQUIPMENT • AIRBORNE FIBRE & SILICA MONITORING

**Sample No. 4. ASET96265 / 99445 / 4. 121070 - TP6_0.1.**

Approx dimensions 10.0 cm x 10.0 cm x 6.5 cm

Approximate total dry weight of soil = 652.0g.

The sample consisted of a mixture of clayish sandy soil, stones, fragments of cement, slag, wood chips and plant matter.

No asbestos detected.**Sample No. 5. ASET96265 / 99445 / 5. 121070 - TP7_0.2.**

Approx dimensions 10.0 cm x 10.0 cm x 7.3 cm

Approximate total dry weight of soil = 725.0g.

The sample consisted of a mixture of clayish sandy soil, organic fibres, stones, fragments of cement, wood chips and plant matter.

No asbestos detected.**Sample No. 6. ASET96265 / 99445 / 6. 121070 - TP8_0.15.**

Approx dimensions 10.0 cm x 10.0 cm x 7.7 cm

Approximate total dry weight of soil = 765.0g.

The sample consisted of a mixture of clayish sandy soil, stones, fragments of brick, cement, wood chips and plant matter.

No asbestos detected.**Sample No. 7. ASET96265 / 99445 / 7. 121070 - TP10_0.05.**

Approx dimensions 10.0 cm x 10.0 cm x 7.8 cm

Approximate total dry weight of soil = 779.0g.

The sample consisted of a mixture of clayish sandy soil, stones, fragments of cement, wood chips and plant matter.

No asbestos detected.

Reported by,

A handwritten signature in black ink, appearing to read 'Mahen De Silva'.

Mahen De Silva. BSc, MSc, Grad Dip (Occ Hyg)
Occupational Hygienist / Approved Identifier.
Approved Signatory

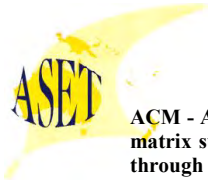


Accredited for compliance with ISO/IEC 17025 - Testing.

This report is consistent with the analytical procedures and reporting recommendations in the Western Australia Guidelines for the Assessment Remediation and Management of Asbestos contaminated sites in Western Australia and it also satisfies the requirements of the current NEPM Guidelines. NATA Accreditation does not cover the performance of this service.

Disclaimers;

The approx; weights given above can be used only as a guide. They do not represent absolute weights of each kind of asbestos, as it is impossible to extract all loose fibres from soil and other asbestos containing building material samples using this method. However above figures may be used as closest approximations to the exact values in each case. Estimation and/ or reporting of asbestos fibre weights in asbestos containing materials and soil is out of the Scope of the NATA Accreditation. NATA Accreditation only covers the qualitative part of the results reported. This weight disclaimer also covers weight / weight percentages if given.



ACM - Asbestos Containing Material - Products or materials that contain asbestos in an inert bound matrix such as cement or resin. Here taken to be sound material, even as fragments and not fitting through a 7mm X 7 mm sieve.

AF -Includes asbestos free fibres, small fibre bundles and also ACM fragments that pass through a 7mm X 7 mm sieve.

FA -Friable asbestos material such as severely weathered ACM, and asbestos in the form of loose fibrous material such as insulation products.

^ denotes loose fibres of relevant asbestos types detected in soil/dust.

***** denotes asbestos detected in ACM in bonded form.

denotes friable asbestos as soft fibro plaster and/ or highly weathered ACM that will easily crumble.

The results contained in this report relate only to the sample/s submitted for testing. Australian Safer Environment & Technology accepts no responsibility for whether or not the submitted sample/s is/are representative. Results indicating "No asbestos detected" indicates a reporting limit specified in AS4964 -2004 which is 0.1g/ Kg (0.01%). Any amounts detected at assumed lower level than that would be reported, however those assumed lower levels may be treated as "No asbestos detected" as specified and recommended by AS4964-2004. Trace / respirable level asbestos will be reported only when detected and trace analysis have been performed on each sample as required by AS4964-2004. When loose asbestos fibres/ fibre bundles are detected and reported that means they are larger handpicked fibres/ fibre bundles, and they do not represent respirable fibres. Dust/soil samples are always subjected to trace analysis except where the amounts involved are extremely minute and trace analysis is not possible to be carried out. When trace analysis is not performed on dust samples it will be indicated in the report that trace analysis has not been carried out due to the volume of the sample being extremely minute.

Estimation of asbestos weights involves the use of following assumptions;

Volume of each kind of Asbestos present in broken edges have been visually estimated and its been assumed that volumes remain similar throughout the binding matrix and those volumes are only approximate and not exact. Material densities have been assumed to be similar to commonly found similar materials and may not be exact.

All samples indicating "No asbestos detected" are assumed to be less than 0.001% for friable AF and FA portions detected and 0.01 % for ACM detected unless the approximate weight is given.



APPENDIX J: UNEXPECTED FINDS PROTOCOL



Unexpected Findings Protocol Form

Site:

Job reference:

Client:

Personnel Onsite:

Date:

Daily Summary

1. Fill or suspect material encountered during daily activities

_____ (if yes complete 2 - 8).

2. Environmental consultant contacted:

3. Record location of foreign material (label occurrences sequentially 1, 2, 3, etc).

Description of material encountered:

4. Asbestos or suspected asbestos containing material present (Yes/No):

5. If No to 4 is there an obvious odour present (Note: Do Not sniff soil) (Yes/No):

6. Visible staining (Yes/No): _____

7. Brief written description:

8. Material quarantined (Yes/No):

9. Location of contaminated material: _____

10. Attach photographs taken _____

Signature: _____



Glaeba (02) Pty Ltd trading as Environmental Earth Sciences NSW
82-84 Dickson Avenue, Artarmon, NSW, 2064
PO Box 380 North Sydney, NSW, 2059
P. 61 2 9922 1777 E. info@eesigroup.com
www.eesigroup.com





City Presentation

Parks Review

Jason Breton
ACTING DIRECTOR OPERATIONS

Liverpool City Council | Parks Review

Contents

1. Review.....	2
1.1. Rationale	2
1.2. Review Considerations	3
1.3. Outcomes.....	3
1.4. Asset Registration & Development	3
1.5. People & Culture	4
1.6. System & Process Improvements	4
1.7. Service Level Agreements & Work Standards	8
1.8. The Industrial Landscape	8
1.9. Resource Levelling.....	9
1.10. Localisation	9
1.11. Vehicles, Plant and Equipment.....	10
1.12. Recommendation	11

Appendix

#	Document	Pages
A	Parks Maintenance Work Standards	12-64
B	Team Structure	65
C	Current Organisation	65-69
D	Organisational Charts (Future State)	70-76
E	Indicative Resource Predictions	77
F	Indicative Plant & Equipment Spend	78-101

Liverpool City Council | Parks Review

1. Review

The purpose of this document to provide a response to a query arriving from a Question With Notice (QWN) on the 24th of February 2021, as to how Council, more particularly City Presentation (CP) manages its schedule of works across the numerous, parks, gardens, and open spaces it maintains.

The Resolution was informed by Councils Delivery Program 2022-2026 and Operational Plan 2022-2023 which collectively undertook to conduct a review of parks operational structure and maintenance requirements.

In preparation of this Report CP understand and acknowledge the residual service debt to be recovered within the program (i.e., recovering the schedule to ensure that the grass, plants, and environs do not 'get out of hand' before the next scheduled maintenance.

1.1. Rationale

Underpinning the importance of this Report is the level of customer and stakeholder interest into how local parks are being maintained and to what degree ratepayers might understand the schedule (or intended schedule) of the maintenance program.

The rationale then is to provide transparency in the baseline program of works to all stakeholders, removing ambiguity as to service levels, and to bridge the gap between expectations and our operational response capability. Bridging this gap is considerate of both capacity constraints and the nature of weather events that will continue to hinder 100% compliance to any maintenance program for parks.



Figure 1 - Rationale Flowchart

Liverpool City Council | Parks Review

1.2. Review Considerations

This Review focused on tangible outcomes for stakeholders including observations as to any potential efficiencies within the operating framework, including but not limited to:

- Asset Registration & Development
- People & Culture
- Systems and Process Improvements
- Service Level Agreements and Work Standards
- The Industrial Landscape; and
- Resource Levelling to meet a growing LGA.
- Localisation

1.3. Outcomes

Implementing the actions described in this review will provide the outcomes herein described in the following sections relative to each category.

The outcomes will realise efficiencies in process which will allow more transparency in our team's performance and highlight areas for improvement.

This Review has also been linked to our industrial instrument, the City Presentation 36 Hour Week Services Staff Agreement 2019-2022 (CA) to ensure adherence to the intent of the Award as it advocates that we "embrace technology and process changes".

1.4. Asset Registration & Development

Prior to the inception of this report no Asset Register, inclusive of Parks existed at Liverpool City Council. The absence of an Asset Register has inhibited CP's ability to understand its service level requirements and develop a program of activity which meets both the expectations of the community, and our operational imperatives.

Without baselining our 'Parks as Assets' it was impossible to implement a standard response as to how we manage the grass and gardens at Parks, let alone the other assets within the Parks (toilets etc).

The effect of this was a purely reactive approach to managing levels of service at Parks, and in the absence of a predictive maintenance regime coupled with daily requests to remedy – the residual service debt could not be recovered.

Outcome 1:

This issue has been resolved with a comprehensive Asset Register developed of all Council's assets including, but not limited to:

- Parks
- Gardens
- Sporting Fields
- Tiered Secondary Assets within the above

Liverpool City Council | Parks Review

- Unit of Measurement (UoM)
- Time to Complete (TtC) Assessment of Each Asset

Council's supplier, Brightly® advised in March 2023 that the LCC Asset Register is, "the best example of any Council using their product, in Australia".

1.5. People & Culture

This Review highlighted some legacy issues around people and culture which have been the by-product of a reducing workforce, no 'teaming principles' being applied and a lack of ownership and localisation of the available workforce that may then have contributed to a sense of pride over their work.

These attributes, within an unfavourable industrial landscape have prohibited improved performance with low morale, a reluctance to take extra steps and a reliance on the residual availability of overtime as the only response to the debt, the most overt impact.

The transfer of two staff from Human Resources to the Rose Street Depot, albeit with good intentions had an adverse effect as the Business Partners arrived in an environment conducive to complaints and counter claims within factions at CP – all leading to reduced operational performance given the time and effort required to manage the HR issues.

Council was represented at the Industrial Relations Commission (IRC) approximately 47 times in 2022 with >90% of those issues emerging from or related to City Presentation.

Outcome 2:

This issue has been resolved with a comprehensive program of activities led by the incoming CEO and a more focused and localised response at CP by the Acting Director.

The aggregated result has seen consistency in decision making and an approach to industrial relations that is more conducive to improving some of the underlying issues that were dormant within City Presentation.

As of the date of this Review:

- Council has not had any Industrial Relations Issues before the IRC
- Council has returned to a centralised HR approach from Moore Street
- CP have established a weekly working group with the USU.
- Teaming Events have occurred, and some overt signs of morale improvement are evident.

1.6. System & Process Improvements

Prior to this review City Presentation did not have an Asset Management System (AMS) that could accurately record, let alone forecast a Maintenance Program (MP) or a regime for parks. Service Level Agreements (SLA's) do not exist between our communities and Council meaning there is no visibility of our activities.

Liverpool City Council | Parks Review

No visibility has led to ambiguity over the sequence of maintenance priorities across the LGA and has also created numerous opportunities for the community to opine via social media, as to the condition of local parks, gardens and roads.

A lack of 'connectivity' and interface between Customer Service (CS) and City Presentation (CP) Directorates has also contributed to a one-sided approach to managing expectations where CP were purely reactive to the customer requirements passed through from CS. This same issue presents where constituents refer matters to Councillors.

The by-product of this approach has been reactivity, coupled with service level debt. It is simply not sustainable.

Council have thus decided to treat all parks like any other complex asset in the portfolio. Like any other asset class, there remains an asset hierarchy within the park and each asset within that hierarchy is then treated consistently via:

- Understanding the maintenance requirements of each asset within the hierarchy
- Acknowledging the Original Equipment Manufacturing (OEM) maintenance specifications
- Preparing a schedule of works that reduces the service debt and is at a sustainable cadence.
- Linking the asset via Pathways® to the CS Database to create transparency, and
- Displaying our scheduled maintenance activities on Councils Website

To achieve this treatment option Council will expand the use of its Asset Management Software called Brightly® to:

1. Develop and Annual Maintenance Program
2. Assign asset management responsibilities.
3. Deliver a predictive maintenance 'Day Sheet'
4. Respond efficiently to stakeholders.
5. Report on the Asset class periodically

These actions are displayed below at Figure 1 - Operational Maintenance Flowchart.

Outcome/s 3:

- Council will capture asset data, as well as photos, condition, and other attachments, with permission controls and the ability to print as required. Seamless interoperability with the Maintenance Module also means, should another adverse defect be identified at a park during an assessment, a work order can be raised on the spot via a simple pop-up, eliminating double-handling and improving response time.
- Council will present intuitive, configurable dashboards making it easier to monitor activity across our asset network, presenting key asset information in a clear, easy-to-understand format. This feature delivers the right to stakeholders immediately and it is intended to post this information on Councils website.
- Council (CP) will work to a pre-configured work management solution that enables best-practice maintenance processes – be that reactive, proactive or strategic whilst connecting to both the field and CS to increase efficiency and visibility across all aspects of park asset management.

Liverpool City Council | Parks Review

- Council will improve transparency of reporting at the level of detail and control that suits our internal requirements around efficiencies but also our customers' expectations. In the field CP will leverage the cloud-based software through tablets and smartphones to relay real-time information to all stakeholder groups.



Figure 2 - Proposed Maintenance Flow



1.7. Service Level Agreements & Work Standards

Councils Delivery Program 2022-2026 and Operational Plan 2022-2023 (Plan) describes its intent around an asset management strategy where Councils assets are well managed to meet the needs of the current community and support future growth.

More specifically the Plan describes a detailed action to complete a review (this document) of parks operational structure and maintenance requirements with the following evaluation criteria:

- Ensure Service Levels are in line with community expectations; and
- Have correct mapping data to have service times and intervals for all parks service requirements.

It is clear the Council have not yet achieved service levels to community expectations given the re-occurrence of reporting around parks and garden maintenance. Whilst not purely a quantifiable exercise due to concurrent reporting and the dynamics of social media – there is still work to do in this space.

Outcome 4:

Council have researched and prepared its Parks Maintenance Work Standards (Appendix A) which detail both a baseline delivery service offering but also an escalated service offering as the asset class (parks) becomes more complex or is of a higher risk profile.

1.8. The Industrial Landscape

CP is a heavily unionised Directorate with a workforce that had been at odds with Management and previous Directors - the residual impact being hundreds of hours lost to matters other than parks and maintenance. Numerous issues presented which took the focus of the Directorate away from its core business function and this was counterproductive.

Outcome 5:

A more collegiate and collaborate model has been established which includes, but is not limited to:

- Weekly United Services Union (USU) / CP Meetings each Thursday
- Engagement to continue the CP 36 Hour Week Services Agreement
- Consensus to continue dialogue around safety and efficiency projects.
- A re-invigoration of matters to the Joint Consultative Committee
- Staff Breakfasts and Catch-Up at CP with all the Executive Leadership Team

It should be noted that a senior Delegate of the USU was the author and main contributor of Appendix A – Parks Works Maintenance Standards and we are united in our collective approach to improving our service offering.

Liverpool City Council | Parks Review

1.9. Resource Levelling

The LGA is growing exponentially, with a residential housing spread to the West and Southwest of the LGA which has required more park and garden infrastructure and a higher local demand for its current open green space and facilities.

Resourcing has been challenging for the Directorate, currently operating a hybrid mix of Full Time Equivalent (FTE) and contracted labour force to manage the service debt and the ongoing works.

CP had a resource level debt of circa 20 FTE positions across a range of roles and activities.

This debt presents not only a decreased response capability but the residual impacts of fatigue, an increase overtime liability, increased absenteeism and issues around short-term transfers into teams and roles - which ultimately became unsustainable.

Outcome 6:

- All vacant positions in CP are now in the Market.
- CP have modelled our resource requirements (levelling) towards 2032 which will allow us to provision and budget for a potential increased workforce of approximately 153 staff in three tranches over ten years.

This has been modelled at Appendix D

1.10. Localisation

CP staff are experience significant delays and 'dead running' during operational hours. The concept of 'dead running' is non-productive time spent travelling from location 'A' to the Depot to collect equipment and crew before returning to location 'A' to complete the work tasks assigned. 'Kitting to the Line' or having our 'kit' in closer proximity to where priority works or known works exist is then advantageous.

Outcome 7:

CP will re-open the Western Depot Site at Devonshire Street, Kemps Creek to service the key local priority of Austral and surrounds where LCC is seeing a development boom (and the residual demand of maintained parks and streets). From June 2023 the Western Depot will house:

- Civil Crew for potholes, shoulders, and roads
- Parks Crews
- Facilities Crews

CP will look at other opportunities to localize its teams to the north and east of the LGA.

Additionally, teams have been allocated clearly demarcated operational precincts of West, Central and East which ensure that CP can respond with optimal efficiency to scheduled and non-scheduled works.

Liverpool City Council | Parks Review

CP have modelled their requirements for Plant and Equipment through to 2031 to arrive at a potential cost of \$12.6m AUD (noting this does not take into account escalation nor the upside of the sale at auction of Councils Plant and Equipment).

These costs will be budgeted in line with the lifecycle of the equipment and replaced only where the equipment is exhausted, its warranty has expired, and its only residual value is its sale.

Outcome 8:

CP (Operations) will continue to trial and research innovative solutions that map to the intent of Council and its Environmental objectives where these innovations also provide cost efficiencies for constituents.

1.12.Recommendation

Council acknowledges the outcomes described in this Parks Review with a further update on our progress in September 2023

The Outcomes described in this review be presented to Council in satisfaction of the Resolution and in response to Councils Delivery Program 2022-2026 and Operational Plan 2022-2023. These are, in summary:

1. A comprehensive register developed of all Council's assets.
2. A comprehensive program of activities led by the incoming CEO.
3. Expand the use of the Asset Management Software called Brightly®
4. Prepared its Parks Maintenance Work Standards (Appendix A) which details a baseline delivery service offering.
5. A more collegiate and collaborate industrial model.
6. Modelled resource levels through to 2031.
7. Re-opening of the Western Depot; and
8. Research and develop green efficiencies.



Jason Breton
Acting Director Operations



Appendix A | Parks Maintenance Work Standards

Park Maintenance Work Standards applies to all parks and reserves that require the greatest level of maintenance standard in the Liverpool Local Government Area. These are typically parks and reserves that contain a high standard of amenities that are heavily used.

Parks maintained under the Parks Maintenance Work Standards include the following regional parks, sports complexes, community parks and special use facilities. The area of mowing should be inspected for any loose litter, debris or any potential projectiles that may put the operator, public or machinery at risk.

The following maintenance tasks contain basic elements for maintaining the parks and facilities, as per the agreed frequency schedule. They include:

- Lawn maintenance - Mowing, aeration, top dressing, weed control.
- Fertilising - Fertilising of turf, trees, shrubs and garden beds.
- Irrigation - Automated or manual watering of turf, trees, shrubs and garden beds.
- Disease and Pest Control - Prevention, correction and management of disease and pests in turf, trees, shrubs, garden beds either by chemical or cultural methods, includes pest control in and around park buildings and facilities.
- Hardscape surfaces- Sweeping, mowing and high pressure washing of walkways, streetscapes, median islands, parking lots, tennis courts, playgrounds and any other landscape surfaces in parks and facilities.
- Repair- Maintenance required for facilities or park amenities.
- Inspection - Visual and physical examination of a park facility, equipment, or amenity to ensure compliance, safety and proper operation.
- Garden Beds and Features - Mulching, watering, fertilising, disease control, weeding, planting or garden renovation.
- Park Building and Amenities Cleaning - Sweeping, sanitising, stocking of supplies; Reporting of all vandalism and graffiti.
- Special features - Maintenance of equipment or facilities such as drinking fountains, flag poles, soccer goals, tennis, volleyball, and basketball netting, picnic shelters, signs and rubbish bins etc.
- Playgrounds - Inspection and maintenance of play equipment and high frequency inspections are completed according to Australian Standards. Raking of soft fall mulch to level any dips or runs, and to remove any litter and other foreign objects in the surfacing material. All playground inspections are to be completed and kept on file.

A | Turf Areas

Turf areas are areas of turf within properties and road reserves of varying standards and sizes that range from intensive formal lawns through to extensive open space areas. Areas typically may be found in neighbourhood parks, Civic areas, Community Centres, Open Parkland etc. Parks Maintenance Staff are responsible for the mowing of turf areas, weeding, edging, litter control, surface finish, turf management, irrigation, drainage, and all other assets adjacent to or that form part of the turf areas, including nature strips and integrating maintenance with boundaries to adjoining properties.

Turf works include preparing areas for sowing or re sowing and the establishment of turf on sown or resown areas, maintaining the health and physical appearance of turf, irrigating to maintain optimum nutrient levels in the soil, soil conditioning, aeration of soils, top dressing to maintain level and safe playing surfaces and controlling turf pests, weeds and diseases.

Mowing:

Parks Maintenance Staff are to ensure that any mowing or turf trimming operation is carried out in a manner which does not damage or cause damage to any turf area, horticultural display, shrub, tree, amenity or facility within or adjacent to the work site. When ground conditions due to inclement weather (i.e. wet weather) prevents access by machinery, Parks Maintenance Staff shall make alternative arrangements for mowing in consultation with their respective Parks Coordinator.

Grass Surface:

The grass surface of all turf areas shall be even and free of holes and any protruding objects or other items which may cause injury to any person or equipment. Particular attention is to be paid to items such as in ground watering systems, all sprinkler heads, attachments and hose connection points shall finish flush with the ground surface. Parks Maintenance Staff are responsible for filling or lowering any area of turf and altering the level of any in ground watering system to comply with the above requirement.

Turf Management:

Turf Management involves a range of specialist operations to varying degrees, such as aeration, fertilising, over seeding etc. on a variety of Council assets. Parks Maintenance Staff are to develop a program that reflects the needs, complexities and all other aspects of turf management, consideration is to be given to use, profile, irrigation presence, turf species, seasonal factors etc. regarding turf areas. All works are to be carried out in accordance with accepted turf management industry standards and practices.

High Profile Park Assets:

Generally, include small areas of turf located at high profile civic locations. The lawns are maintained to reflect a high standard and precise attention to detail. Typically, the sites include lawns at locations such as Civic Centres and CBD areas.

Liverpool City Council | Parks Review

Maintenance Standards:

Parks Maintenance Staff shall ensure that the maintenance tasks described in this category are carried out and that the assets are maintained at the following minimum cleaning standards.

ACTIVITY		MAINTENANCE STANDARD
Service Cycle	Weekly	
Mowing	Mow when height exceeds 60mm by cutting to minimum 35mm length all year to achieve a regular cut finish. No visible clippings or windrows to remain. Parks Maintenance Staff are to replace any plantings damaged because of mowing, including plantings by community, individuals, Council, etc. If the plantings are a maintenance issue Parks Maintenance Staff are to advise the Parks Coordinator.	
Weeding	Weed when greater than 20% undesirable weeds including broad leaf weeds as determined by the Parks Coordinator. Weeding by chemical means is restricted to the use of Chemicals approved by the Parks Coordinator and used in accordance with the manufacturer's instructions. Only qualified Parks Maintenance Staff with AQF3 Chemical Application and Safety training are permitted to apply chemicals. An Herbicide/Chemical Application Form is to be completed whenever chemical/herbicide is used. All appropriate signage needs to be installed when chemical spraying occurs.	
Edging	Edge when turf has grown greater than 20mm over greater than 10% of the lawn edge. No single/isolated clump intrusion exceeds 50mm. Mechanical edging only. Edging includes the control of vegetation around poles, seats, fences, boundaries structures etc. and the removal of all remnant material form paths etc. Mechanical edging shall be vertical and chemical edging to mutually agreed with between relevant Parks Maintenance Team and Parks Coordinator.	
Mulching	Parks Maintenance Staff are responsible for the transport, placement, and containment of approved woodchips, mulch or other surface material and the maintenance of a minimum and maximum specified depth of cover always, free of weed species. This includes material placed for aesthetic, water conservation, and weed control measures in garden beds and planting situations as well as soft fall under playgrounds.	
Litter Control	Remove all visible litter, rubbish, debris, hazardous materials, and other unwanted objects.	
Grass surface	Repair all visible wheel ruts.	
Reporting	Report problems with assets/services that are and not part of these Standards, both Council and non – Council.	
Turf Management	Healthy turf all year-round exhibiting vigour and capable of withstanding traffic. Maintain a minimum 70% cover excluding significantly shade affected areas. According to program.	
Hygiene	Clean and/or sterilise all vehicles plant and equipment used including hand tools.	
Mandatory Forms	Mandatory Site Inspection Form, Toolbox Meeting Form, Plant Vehicle Checklist Form and Chemical/Herbicide Application Form, to be completed daily or as required.	

B | Medium Profile Park Assets:

Medium Profile areas range in size from small to medium turfed areas located predominantly within parks and road reserves. These areas are to be maintained to provide a quality recreational experience for all users, with a consistently turfed surface for general activities. Medium Profile areas constitute the entire area of small and medium sized parks, and the high use, high profile, visible areas of larger parks. Typically, sites include local parks, neighbourhood parks, the open space areas around sporting facilities, linear parks, playgrounds and streetscapes etc.

Maintenance Standards:

Parks Maintenance Staff shall ensure that the maintenance tasks described in this category are carried out and that the assets are maintained at the following minimum standards:

MAINTENANCE STANDARD	
ACTIVITY	
Service Cycle	Fortnightly
Mowing	Mow when height exceeds 125mm by cutting to minimum 45mm height to achieve a regular cut finish. Minimal windrows are allowed. Parks Maintenance Staff are to replace any plantings damaged as a result of mowing, including plantings by community, individuals, Council, etc. If the plantings are a maintenance issue the Parks Maintenance Staff are to advise the Parks Coordinator.
Weeding	Control of undesirable weeds as determined by the Parks Coordinator. Weeding by chemical means is restricted to the use of Chemicals approved by the Parks Coordinator and used in accordance with the manufacturer's instructions. Only qualified Parks Maintenance Staff with AQF3 Chemical Application and Safety training are permitted to apply chemicals. An Herbicide/Chemical Application Form is to be completed whenever chemical/herbicide is used. All appropriate signage needs to be installed when chemical spraying occurs.
Edging	Edge when turf has grown greater than 50mm over greater than 50% of the turf edge. No single/isolated clump intrusion greater than 100mm. Mechanical edging only, Chemical edging permitted to maximum width 50mm only with Parks Coordinator prior approval. Where no formal edge exists a smooth even continuous edge is to be maintained. Edging includes the control of vegetation around poles, seats, fences, boundaries structures etc. and the removal of all remnant material form paths etc. Mechanical edging shall be vertical and chemical edging to mutually agreed with between relevant team and Parks Coordinator.
Mulching	Parks Maintenance Staff are responsible for the transport, placement, and containment of approved woodchips, mulch or other surface material and the maintenance of a minimum and maximum specified depth of cover at all times, free of weed species. This includes material placed for aesthetic, water conservation, and weed control measures in garden beds and planting situations as well as soft fall under playgrounds.
Litter Control	Remove all visible litter, rubbish, debris, hazardous materials and other unwanted objects.

Grass Surface Reporting	Repair all visible wheel ruts.
Turf Management	Report problems with assets/services that are and also not part of these standards, both Council and non Council. Healthy turf and capable of withstanding normal pedestrian traffic. Maintain greater than 70% cover excluding significantly shade affected areas.
Hygiene	Clean and/or sterilise all vehicles plant and equipment used including hand tools.
Mandatory Forms	Mandatory Site Inspection Form, Toolbox Meeting Form, Plant Vehicle Checklist Form and Chemical/Herbicide Application Form, to be completed daily or as required.

C | Low Profile Park Assets:

Generally, are larger areas of open space and are generally less utilised for recreational activities. Low Profile areas are to be maintained to a standard which adds to the visual experience of these larger open spaces whilst being safe and useable for general activities. Low Profile areas are generally the large area sites or the components of larger parks of lower intensity use or profile, generally integrated onto various sites with grass areas, bushland and sporting facilities. Typically, these sites include large open areas, undeveloped areas of larger reserves, undeveloped linear reserves etc.

Liverpool City Council | Parks Review

Maintenance Standards:

Parks Maintenance Staff shall ensure that the maintenance tasks described in this category are carried out and that the assets are maintained at the following minimum standards:

MAINTENANCE STANDARD	
ACTIVITY	Monthly
Service Cycle	Monthly
Mowing	Mow when height exceeds 200mm by cutting to minimum 60mm length to achieve a regular cut finish. Minimal windrowing. Parks Maintenance Staff are to replace any plantings damaged as a result of mowing, including plantings by community, individuals, Council, etc. If the plantings are a maintenance issue Parks Maintenance Staff are to advise the Parks Coordinator.
Weeding	Control of undesirable weeds as determined by the Parks Coordinator. Weeding by chemical means is restricted to the use of Chemicals approved by the Parks Coordinator and used in accordance with the manufacturer's instructions. Only qualified Parks Maintenance Staff with AQF3 Chemical Application and Safety training are permitted to apply chemicals. An Herbicide/Chemical Application Form is to be filled out whenever chemical/herbicide is used. All appropriate signage needs to be installed when chemical spraying occurs.
Edging	Edge when turf has grown greater than 50mm over greater than 50% of the turf edge. No single/isolated clump intrusion greater than 100mm. Mechanical edging only. Chemical edging permitted to maximum width 100 only with Parks Coordinator prior approval. Where no formal edge exists a smooth even continuous edge is to be maintained. Edging includes the control of vegetation around poles, seats, fences, boundaries structures etc. and the removal of all remnant material form paths etc. Mechanical edging shall be vertical and chemical edging to mutually agreed with between the relevant Parks Maintenance Team and Parks Coordinator.
Mulching	Parks Maintenance Staff are responsible for the transport, placement, and containment of approved woodchips, mulch or other surface material and the maintenance of a minimum and maximum specified depth of cover at all times, free of weed species. This includes material placed for aesthetic, water conservation, and weed control measures in garden beds and planting situations as well as soft fall under playgrounds.
Litter Control	Remove all visible litter, rubbish, debris, hazardous materials and other unwanted objects.
Surface Finish	Repair all visible wheel ruts.
Reporting	Report problems with assets/services that are and also not part of these Standards, both Council and non-Council.
Turf Management	Healthy turf and capable of withstanding normal pedestrian traffic. Maintain greater than 50% cover excluding significantly shade affected areas.
Hygiene	Clean and/or sterilise all vehicles plant and equipment used including hand tools.
Mandatory Forms	Mandatory Site Inspection Form, Toolbox Meeting Form, Plant Vehicle Checklist Form and Chemical/Herbicide Application Form, to be completed daily or as required.

D | Asset Protection Zones (APZ):

Asset Protection Zones are larger areas of open space and road reserve not used for recreational activities. The APZ sites are to be maintained to a standard which adds to the visual experience of these larger open spaces with fire prevention in mind.

Maintenance Standards:

Parks Maintenance Staff shall ensure that the maintenance tasks described in this category are carried out and that the assets are maintained at the following minimum standards.

ACTIVITY	MAINTENANCE STANDARD
Service Cycle	Three weekly.
Mowing	Mow when height (when 15% of total area) exceeds 200mm by cutting to a minimum 100mm length to achieve a regular cut finish. Minimal windrowing. Parks Maintenance Staff are to replace any plantings damaged as a result of mowing, including plantings by community, individuals, Council, etc. If the plantings are a maintenance issue the Parks Maintenance Staff are to advise the Parks Coordinator.
Weeding	Control of undesirable weeds as determined by the Parks Coordinator. Weeding by chemical means is restricted to the use of Chemicals approved by the Parks Coordinator and used in accordance with the manufacturer's instructions. Only qualified Parks Maintenance Staff with AQF3 Chemical Application and Safety training are permitted to apply chemicals. An Herbicide/Chemical Application Form is to be completed whenever chemical/herbicide is used. All appropriate signage needs to be installed when chemical spraying occurs.
Edging	Edge when turf has grown greater than 150mm over greater than 50% of the turf edge. No single/isolated clump intrusion greater than 300mm. Chemical edging permitted to maximum width 150mm only with Parks Coordinators prior approval. Where no formal edge exists a smooth even continuous edge is to be maintained. Edging includes the control of vegetation around poles, seats, fences, boundaries structures etc. and the removal of all remnant material form paths etc. Mechanical edging shall be vertical and chemical edging to mutually agreed width between relevant Parks Maintenance Team and Parks Coordinator.
Litter Control	Remove all visible litter, rubbish, debris, hazardous materials and other unwanted objects.
Surface Finish	Repair all visible wheel ruts.
Reporting	Report problems with assets/services that are and not part of these Standards, both Council and non-Council.
Turf Management	Not required.
Hygiene	Clean and/or sterilise all vehicles plant and equipment used including hand tools.
Mandatory Forms	Mandatory Site Inspection Form, Toolbox Meeting Form, Plant Vehicle Checklist Form and Chemical/Herbicide Application Form, to be completed daily or as required.

E | Garden Beds and Streetscapes:

Garden beds are a range of both small and extensive landscaped areas within properties, road reserves and streetscapes and are the result of deliberate planting and construction within defined boundaries. They contain a range of sites from high profile intensively managed and maintained landscapes through to screen planting or a massed planting bed not located in a prominent or high activity area. Garden beds may include a range of features that are designed to enhance the aesthetic appeal such as rock outcrops or for functional purposes such as barriers to pedestrian traffic.

The Parks Maintenance Staff shall be responsible for the garden bed maintenance including, but not limited to, plant maintenance, weeding, edging, irrigation, litter control, mulching, drainage and all other assets adjacent to or that form part of the garden beds. All maintenance works shall be carried out so as not to compromise the integrity of the intent of the design for the garden bed or site. All shrubs and trees adjacent to paths, car parks, roadways, etc. shall be maintained to ensure clear sight lines and consider safety. All works are to be carried out in accordance with accepted horticultural industry standards and practices.

High Profile Garden Beds and Streetscapes:

Include a range of high profile, landscaped areas within parks, road reserves and Community and Civic Centres, generally associated with prominent infrastructure. They tend to have a high aesthetic profile and always result from deliberate construction within defined boundaries.

High Profile Garden Beds usually consist of perennials, herbaceous perennials or native and exotic shrubs or ground covers grown and arranged specifically for horticultural display purpose. Typically, the sites include garden beds adjacent to car parks, picnic/barbeque areas,

Civic buildings and facilities and gateways into the Liverpool Government Area.

In all floral displays, plants, including any replacements, must be of height, habit, and maturity, consistent with the design intent.

Maintenance Standards:

The Parks Maintenance Staff shall ensure that the maintenance tasks described in this category are carried out and that the assets are maintained at the following minimum standards:

Liverpool City Council | Parks Review

MAINTENANCE STANDARD	
ACTIVITY	Weekly
Service Cycle	
Weeding	Weed when coverage of any one bed exceeds 10% or height exceeds 100mm or a single weed occupies a spread area greater than 100cm. Weeding by chemical means is restricted to the use of Chemicals approved by the Parks Coordinator and used in accordance with the manufacturer's instructions. Only qualified Parks Maintenance Staff with AQF3 Chemical Application and Safety training are permitted to apply chemicals. An Herbicide/Chemical Application Form is to be completed whenever chemical/herbicide is used. All appropriate signage needs to be installed when chemical spraying occurs.
Mulching	Replenish when depth is less than 20mm or reduce when depth is 150mm after 2 weeks settlement, or when coverage less than 100% with approved mulch. Parks Maintenance Staff are responsible for the transport, placement, and containment of approved woodchips, mulch or other surface material and the maintenance of a minimum and maximum specified depth of cover always, free of weed species. This includes material placed for aesthetic, water conservation, and weed control measures in garden beds and planting situations as well as soft fall under playgrounds.
Litter Control	Remove all visible litter, rubbish, debris, hazardous materials and other unwanted objects.
Plant Maintenance	Remove when plant condition is less than 75% healthy. Plants divided as required for plant health and appearance. Removal of significant dead flowers or cuttings. Monitor plants in extreme weather conditions.
Edging	Edging when turf has grown greater than 30mm over greater than 25% of the garden edge or intrudes into bed and disrupts continually of edge (where not formally edged). Chemical edging only with prior approval to a maximum width of 50mm. Edging includes the control of vegetation around poles, seats, fences, boundaries structures etc. and the removal of all remnant material form paths etc. Mechanical edging shall be vertical and chemical edging to mutually agreed with between relevant Parks Maintenance Team and Parks Coordinator.
Reporting	Report problems with assets/services that are and also not part of these Standards, both Council and non Council.
Planting	Replace when plant number less than 90% or plant coverage less than 90% of design intent. Replace within 4 weeks or as per program approved by the Parks Coordinator.
Hygiene	Clean and/or sterilise all vehicles plant and equipment used including hand tools.
Mandatory Forms	

Medium Profile Garden Beds and Streetscapes:

Medium Profile Garden Beds include a range of both small and extensive landscaped areas within Parks. They are the result of deliberate planting and construction with defined boundaries. Medium Profile Garden Beds generally consist of native and exotic trees and shrubs grown in a self-sufficient manner, usually as screen plantings or as a massed planting bed and are not located in prominent or high activity areas. Typically, the sites include garden beds adjacent to car parks, playgrounds, or as screen planting to sports reserves, mass planting in neighbourhood parks, and plantings adjacent to mown turf areas in bushland settings.

Liverpool City Council | Parks Review

Maintenance Standards:

Parks Maintenance Staff shall ensure that the maintenance tasks described in this category are carried out and that the assets are maintained at the following minimum standards:

ACTIVITY	MAINTENANCE STANDARD
Service Cycle	Fortnightly
Weeding	Weed when coverage of any one bed exceeds 20% or height exceeds 150mm or a single weed occupies a spread area greater than 150cm ²
Mulching	Replenish when depth less than 20mm or reduce when exceeds 150mm after 2 weeks settlement, or when coverage less than 100% with approved mulch. Parks Maintenance Staff are responsible for the transport, placement, and containment of approved woodchips, mulch or other surface material and the maintenance of a minimum and maximum specified depth of cover always, free of weed species. This includes material placed for aesthetic, water conservation, and weed control measures in garden beds and planting situations as well as soft fall under playgrounds.
Litter Control	Remove all visible litter, rubbish, hazardous materials, and other unwanted objects.
Plant Maintenance	Remove when plant condition less than 60%.
Edging	Edge when turf has grown greater than 35mm over greater than 50% of the garden edge or intrudes into bed and disrupts continuity of edge (where not clearly defined). Chemical edging permitted to maximum width 50mm. Edging includes the control of vegetation around poles, seats, fences, boundaries structures etc. and the removal of all remnant material form paths etc. Mechanical edging shall be vertical and chemical edging to mutually agreed with between relevant Parks Maintenance Staff and Parks Coordinator.
Reporting	Report problems with assets/services that are and also not part of these Standards, both Council and non-Council.
Planting	Replace when plant number less than 80% or plant coverage less than 70% of design intent. Replace within 6 months or as per program approved by Parks Coordinator.
Hygiene	Clean and/or sterilise all vehicles plant and equipment used including hand tools.
Mandatory Forms	Mandatory Site Inspection Form, Toolbox Meeting Form, Plant Vehicle Checklist Form and Chemical/Herbicide Application Form, to be completed daily or as required.

Low Profile Garden Beds and Streetscapes:

Include a range of both small and extensive landscaped areas within Reserves. They are the result of deliberate planting and construction within defined boundaries. Low Profile Garden Beds generally consist of native trees and shrubs grown in a self-sufficient manner, usually as screen plantings and are also located in Road Reserves.

Liverpool City Council | Parks Review

Maintenance Standards:

Parks Maintenance Staff shall ensure that the maintenance tasks described in this category are carried out and that the assets are maintained at the following minimum standards:

Activity	Maintenance Standard
Service Cycle	Monthly
Weeding	Weed when coverage of any one bed exceeds 30% or height exceeds 250mm or a single weed occupies a spread area greater than 250cm ² . Weeding by chemical means is restricted to chemicals approved by the Parks Coordinator and used in accordance with the manufacturer's instructions. Only qualified Parks Maintenance Staff with AQF3 Chemical Application and Safety qualification are permitted to apply chemicals. An Herbicide/Chemical Application Form is to be completed whenever chemical/herbicide is used. All appropriate signage needs to be installed when chemical spraying occurs.
Mulching	Parks Maintenance Staff are responsible for the transport, placement, and containment of approved woodchips, mulch or other surface material and the maintenance of a minimum and maximum specified depth of cover always, free of weed species. This includes material placed for aesthetic, water conservation, and weed control measures in garden beds and planting situations as well as soft fall under playgrounds. Replenish when depth is less than 20mm or reduce when depth exceeds 150mm after 2 weeks settlement, or when coverage less than 100% with approved mulch.
Litter Control	Remove all visible litter, rubbish, hazardous materials and other unwanted objects.
Plant Maintenance	Remove when plant condition less than 60%.
Edging	Edge when turf has grown greater than 35mm over greater than 50% of the garden edge or intrudes into bed and disrupts continuity of edge (where not clearly defined). Chemical edging permitted to maximum width 50mm. Edging includes the control of vegetation around poles, seats, fences, boundaries structures etc. and the removal of all remnant material form paths etc. Mechanical edging shall be vertical and chemical edging to mutually agreed with between relevant Parks Maintenance Team and Parks Coordinator.
Reporting	Report problems with assets/services that are and also not part of these Standards, both Council and non Council.
Planting	Replace when plant number less than 60% or plant coverage less than 70% of design intent. Replace within 6 months or as per program approved by the Parks Co-ordinator.
Hygiene	Clean and/or sterilise all vehicles plant and equipment used including hand tools.
Mandatory Forms	Mandatory Site Inspection Form, Toolbox Meeting Form, Plant Vehicle Checklist Form and Chemical/Herbicide Application Form, to be completed daily or as required.

F | Natural Areas:

Natural areas range from small areas through to larger reserves, which may constitute part or all of a property of remnant vegetation, natural revegetation, or revegetation projects. Natural areas are managed and maintained for their natural experience and conservation values and often involve significant Community input. Natural areas are to be maintained with specialised work practices, by people with practical knowledge of the indigenous vegetation including its preservation, regeneration and revegetation. The quality of natural areas ranges from degraded sites with some remnant or revegetated material to good quality natural remnant areas. Typically, these sites include areas along water courses, wetlands, reserves set aside for the specific purpose of bushland preservation, and revegetation exercises within larger parks and smaller sites and remnants.

Natural areas are measured according to their 'Conservation Value' – Very High (>65), High (55-65), Medium (40-54) and (<40) Low. The Conservation Value is measured by using the Conservation Value Mapping method, which is the total score of the following ecological characteristics which make up a bushland environment:

- Tree canopy cover
- Understorey percentage cover
- Weed percentage cover
- Regeneration of native vegetation
- Percentage of Organic materials, including leaf litter and logs;
- Patch size;
- Vegetation Links with neighbouring bushland vegetation: and
- Site disturbance.

Maintenance:

Natural area maintenance means the management of a dynamic resource and includes revegetating and restoring areas, enabling natural regeneration, planting, weeding, mulching, etc. Bushland Maintenance Staff shall be responsible for the general maintenance of the natural areas in conjunction with the Community. Bushland Maintenance Staff are responsible for the regular inspection and general maintenance and upkeep of the natural areas included in the Standards.

Bushland Maintenance Staff shall not carry out any activities other than litter control, fire protection, surface finishing, and plant maintenance within areas defined as natural areas unless directed by the Environmental Operations Co-ordinator. Bushland Maintenance Staff shall, always when working in areas defined as a natural area, pay due regard to the protection of fauna and related habitat areas. Works on adjacent or overlapping assets such as park furniture, landscape features and structures, paths access roads and car parks, firebreaks etc. will be carried out to satisfy the required maintenance standards.

Liverpool City Council | Parks Review

The Environmental Operations Coordinator shall identify works, in conjunction with Community groups, and the Bushland Maintenance Staff, and advise the Bushland Maintenance Staff of those areas and the types of works required to be carried out within the Natural areas.

Bushland Maintenance Staff are to exhibit a proactive approach to community involvement, planning, nominating works and review of works in Natural areas. The works carried out will be directed towards protecting and reinforcing the existing indigenous species, controlling and eradicating invasive weeds, and revegetating nominated sites. Bushland Maintenance Staff will assist the Community Groups in the preparation of an Environmental Strategies and Management Plans for natural areas if required.

Plant maintenance shall be carried out to promote the natural habitat in a consistent and sympathetic manner, removing unsafe limbs and trees from high-risk areas such as paths, seats, turfed areas etc. Plant maintenance also addresses management practices to minimise potential spread of Phytophthora. Only Bushland Maintenance Staff who have demonstrated relevant experience and qualifications shall work in natural areas and be available as a direct point of contact/reference and for regular on-site review and planning.

Community Consultation/Support and Volunteers:

The Environmental Operations Coordinator shall be available to meet with the Community Representatives to determine the maintenance programs and extent of works at a range of specific locations at regular intervals. Bushland Maintenance Staff are responsible for providing support to Community Works in activities such as mulch delivery and spreading, rubbish removal, spraying, etc. These works are to be nominated by the Environmental Operations Coordinator.

Natural Areas with Very High Conservation Value:

Natural areas with a Very High Conservation Value should be maintained to ensure they remain at a level greater than 65 per cent using the Conservation Value Mapping Method. Ideally the aim should be to keep improving the Conservation Value of these areas.

Maintenance Standards:

Bushland Maintenance Staff shall ensure that the maintenance tasks described in this category are carried out and that the assets are maintained at the following minimum standards:

Liverpool City Council | Parks Review

TASK		MAINTENANCE STANDARD	
Service Cycle	Monthly		
Weeding		As mutually agreed by the Environmental Operations Coordinator and relevant Bushland Maintenance Team based on each bushland site objectives. Chemicals approved by the Environmental Operations Coordinator and used in accordance with the manufacturer's instructions. Only qualified Bushland Maintenance Staff with AQF3 Chemical Application and Safety qualifications are permitted to apply chemicals. An Herbicide/Chemical Application Form is to be completed whenever chemical/herbicide is used. All appropriate signage needs to be installed when chemical spraying occurs.	
Mulching		By mutual agreement between the Environmental Operations Coordinator and relevant Bushland Maintenance Team. Bushland Maintenance Staff are responsible for the transport, placement, and containment of approved woodchips, mulch or other surface material and the maintenance of a minimum and maximum specified depth of cover always, free of weed species. This includes material placed for aesthetic, water conservation, and weed control measures in garden beds and planting situations as well as soft fall under playgrounds.	
Litter Control		Remove all visible litter, rubbish, hazardous materials and other unwanted objects.	
Plant Maintenance		Habitat and environmentally sensitive.	
Reporting		Report problems with assets/services that are and also not part of these Standards, both Council and non Council.	
Planting		As mutually agreed between the Environmental Operations Coordinator and relevant Bushland Maintenance Team using local provenance plant material.	
Hygiene		Clean and/or sterilise all vehicles plant and equipment used including hand tools.	
Mandatory Forms		Mandatory Site Inspection Form, Toolbox Meeting Form, Plant Vehicle Checklist Form and Chemical/Herbicide Application Form, to be completed daily or as required.	

Natural Area with High Conservation Value:

Natural areas with a High Conservation Value should be maintained to ensure they remain at a level between 55 – 65 per cent using the Conservation Value Mapping method. Ideally the aim should be to keep improving the Conservation Value of these areas.

Maintenance Standards:

Bushland Maintenance Staff shall ensure that the maintenance tasks described in this category are carried out and that the assets are maintained at the following minimum standards:

Liverpool City Council | Parks Review

TASK		MAINTENANCE STANDARD
Service Cycle	Monthly	
Weeding		As mutually agreed between the Environmental Operations Coordinator and the respective Bushland Maintenance Team based on each individual site objectives. Weeding by chemical means is restricted to the use of Chemicals approved by the Environmental Operations Coordinator and used in accordance with the manufacturer's instructions. Only qualified Bushland Maintenance Staff with AQF3 Chemical Application and Safety qualifications are permitted to apply chemicals. An Herbicide/Chemical Application Form is to be completed whenever chemical/herbicide is used. All appropriate signage needs to be installed when chemical spraying occurs.
Mulching		As mutually agreed between Environmental Operations Coordinator and relevant Bushland Maintenance Team. Bushland Maintenance Staff are responsible for the transport, placement, and containment of approved woodchips, mulch or other surface material and the maintenance of a minimum and maximum specified depth of cover always, free of weed species. This includes material placed for aesthetic, water conservation, and weed control measures in garden beds and planting situations as well as soft fall under playgrounds.
Litter Control		Remove all visible litter, rubbish, hazardous materials and other unwanted objects.
Plant Maintenance		Habitat and environmentally sensitive.
Reporting		Report problems with assets/services that are and also not part of these Standards, both Council and non Council.
Planting		As mutually agreed between the Environmental Operations Co-ordinator and Bushland Maintenance Staff using local provenance plant material.
Hygiene		Clean and/or sterilise all vehicles plant and equipment used including hand tools.
Mandatory Forms		

Natural Area with Medium Conservation Value:

Natural areas with a Medium Conservation Value should be maintained to ensure they remain at a level between 45 -54 per cent using the Conservation Value Mapping method. Ideally the aim should be to keep improving the Conservation Value of these areas.

Maintenance Standards:

Bushland Maintenance Staff shall ensure that the maintenance tasks described in this category are carried out and that the assets are maintained at the following minimum standards:

Liverpool City Council | Parks Review

TASK		MAINTENANCE STANDARD	
Service Cycle	Monthly		
Weeding		As mutually agreed between the Environmental Operations Co-ordinator and the respective Bushland Maintenance Team based on each individual site objectives. Weeding by chemical means is restricted to the use of Chemicals approved by the Environmental Operations Coordinator and used in accordance with the manufacturer's instructions. Only qualified Bushland Maintenance Staff with AQF3 Chemical Application and Safety qualifications are permitted to apply chemicals. An Herbicide/Chemical Application Form is to be completed, whenever chemical/herbicide is used. All appropriate signage needs to be installed when chemical spraying occurs.	
Mulching		As mutually agreed between the Environmental Operations Coordinator and the relevant Bushland Maintenance Team. Bushland Maintenance Staff are responsible for the transport, placement, and containment of approved woodchips, mulch or other surface material and the maintenance of a minimum and maximum specified depth of cover always, free of weed species. This includes material placed for aesthetic, water conservation, and weed control measures in garden beds and planting situations as well as soft fall under playgrounds.	
Litter Control		Remove all visible litter, rubbish, hazardous materials and other unwanted objects.	
Plant Maintenance		Habitat and environmentally sensitive.	
Reporting		Report problems with assets/services that are and also not part of these Standards, both Council and non - Council.	
Planting		As mutually agreed by the Environmental Operations Co-ordinator and Bushland Maintenance Team using local provenance plant material.	
Hygiene		Clean and/or sterilise all vehicles plant and equipment used including hand tools.	
Mandatory Forms		Mandatory Site Inspection Form, Toolbox Meeting Form, Plant Vehicle Checklist Form and Chemical/Herbicide Application Form, to be completed daily or as required.	

Natural Area with Low Conservation Value:

Natural areas with a Low Conservation Value should be maintained to ensure they do not deteriorate below their current level using the Conservation Value Mapping method. Ideally the aim should be to keep improving the Conservation Value of these areas.

Maintenance Standards:

Bushland Maintenance Staff shall ensure that the maintenance tasks described in this category are carried out and that the assets are maintained at the following minimum standards:

Liverpool City Council | Parks Review

TASK		MAINTENANCE STANDARD
Maintenance Cycle	Monthly	
Weeding	As mutually agreed by the Environmental Operations Co-ordinator and respective Bushland Maintenance Team on each of the site objectives. Weeding by chemical means is restricted to the use of Chemicals approved by the Environmental Operations Coordinator and used in accordance with the manufacturer's instructions. Only qualified Bushland Maintenance Staff with AQF3 Chemical Application and Safety qualifications are permitted to apply chemicals. An Herbicide/Chemical Application Form is to be completed whenever chemical/herbicide is used. All appropriate signage needs to be installed when chemical spraying occurs.	
Mulching	As mutually agreed between the Environmental Operations Co-ordinator and relevant Bushland Maintenance Team. Bushland Maintenance Staff are responsible for the transport, placement, and containment of approved woodchips, mulch or other surface material and the maintenance of a minimum and maximum specified depth of cover always, free of weed species. This includes material placed for aesthetic, water conservation, and weed control measures in garden beds and planting situations as well as soft fall under playgrounds.	
Litter Control	Remove all visible litter, rubbish, debris, hazardous materials and other unwanted objects.	
Plant Maintenance	Habitat and environmentally sensitive.	
Reporting	Report problems with assets/services that are and not part of these Standards, both Council and non – Council	
Planting	As mutually agreed between the Environmental Operations Co-ordinator and Bushland Maintenance Team using local provenance plant material.	
Hygiene	Clean and/or sterilise all vehicles plant and equipment used including hand tools.	
Mandatory Completed Forms	Mandatory Site Inspection Form, Toolbox Meeting Form, Plant Vehicle Checklist Form and Chemical/Herbicide Application Form, to be completed daily or as required.	

G | Playgrounds

Playground areas are precise areas in which climbing, swinging, sliding, balancing and passive role playing occurs on constructed playground equipment within a soft fall area. Playgrounds are to be maintained to the highest quality to ensure the safety of children both using and watching the activity.

Playground Standards are established and defined by the Australian Standards Association (AS 4422 and AS 4486 and 4685) these will be the overriding quality standards. In the event of the Australian Standard being upgraded or otherwise changed, the new Australian Standard will become the overriding quality standard.

The playground includes all play equipment, under surfacing safety areas and edges. Typically, playgrounds are manufactured by a specialised playground equipment supplier, with under surfacing that has been tested and approved for its soft fall qualities. Playground Maintenance Staff are responsible for the regular inspection, maintenance and upkeep of all playgrounds. All playgrounds are to be maintained to the manufacturers' recommendations and current best practice in reducing all foreseeable risk.

Playground Cleaning and Maintenance:

Cleaning and Maintenance shall include, but not be limited to, the following tasks:

- Check general condition
- Remove all litter and rubbish including glass and other hazards from within the playground and surrounds
- Clean all structures and wash and disinfect as necessary
- Check all moving components for the correct movement
- Check and maintain the soft fall area around the equipment
- Check and maintain the soft fall area edging
- Remove graffiti and bill posters
- Report all issues that should come to the attention of the Playground and Community Centre Co-ordinator.

Playground Equipment:

Playground Maintenance Staff are to ensure that all playground equipment is in a safe condition for normal usage in accordance with the manufacturers' recommendations and current best practice in reducing foreseeable risk. Any components found to be showing signs of excessive wear, fatigue, and distress or suspected of being not up to the required standard are to be reported to the Playground and Community Centres Co-ordinator, immediately made safe and replaced with approved parts. This includes checking the operation of equipment to ensure that no condition exists for any entrapment of penetration resulting in injury as a result of using the equipment. Also included are repairs to any barriers,

Liverpool City Council | Parks Review

restrictive fencing etc. around or that form part of such sites as skateboard ramps and all maintenance to basketball rings, backboards and associated hard surfacing.

Replacement equipment arising from wear and tear and normal vandalism shall be reported to the Playground and Community Centre Coordinator. Complete destruction of equipment shall be referred to the Capital Works Program.

Soft fall Material:

Softfall material is to consist of either approved wood chips or bark chips supplied from an approved source, and which is free of large and sharp objects. Any Softfall material purchased by the Playground and Community Centre Co-ordinator and are to be accompanied with documentation demonstrating satisfactory results from an approved test for playground Softfall material.

Sufficient Softfall material shall be provided around all equipment to provide a cushioned landing area in accordance with the Australian Standards for the users of the playground equipment. Softfall material depth is to be a minimum of the Australian Standard for the approved mulch type and uniformly spread around the equipment. The Softfall material shall be of a consistent type across the Council and shall not be changed without the approval of the Playground and Community Centre Co-ordinator.

The depth of Softfall material shall not inhibit the effective use of playground equipment and appropriate clearances shall be always maintained. All Softfall material is to be raked over on a regular basis to redistribute it in areas where it has been removed from by use of the equipment. Raking shall be carried out to such an extent that any rubbish, debris, and unwanted objects are exposed and then removed.

Playground Maintenance Staff shall remove and dispose of all foreign material found in the soft-landing material or on the play equipment itself. Where excrement is removed from the surface of play equipment Playground Maintenance Staff shall scrub and disinfect the surface of the equipment. The Softfall material shall be enclosed within any existing edging where present. Where the soft fall is below the soil surface the top of the edging is to be level with the surrounding ground levels.

Edging:

All edging on defined edges shall be treated using mechanical means.

Playground Assessments:

Playground Maintenance Staff shall be responsible for carrying out an annual inspection to check the structural integrity of all playground equipment and its conformance with all current regulations.

The Playground District and Neighbourhood Asset distinctions generally exist to highlight intensity of use and development and in no way suggest a compromised safety standard is to exist. Playground Maintenance Staff shall carry out regular inspections of all equipment throughout the year to an agreed program. Playground Maintenance staff are the only suitably qualified and experienced personnel to undertake playground inspections.

Liverpool City Council | Parks Review

District Playgrounds:

District playgrounds are generally district playgrounds and draw people from the broader area and offer a greater range of play activities on one site. The playgrounds are often located in conjunction with other park structures and developments in larger parks linking various areas. These playgrounds are generally intensively used and are more complex in nature: included in this category are skateboard parks, water parks, childcare and community centre playgrounds.

Maintenance District Playgrounds:

Playground Maintenance Staff shall ensure that the maintenance tasks described in this category are carried out and that the assets are maintained at the following minimum standards:

TASK		MAINTENANCE STANDARD	
Service Cycle		Daily	
Weeding		Weed when coverage of any one soft fall area exceeds 10% or height exceeds 50mm or single weed occupies a spread area greater than 100cm ² . Weeding by chemical means is restricted to the use of Chemicals approved by the Playground and Community Centres Coordinator and used in accordance with the manufacturer's instructions. Only qualified Playground Maintenance Staff with AQF3 Chemical Application and Safety qualifications are permitted to apply chemicals. An Herbicide/Chemical Application Form is to be completed whenever chemical/herbicide is used. All appropriate signage needs to be installed when chemical spraying occurs.	
Mulching		Maintain soft fall to relevant Australian Standards for approved mulch type. Playground Maintenance Staff are responsible for the transport, placement, and containment of approved woodchips, mulch or other surface material and the maintenance of a minimum and maximum specified depth of cover always, free of weed species. This includes material placed for aesthetic, water conservation, and weed control measures in garden beds and planting situations as well as soft fall under playgrounds.	
Litter Control		Remove all visible litter, rubbish, debris, hazardous materials and other unwanted objects.	
Plant Maintenance		Prune all overhanging dead or low hanging branches to make safe.	
Cleaning		Clean when stains, grease, graffiti or build-up of dirt appear and are generally to provide hygienic appealing opportunities for play.	
Repairs		Playground Maintenance Staff are to report any repairs required to the Playground and Community Centres Coordinator for action.	
Painting		Paint when the painted surface is worn, cracked or lifting or when cleaning fails to remove graffiti. As per approved program.	
Edging		Edge when turf has grown greater than 50mm over greater than 50% of the turf edge. No single/isolated clump intrusion greater than 70mm. Where no formal edge exists a smooth even continuous edge is to be maintained.	

Liverpool City Council | Parks Review

	Edging includes the control of vegetation around poles, seats, fences, boundaries structures etc. and the removal of all remnant material form paths etc. Mechanical edging shall be vertical and chemical edging mutually agreed between relevant Playground Maintenance Staff and Playground and Community Centre Coordinator.
Surface Finish	Maintain even and regular surface that is free draining around playground equipment with appropriate clearances.
Reporting	Report problems with assets/services that are and also not part of these Standards, both Council and non Council. Report monthly activity. Report responses to external inspections, including, equipment which cannot be repaired and needs replacing through the Capital Works Program.
Hygiene	Clean and/or sterilise all vehicles plant and equipment used including hand tools.
Professional Services-Internal	12 inspections per year to an approved program using approved Playground Maintenance Staff.
Professional Services-External	An inspection/report annually to an approved program using approved Playground Inspectors to ensure specified outcomes with current best practice in accordance with current, and any future, Australian Standards.
Mandatory Forms	Mandatory Site Inspection Form, Toolbox Meeting Form, Plant Vehicle Checklist Form and Chemical/Herbicide Application Form, to be completed daily or as required.

Neighborhood Playgrounds:

Neighbourhood Playgrounds are generally playgrounds that generally draw their patronage from the immediate area. The playgrounds offer a variety of activities in a confined and intense area and typically occur in smaller parks in isolation from other park structures. These playgrounds are generally less intensively used and are often of a simpler nature.

Maintenance Standards:

Playground Maintenance Staff shall ensure that the maintenance tasks described in this Category are carried out and that the assets are maintained at the following minimum standards:

TASK	MAINTENANCE STANDARD
Service Cycle	Monthly
Weeding	Weed when coverage of any one soft fall area exceeds 10% or height exceeds 50mm or single weed occupies a spread area greater than 100cm ² Weeding by chemical means is restricted to the use of Chemicals approved by the Playground and Community Centres Coordinator and used in accordance with the manufacturer's instructions. Only qualified Playground Maintenance Staff with AQF3 Chemical Application and Safety qualifications are permitted to apply chemicals. An Herbicide/Chemical Application Form is to be filled out whenever chemical/herbicide is used. All appropriate signage needs to be installed when chemical spraying occurs.

Liverpool City Council | Parks Review

Mulching	Maintain soft fall to relevant Australian Standards for approved mulch type. Playground Maintenance Staff are responsible for the transport, placement, and containment of approved woodchips, mulch or other surface material and the maintenance of a minimum and maximum specified depth of cover always, free of weed species. This includes material placed for aesthetic, water conservation, and weed control measures in garden beds and planting situations as well as soft fall under playgrounds.
Litter Control	Remove all visible litter, rubbish, debris, hazardous materials and other unwanted objects.
Plant Maintenance	Prune all overhanging dead or low hanging branches to make safe.
Cleaning	Clean when stains, grease, graffiti or build-up of dirt appear and generally to provide hygienic appealing opportunities for play.
Repairs	To a standard that reduces all foreseeable risks and where the structure permits to conform with current, and any future, Australian Standards.
Painting	Paint when the painted surface is worn, cracked or lifting or when cleaning fails to remove graffiti. As per approved program.
Edging	Edge when turf has grown greater than 80mm over greater than 50% of the turf edge. No single clump intrusion greater than 100mm. Where no formal edge exists a smooth even continuous edge is to be maintained. Edging includes the control of vegetation around poles, seats, fences, boundaries structures etc. and the removal of all remnant material form paths etc. Mechanical edging shall be vertical and chemical edging to mutually agreed with between relevant team and Parks Coordinator.
Surface finish	Maintain even and regular surface that is free draining around playground equipment with appropriate clearances.
Reporting	Report problems with assets/services that are and not part of these Standards, both Council and non - Council. Report monthly activity. Report responses to external inspections, including, equipment, which cannot be repaired and needs replacing through the Capital Works Program.
Hygiene	Clean and/or sterilise all vehicles plant and equipment used including hand tools.
Professional Services – Internal	12 inspections/reports per year to an approved program by approved inspectors.
Professional Services – External	An inspection/report annually to an approved program using approved inspectors to ensure specified outcomes with current best practice in accordance with current, and any future, Australian Standards.
Mandatory Forms	Mandatory Site Inspection Form, Toolbox Meeting Form, Plant Vehicle Checklist Form and Chemical/Herbicide Application Form, to be completed daily or as required.

H | Paths, Access Roads, and Carparks:

Liverpool City Council | Parks Review

Paths, Access Roads and Car Parks are generally located within larger properties and include all designated shared pathways including equestrian, paths, access roads, walkways, standing areas, steps, courtyards, car parks and board walks and consist of various materials including timber, crushed rock, granitic sand, concrete, brick etc. and without a formal kerb. Typically, paths, access roads and car parks provide all weather access and are defined by their surface material and usage and are a result of deliberate construction. Parks Maintenance Staff are responsible for the regular inspection, maintenance and upkeep of all pedestrian pathways, bicycle paths, access roads and car parks. Pedestrian pathways, bicycle paths, roads and car parks shall be always fully operational, effectively drained of all surface water and maintained in a sound condition that ensures the safe passage of pedestrians, bicycles, and vehicles.

The maintenance of Paths, Access Roads, and Car Parks shall include but not be limited to the following tasks that should be performed on a regular basis:

- regular attention to potholes, depressions, cracks, steps, erosion, and surface finish
- grading and replacement of gravel/sand materials to maintain correct pavement shape
- attention to drainage
- attention to edging.
- attention to safety and hazard.
- attention to maintenance of clear sight lines.
- attention to weeding.

Replacement paving and edgings shall be constructed to match adjacent sections using similar materials and profile unless otherwise directed by the relevant Parks Co-ordinator.

Potholes or depressions in an unsealed gravel or fine crushed rock pavement or shoulder shall be filled with the same material as that in the existing pavement or shoulder. Parks Maintenance Staff shall maintain all paths and pedestrian areas in a moss/mould free, non-slippery, stable surface condition. Parks Maintenance Staff are responsible for all signage associated with car parks and all drainage including pits, pipes, grates etc. except that which constitutes part of the main or general storm water system. All works are to be carried out in accordance with accepted trade and industry standards and practices.

Maintenance Standards:

Parks Maintenance Staff shall ensure that the maintenance tasks described in this category are carried out and that the assets are maintained at the following minimum standards: Weeding by chemical means is restricted to the use of Chemicals approved by the Parks Coordinator and used in accordance with the manufacturer's instructions. Only qualified Parks Maintenance Staff with AQF3 Chemical Application and Safety training are permitted to apply chemicals. An Herbicide/Chemical Application Form is to be completed whenever chemical/herbicide is used. All appropriate signage needs to be installed when chemical spraying occurs.

Liverpool City Council | Parks Review

TASK		MAINTENANCE STANDARD	
Service Cycle		Monthly	
Surface Finish			Grade gravel surfaces when rutting, potholing and corrugations exceeds 75mm over 20% of pavement surface.
Weeding			Weed when coverage exceeds 20% or height exceeds 50mm or a single weed occupies a spread area greater than 100cm ² . Weeding by chemical means is restricted to the use of Chemicals approved by the Parks Coordinator and used in accordance with the manufacturer's instructions. Only qualified staff with AQF3 Chemical Application and Safety qualifications are permitted to apply chemicals. An Herbicide/Chemical Application Form is to be filled out whenever chemical/herbicide is used. All appropriate signage needs to be installed when chemical spraying occurs.
Litter Control			Remove all visible litter, rubbish, debris, hazardous materials and other unwanted objects.
Reporting			Report problems with assets/services that are and also not part of these Standards, both Council and non-Council.
Edging			As for adjacent Turf/Garden Bed Asset. Where no formal edge exists a smooth even continuous edge is to be maintained to a vegetation clearance of greater than 90% the path design width. Edging includes the control of vegetation around poles, seats, fences, boundaries structures etc. and the removal of all remnant material form paths etc. Mechanical edging shall be vertical and chemical edging to mutually agreed with between relevant team and Parks Coordinator.
Hygiene			Clean and/or sterilise all vehicles plant and equipment used including hand tools.
Mandatory Forms			Mandatory Site Inspection Form, Toolbox Meeting Form, Plant Vehicle Checklist Form and Chemical/Herbicide Application Form, to be completed daily or as required.

I | PARK FURNITURE:

Park furniture is generally located throughout Liverpool City Councils Parks and includes signs, seats, tables, bins, lights, drinking fountains, bollards, fences, gates, plaques, hand - rails, outdoor exercise equipment, electrical outlet points, etc. Also included are all associated infrastructure such as wiring, pipes etc. The constructed components of the park are to be maintained to a high standard and safety reflecting the quality of the environment they are located within. Typically, park furniture is located throughout all parks and reserves in various forms and constitutes all manufactured and constructed items, excluding natural items and landforms.

Parks Maintenance Staff are responsible for the regular inspection, maintenance and upkeep, including the safety, of all park furniture and similar facilities within the properties of the Standards. All park furniture shall be regularly inspected to ensure that it remains clean, safe and maintained in good repair always. Signs are to be maintained so they are clear and legible, graffiti free, upright and in a safe condition. All signs within park facilities, such as corporate, local laws, informative, interpretive, regulatory and statutory are included. Signs denominating activities on properties such as Child Care Centres, Libraries, Community Houses, Recreation Centres etc. are not the responsibility of the park's maintenance staff, however internal directional signs for such are. In some property's fittings, appliances, and equipment related to authorities and or easements

exist, these items are not the responsibility of the park's maintenance staff except for the reporting of any damage. All works are to be carried out in accordance with accepted trade and industry standards and practices. Shared boundary fencing with abutting properties is not included in these standards.

Cleaning:

All furniture shall be always kept clean from the accumulation of dirt, grease, cobwebs, graffiti, bill posters etc. and the surrounds shall be cleared of vegetation (weeds and long turf). If graffiti cannot be removed from non-painted furniture by cleaning and/or sanding, the furniture or components shall be replaced with the prior approval of the Parks Co-ordinator. All vegetation including overhanging vegetation shall be removed from around signs and other furniture to maintain good visibility and to ensure that it fulfils its purpose for park users. All drinking fountains shall be regularly inspected and maintained in a clean, hygienic condition and operational with adequate pressure and drainage always. All light fittings shall be regularly always inspected and maintained with all lamps (globes) operational.

Parks Maintenance Staff shall ensure that the park furniture is adequately drained, and that storm water drains away from the base and immediate surrounds. Where excrement is removed from the surface of park furniture the staff shall scrub and disinfect the surface of the equipment.

Painting:

Parks Maintenance Staff shall paint furniture as follows:

- Spot paint to cover graffiti where the graffiti cannot be cleaned.
- Paint furniture in accordance with an approved program.

Parks Maintenance Staff shall repaint furniture with paint of equivalent brand and colours and shall record all brands and colours used by the Council at the commencement of the Standards.

Repairs:

Facilities Management Staff shall undertake minor repairs to all park furniture. Such repairs shall include replacing and securing worn or loose components and fixings and sanding of splintered surfaces on seats, tables handrails etc. Facilities Management Staff shall inspect, and when required, replace lamps (globes) to all park lights that are the responsibility of Council. Lights specifically for the purpose of illuminating buildings for ambient effect or illuminating signs on buildings (i.e., non-park-based signs) are not the responsibility of the Parks Maintenance Staff.

Lights requiring attention that are the responsibility of a service authority are to be reported to the Facilities Management Co-ordinator for notification. All work on lights and other electrical fittings shall be carried out by a registered electrical contractor where required by legislation and industry requirements and shall be approved by the Facilities Management Co-ordinator.

Liverpool City Council | Parks Review

All plumbing works on drinking fountains and other installations shall be carried out by a registered plumber approved by the Facilities Management Co-ordinator using approved materials only all in accordance with the appropriate plumbing regulations. Timers shall be set and adjusted to allow for power interruptions, daylight savings other specific occasions etc.

Facilities Management Staff are responsible for the maintenance or replacement of any in ground pipework. All repairs on park furniture are only to be performed by licensed trade persons where such licensing is required and elsewhere by appropriately experienced and trained Facilities Management Staff.

Maintenance Standards:

Parks Maintenance Staff shall ensure that the maintenance tasks described in this Category are carried out and that the assets are maintained at the following minimum standards:

TASK	MAINTENANCE STANDARD
Service Cycle	Monthly
Cleaning	Clean when stains, grease, graffiti or build-up of dirt cobwebs or other contaminants etc. appear.
Painting	Paint when the painted surface is worn, cracked or lifting or when cleaning fails to remove graffiti. When signs are faded or damaged and compromise sign function and aesthetics. As per approved program.
Repairs	Report any parts that require adjusting, repair, testing, replacing when parts are non-operative, defective or worn to the Facilities Management Coordinator. Ensure all park furniture is fully operational and in good repair.
Litter Control	Remove all visible litter, rubbish, debris, hazardous materials and other unwanted objects.
Surface Finish	Provide a safe, non-slip, even surface with no potholes, trip edges, loose paving etc.
Weeding	Weed when coverage exceeds 20% or height exceeds 50mm or a single weed occupies a spread area greater than 100cm ² . Weeding by chemical means is restricted to the use of Chemicals approved by the Parks Coordinator and used in accordance with the manufacturer's instructions. Only qualified staff with AQF3 Chemical Application and Safety training are permitted to apply chemicals. An Herbicide/Chemical Application Form is to be filled out whenever chemical/herbicide is used. All appropriate signage needs to be installed when chemical spraying occurs.
Litter Control	Remove all visible litter, rubbish, debris, hazardous materials and other unwanted objects.
Reporting	Report problems with assets/services that are and also not part of these Standards, both Council and non-Council.

Edging	Where no formal edge exists a smooth even continuous edge is to be maintained. Max 150mm Chemical edging where permitted. Edging includes the control of vegetation around poles, seats, fences, boundaries structures etc. and the removal of all remnant material form paths etc. Mechanical edging shall be vertical and chemical edging to mutually agreed with between relevant team and Parks Coordinator.
Hygiene	Clean and/or sterilise all vehicles plant and equipment used including hand tools.
Mandatory Forms Completed	Mandatory Site Inspection Form, Toolbox Meeting Form, Plant Vehicle Checklist Form and Chemical/Herbicide Application Form, to be completed daily or as required.

J | LANDSCAPE FEATURES AND STRUCTURES:

Landscape Features and Structures are generally located throughout Liverpool City Councils parks and include all structural and definitive elements, including retaining walls, garden edges, planter boxes, shelters, bridges, culverts etc. Also included in this asset category are such sites as B.M.X mounds, rebound walls, etc. These constructed elements are to be maintained to a high standard and safety reflecting the designed intent, and the quality environment they are located within. All elements are to conform to the relevant Australian Standards and building codes. Typically, the structural elements are located throughout the Council and include all-purpose built structures at various sites. This asset does not include buildings such as pavilions, toilets, information centres, Civic buildings, storage facilities, etc.

Parks Maintenance Staff are responsible for the inspection, maintenance, cleaning and upkeep of all landscape features and structures within the properties covered by these Standards. All park landscape features and structures shall be regularly inspected to ensure that they remain clean and always maintained in good repair. All works are to be carried out in accordance with accepted trade and industry standards and practices.

Cleaning:

All landscape features and structures shall be always kept clean from the accumulation of dirt, grease, cobwebs, graffiti, bill posters etc. and the surrounds shall be cleared of vegetation (weeds and long turf). If graffiti cannot be removed from non-painted furniture by cleaning and/or sanding, the furniture or components shall be replaced with the prior approval of the Parks Maintenance Co-ordinator. All vegetation and overhanging vegetation shall be removed from around signs to maintain good visibility for the park users and from any structures etc. to ensure that they fill their intended purpose. Parks Maintenance Staff shall ensure that the landscape features and structures are adequately drained, and that stormwater drains away from the base and immediate surrounds.

Liverpool City Council | Parks Review

Painting:

Facilities Management Staff shall paint the structures as follows:

- Spot paint to cover graffiti where the graffiti cannot be cleaned.
- Paint the feature/structure once every two years.

Where the structure has been damaged, Parks Maintenance Staff shall advise the Parks Maintenance Co-ordinator within 24 hours.

Repairs:

Facilities Management Staff shall undertake minor repairs to all Landscape Features and Structures. Such repairs shall be limited to securing loose roofing, cladding, seating, bricks, timbers, fixings, etc. and associated assets identified within these Standards. All other damages shall be made safe and shall be reported to the Facilities Management Co-ordinator. All repairs on landscape features and structures are only to be performed by licensed trade persons where such licensing is required and elsewhere by appropriately experienced and trained Facilities Management Staff.

B.M.X mounds and tracks are to be maintained free of any hazards and weed when coverage of any one bed exceeds 20% or height exceeds 150mm or a single weed occupies a spread area greater than 150cm². Rebound walls are to be maintained in a structurally safe condition and with all graffiti regularly removed and fulfilling their constructed intent.

Liverpool City Council | Parks Review

Maintenance Standards:

Parks Maintenance Staff shall ensure that the maintenance tasks described in this Category are carried out and that the assets are maintained at the following minimum standards:

TASK		MAINTENANCE STANDARD	
Service Cycle	Monthly		
Cleaning		Clean when stains, grease, graffiti or build-up of dirt, cobwebs, droppings etc. appear.	
Painting		Report any painting required to Facilities Management Coordinator when the painted surface is worn, cracked or lifting or when cleaning fails to remove graffiti. When signs are badly faded or damaged.	
Repairs		Report any adjusting, repairs, testing and replacing of parts that are non-operative, defective or worn. Check/testing of residual current devices in accordance with manufacturers recommendations.	
Litter Control		Remove all visible litter, rubbish, debris, hazardous materials and other unwanted objects.	
Surface Finishing		Provide a safe, non-slip, even surface with no potholes, trip edge, loose paving etc.	
Weeding		Weed when coverage exceeds 20% or height exceeds 50mm or a single weed occupies a spread area greater than 100cm ² . Weeding by chemical means is restricted to the use of Chemicals approved by the Parks Coordinator and used in accordance with the manufacturer's instructions. Only qualified staff with AQF3 Chemical Application and Safety training are permitted to apply chemicals. An Herbicide/Chemical Application Form is to be filled out whenever chemical/herbicide is used. All appropriate signage needs to be installed when chemical spraying occurs.	
Reporting		Report problems with assets/services that are and also not part of these Standards, both Council and non-Council.	
Edging		Mechanical where formal edges exist. Edging includes the control of vegetation around poles, seats, fences, boundaries structures etc. and the removal of all remnant material form paths etc. Mechanical edging shall be vertical and chemical edging to mutually agreed with between relevant team and Parks Coordinator.	
Hygiene		Clean and/or sterilise all vehicles plant and equipment used including hand tools.	
Mandatory Forms		Mandatory Site Inspection Form, Toolbox Meeting Form, Plant Vehicle Checklist Form and Chemical/Herbicide Application Form, to be completed daily or as required.	

K | INFORMAL WATER FEATURES / WATER SENSITIVE URBAN DESIGN / WETLANDS

These are water bodies intended for the aesthetic, habitat and drainage purposes and associated infrastructure located within various properties. Typically, they tend to be free form water courses, ponds, lakes and dams, with associated water courses, wetlands and aquatic infrastructure. WSUD Maintenance Staff are responsible for the regular inspection, maintenance and upkeep of water features under Councils responsibility.

Water Quality:

WSUD Maintenance Staff shall carry out regular visual checks of all water bodies for signs of water contamination or deterioration in health quality advising the Co-ordinator of any such change.

Maintenance Standards:

WSUD Maintenance Staff shall ensure that the maintenance tasks described in this Category are carried out and that the assets are maintained at the following minimum standards:

MAINTENANCE STANDARD	
TASK	
Service Cycle	Quarterly and following storm events.
Cleaning	When loose litter, stains, graffiti and other foreign matter appear. When water quality falls below Council's Health Standards.
Debris Control	Inspect, assess and clear obstructions and sediment from drainage pipes, end walls, pipe outlets, swale drains, trenches, pits, rock walls and rock beaching.
Weed Control	Monitor terrestrial and riparian areas for noxious and environmental weeds. Remove weeds from terrestrial and riparian areas to <5% cover or as mutually agreed with Environmental Operations Coordinator and the WSUD Maintenance Team. Monitor the spread of Typha and Phragmites and control where emergent. Weeding by chemical means is restricted to the use of Chemicals approved by the Environmental Operations Coordinator and used in accordance with the manufacturer's instructions. Only qualified staff with AQF3 Chemical Application and Safety qualifications are permitted to apply chemicals. An Herbicide/Chemical Application Form is to be completed whenever chemical/herbicide is used. All appropriate signage needs to be installed when chemical spraying occurs.
Litter Control	Remove all visible litter, rubbish, debris, hazardous materials and other unwanted objects.
Repairs	Ensure all protective grates and barriers are secure. Adjust, repair and replace any damaged, defective or worn materials on bridges and/or viewing structures. Maintain applied finishes on bridges and/or viewing structures. Assess and report any replacement park furniture and fencing required. Report any timber requiring oiling, painting of park furniture and fencing as required. Repair and replace drainage structures as required. Replace

Liverpool City Council | Parks Review

	rocks as required. Structural assessment, repair and replacement of all assets as required. Re – grouting, replacement and reinstatement of rock beaching as required. Repair and maintain access track following each de – silting operation.
Plant Maintenance	Maintenance to occur in terrestrial, riparian and aquatic areas. Inspect plants for signs of disease, pest infection and stunted growth – remove affected plants or treat as necessary. Plant and mulch replacement as required. Stake straightening, replacement and removal as required. Fertilising and pruning as required. Plant replacement and thinning in aquatic and terrestrial zones as required. Dead plants may need to be periodically removed. Ensure that the bed of the wetland remains free draining as a result of the vegetation removal.
Planting	Infill planting should be carried out as required using the original planting schedules to guide species selection and planting densities.
Mowing	Ensure grass clippings are directed away from garden beds/planted areas and wetlands where possible.
Hygiene	Clean and/or sterilise all vehicles plant and equipment used including hand tools.
Surface Finish	Provide a safe, non-slip, even, stable surface reflecting design intent including all access points.
Reporting	Report problems with assets/services that are and also not part of these Standards, both Council and non-Council.
Sediment Control	Remove settleable materials, including sediment, silt, litter and organic matter once accumulation is within 500mm of the normal water level or is significantly compromising the operation of the asset
Erosion Control	Any erosion damage of the wetland batters or around the inlet and outlet structures should be noted and remediation measures undertaken immediately. Remediation measures may include velocity reduction and dispersal, surface reinforcement and revegetation.
Mandatory Forms	Mandatory Site Inspection Form, Toolbox Meeting Form, Plant Vehicle Checklist Form and Chemical/Herbicide Application Form, to be completed daily or as required.

L | RIVERS / CREEKS – BANKS AND BEDS:

These are located at specific sites and are generally those water courses which are naturally occurring although may be significantly modified. These assets are typically recognised Roads and Maritime Services properties and are natural, concrete lined, revegetated or modified in other ways, any works or modification to the creek flow requires Roads and Maritime Services approval.

Liverpool City Council | Parks Review

The overriding responsibility of Rivers/Creeks – Beds and Banks is that of Roads and Maritime Services, however the Bushland Maintenance Staff are responsible for a range of maintenance issues.

Bushland Maintenance Staff are responsible for the maintenance of beds and banks of rivers, creeks and associated wetlands including litter control, weed control and plant maintenance at the Environmental Operations Coordinator's direction. Any reports by the public or observations by the Bushland Maintenance Staff of suspected water pollution are to be reported to the Environmental Operations Coordinator immediately.

Maintenance Standards:

Bushland Maintenance Staff shall ensure that the maintenance tasks are carried out and that the assets are maintained at the following minimum standards:

TASK		MAINTENANCE STANDARD
Service Cycle	Fortnightly	
Cleaning	When loose litter, debris, rubbish or graffiti appear.	
Weed Control	When identified, in conjunction with bushland works. Weeding by chemical means is restricted to the use of Chemicals approved by the Environmental Operations Coordinator and used in accordance with the manufacturer's instructions. Only qualified staff with AQF3 Chemical Application and Safety qualifications are permitted to apply chemicals. An Herbicide/Chemical Application Form is to be completed whenever chemical/herbicide is used. All appropriate signage needs to be installed when chemical spraying occurs.	
Litter Control	Remove all visible litter, rubbish, debris, hazardous materials and other unwanted objects. Clearing of litter traps according to approved program. Fallen trees and large limbs are to be reported to the Environmental Operations Co-ordinator for action by Roads and Maritime Services NSW.	
Planting	As mutually agreed between the Environmental Operations Coordinator and the Bushland Maintenance Team.	
Plant Maintenance	Maintain to protect habitats. Maintain regarding erosion.	
Reporting	Report problems with assets/services that are and also not part of these Standards, both Council and non-Council.	
Surface Finish	Report erosion and potential hazards to the Environmental Operations Coordinator where action is required by Roads and Maritime Services NSW.	
Hygiene	Clean and/or sterilise all vehicles plant and equipment used including hand tools.	
Mandatory Forms Completed	Mandatory Site Inspection Form, Toolbox Meeting Form, Plant Vehicle Checklist Form and Chemical/Herbicide Application Form, to be completed daily or as required.	

M | TREES AND SHRUBS:

Trees and shrubs are located within road reservations, parks, and other Council properties and range in age, species, form, vigour etc. generally providing an over storey canopy to the parks and road settings thus becoming highly prominent and significant to Liverpool City Councils amenity.

Public Tree Maintenance Staff are responsible for the customer requests, maintenance, and upkeep of all parks, street, car park and centre trees, within the properties included in the Standards.

Public Tree Maintenance Staff should as far as possibly deal with all trees related problems but limiting their involvement to one of fact and professional technical opinion, recognising that making decisions requiring political or arbitrary judgement is a role of the coordinator.

The minimum benchmark for pruning shall be:

- Australian Standards Pruning of Amenity Trees AS 4373-2007.
- Electrical Safety (Electric Line Clearance) Regulations 2010 and the included Code of Practice for Electric Line Clearance.

Tree works include such things as pruning, line clearances, removals, planting, pest and disease control, expert assessments, debris removal etc. It is recognised that Public Street Trees particularly have a high public profile, and the Public Tree Maintenance Staff are to deal sensitively with issues related to trees. Public Tree Maintenance Staff shall respond to, and action all, requests and complaints that are received by Council within the allocated target completion time.

Public Street Trees located on private property are not included in these Standards. Fallen or damaged limbs are required to be collected within 24 hours of notification. Requests for urgent tree inspections to be actioned immediately by the Public Trees Coordinator and non-urgent tree inspections within a fortnight of notification by the Public Trees Coordinator. The Public Trees Maintenance Staff are to record all works on trees in the Site Inspection Form which can be readily used. All Public Street Trees within the listed properties and all streets within Liverpool City Council are to be maintained in a healthy, safe and structurally sound condition ensuring a well-balanced tree of aesthetically pleasing appearance.

Pruning:

Public Tree Maintenance Staff shall be responsible for the pruning of all trees not requiring an Elevated Work Platform or for pruning works for overhead service wires. All tree work shall be completed having due regard to the tree's age, heritage value, local significance, shape, size, character, condition and situation. All work shall be performed to maintain a well-balanced tree and pruned in a manner that is as aesthetically pleasing as practicable to maintain the shape and character of the tree and the streetscape or landscape in general.

Tree Planting:

Public Tree Maintenance Staff are responsible for the maintenance, upkeep and replacement of all street trees within Liverpool City Council, excluding Capital Works and Streetscape Projects with a specified maintenance contract. Street Tree Planting Staff are responsible for the replacement of all street trees which have died, are diseased or badly damaged.

Tree Removal:

Public Tree Removals are only to be made in accordance with Liverpool City Councils Tree Management Policy. All tree stumps in road reserves, parks and reserves are to be removed within 6 weeks unless otherwise indicated by the Public Trees Coordinator. Tree stumps to be left, where possible, at a height not greater than 150mm and painted yellow to identify it as a hazard. Each stump is to be ground to a minimum depth of 30cm below the natural ground level. The soil surrounding the stump, elevated by the growth of tree root system shall be ground to natural ground level. All surface roots radiating from the stump shall be grubbed out completely.

Liverpool Council Tree Contractors are responsible for the removal and disposal of all stump grindings from the site. The hole is to be emptied, backfilled, and compacted with approved topsoil approved by the Public Trees Coordinator. Liverpool City Councils Tree Contractors shall be responsible for locating existing services (electricity, gas, water, telephone, drains etc.) prior to the commencement of stump removal where necessary. 'Dial Before You Dig' records must be retained and supplied if requested by the Public Trees Coordinator for the purpose of auditing.

Cabling and Bracing:

The installation of any form of hardware shall not occur without the prior approval of the Public Trees Coordinator. Cabling and bracing should only be used under certain circumstances. All hardware installations shall be according to the most recently available literature on cabling and bracing techniques. A record of all cabled or braced trees shall be maintained by the Public Trees Coordinator. An annual inspection of all cabled trees is required with a comprehensive written report on the condition provided by the Public Trees Coordinator.

Root Barrier Installation:

Root barrier installation should only be used under exceptional circumstances and should not be the norm. Root barrier installation should only be installed by fully qualified consulting arborist under the request of the Public Trees Coordinator.

Any Root Cut/Barrier trenches shall be dug by hand or with specifically designed machinery – Backhoes etc are not acceptable. Minimum depth 1.5 metres approximately. A record of all trees with root barrier installations shall be maintained by the Public Trees Coordinator.

Private Property Trees:

Private residential trees are not included as part of these Standards.

Disposal of Debris/Mulch:

Debris includes all stubs, limbs, branches, twigs, leaves, chips and sawdust created as a result of any tree pruning works. All debris shall be removed from the work site within 48 hours. The site shall have leaf litter, twigs and sawdust swept/raked from the footpath, road and kerb, leaving the area in a clean, safe manner for pedestrians and road users. Vehicles must be blown clean of all sawdust.

All tree pruning's shall be chipped, and the woodchip/mulch are the responsibility of the Public Tree Maintenance Staff to store for Council's use or tipped at approved sites in line with the NSW EPA Mulch Order 2016. No debris is to be left hanging or wedged in any tree. Undesirable refuse such as a log, branches, rubbish, prickles, creepers, grass, or known prolific seeders or noxious weeds are not to be included with any mulch and is to be disposed of in a manner approved of by the Public Trees Coordinator.

Public Safety:

Public Tree Maintenance staff shall ensure that all tree works are carried out having due regard for the safety of the public. Public Tree Maintenance Staff are to be trained in roadside management and have relevant qualifications when working on a roadside or an area frequented by the public.

Tree Supply:

The Public Tree Maintenance staff are responsible for obtaining all trees which shall be first approved by the Public Trees Coordinator.

N | STREET TREES:

Street Trees are located within road reserves throughout Liverpool City Council, generally within the nature strips and medians. The street trees are assets to Council which are to be maintained as such.

Public Tree Maintenance staff are responsible for carrying out tree works coming from customer requests that reflects the significance of the street trees to the Council, maintains the required clearances for pedestrian and vehicular access and provides for formative pruning to improve and enhance this asset. Public Tree Maintenance Staff are responsible for maintaining and keeping accurate records of tree works performed on a Site Inspection Form which is to be submitted at the end of each working day to the Administration Support Officer.

Public Tree Maintenance Staff are responsible for maintaining tree grates where applicable including level adjustments enlargements and weed control within the defined area.

Program:

An essential component of the street tree maintenance is the customer request response times and a coordinated program of works covering vehicle and pedestrian clearances, utility and service clearances where applicable, formative pruning, and routine maintenance. This program

Liverpool City Council | Parks Review

will need to consider all street trees within Liverpool City Council, trees replaced and planted as part of these Standards and all trees planted as Capital Works to improve the streetscapes of Liverpool City Council. Specialist skills, qualifications and experience are required to undertake works on the trees.

Wire Clearing:

Areas within Liverpool City Council are sensitive with respect to the preservation of public trees and any interference to them. Consequently, it is vital that the concerns of the residents of these areas be addressed by the Public Trees Coordinator whilst satisfying the requirements of the regulations with respect of power line clearance carried out by the respective energy supplier tree pruning contractor.

In keeping with the sensitivity of the area, all pruning is to be undertaken in such a way that the impact on the streetscape/environment is minimal. Special consideration shall be paid to significant trees, vegetation of aesthetic significance or the habitat of fauna species. The Public Trees Coordinator is to work closely with the energy supplier tree pruning contractor to alleviate any problems that maybe encountered (e.g., possible removals, cabling, decay, structural unsoundness, etc.).

All work shall be undertaken using qualified/experienced arboriculture personnel. All operators working in an Elevated Work Platform (EWP) must hold an Elevated Work Platform Operators Licence and a current 'Electrical Systems Identification and Powerline Clearance Distances' certificate and all such works are to be in accordance with the Lifts and Cranes Act.

Tree Removal:

Tree removals are only to be made in accordance with Liverpool City Council Tree Management Policy.

Planting:

All trees removed will be recorded by the Public Trees Coordinator including details on location, date, recommended replacement and any other relevant comments. Such details are to be used to develop a program for replacement which should occur in the following planting season (Winter).

Tree stakes, if installed, shall be removed from the tree once the tree has become established and able to support itself, i.e. 24 months after planting.

Watering:

Public Tree Maintenance Staff shall ensure trees retain a healthy appearance and do not become stressed due to lack of, or too much, water. Watering will occur as necessary especially during prolonged dry periods. Regular frequency of deep watering is preferred rather than long periods without water during establishment. All newly planted trees shall be watered for a period of 6 months unless otherwise directed by the Public Trees Coordinator. An area of 700mm diameter around the tree is to remain weed free throughout the tree's watering requirement period. Missing or dead trees are to be noted and replaced as soon as practicable.

O | RECORD KEEPING:

For accurate maintenance of the tree works completed, Public Trees Maintenance Staff shall maintain and keep an accurate daily record of all works per site using a Tree Inspection Form including:

- Address/location of works performed
- Dates of days worked and name of staff present
- Tree Species
- The nature of the work carried out on each tree
- Time taken to complete each job
- For the location of underground services, the Public Tree Maintenance Staff must give an accurate location of stump (if any)- North, South, East, or West side of the street and nearest street intersection.

Maintenance Standards:

Public Tree Maintenance Staff shall ensure that the maintenance tasks described in this Category are carried out and that the assets are maintained at the following minimum standards:

TASK		MAINTENANCE STANDARD
Service Cycle	Customer Request received.	
Pruning -Street-Trees	All pruning carried out by the Public Tree Maintenance Team is to be in accordance with Australian Standards Pruning of Amenity Trees AS 4373-2007. The Public Tree Maintenance Team are to ensure the expectations of the resident is met by responding to the request within an acceptable time frame and actioning while having due regard for the urgency of the request.	
Wire Clearing	In accordance with an approved program provided by Tree Contractor for energy provider. The Public Trees Coordinator to relay resident concerns to Tree Contractor for service wire clearing requests.	
Weeding	Maintain a weed free environment around base when coverage exceeds 5% or weed height exceeds 100mm within defined area. No weeding of nature strips adjacent to private property. Weed removal methods compatible with tree health only. Weeding by chemical means is restricted to the use of Chemicals approved by the Parks Coordinator and used in accordance with the manufacturer's instructions. Only qualified Public Tree Maintenance personnel with AQF3 Chemical Application and Safety qualifications are permitted to apply chemicals. An Herbicide/Chemical Application Form is to be completed whenever chemical/herbicide is applied. All appropriate signage needs to be installed when chemical spraying occurs.	
Planting	Unless otherwise specified by the Public Trees Coordinator, all street trees shall be a minimum of one metre high. Before any street tree planting occurs a Dial Before You Dig needs to occur to ensure there are no underground	

Liverpool City Council | Parks Review

	<p>services. The Public Trees Maintenance Team or Tree Planting Team shall excavate the tree planting hole either manually or mechanically ensuring no underground services are damaged. The hole shall be square, and of diameter/width no less than 2 times the diameter of the root ball width and a depth of equal to the tree root ball. In poorly drained clay soils, the planting hole shall be 25mm shallower, so that the root ball is slightly above grade. Sides of the hole should be thoroughly scarified before the tree is planted to avoid glazing of the planting hole.</p> <p>If the root ball is contained, it shall be removed from the pot, ensuring all ties, strings and bindings are removed from the root ball. All girdling roots are to be teased out or cut, upon placement into the planting hole. The tree, when in the hole should be level with the natural ground level or in poorly drained sites up to 25mm above the natural ground level. The tree shall be able to stand in a straight, vertical position without support. Any soil that has been placed under the root ball of the tree at the right height shall be firmed to ensure that no sinkage occurs after the planting process has been completed.</p> <p>The planting hole shall be backfilled with indigenous soil removed from the tree planting hole. Backfill is not to be incorporated with any other materials such as sawdust, bark or similar. If backfill other than indigenous soil is required, the soil texture shall be consistent with that of the indigenous soil. Where excavated soil is heavily compacted, clods shall be broken up to approximately a 25mm maximum diameter prior to backfilling. The backfill shall be lightly firmed to eliminate any voids or air pockets and to ensure close contact with the tree's root mass and soil.</p> <p>The Street Tree Planting Team or the Public Trees Maintenance Team shall supply and install where necessary two hardwood tree stakes. These stakes shall be positioned either side of the tree so that they are parallel with the side of the road – street trees only. The stakes shall be driven into the soil at the side of the root ball and not driven into the root ball mass. A hessian tie, no less than 50mm width will be stapled to the stake and wrapped around the trunk to allow sufficient freedom of movement after staking.</p>
Plant Maintenance	Healthy and structurally sound. Removal of fallen and dangerous limbs. Maintain access, sight lines and clearances from services, buildings, etc.
Litter Control	Remove all visible litter, rubbish, hazardous materials and other unwanted objects.
Mulching	Approved, consistent, safe material around tree/watering ring 700mm. The Public Trees Maintenance Team or Street Tree Planting Team are responsible for the transport, placement, and containment of approved woodchips, mulch or other surface material and the maintenance of a minimum compacted depth of 75mm and maximum compacted depth of 100mm cover always, free of weed species. This includes material placed for aesthetic, water conservation, and weed control measures in garden beds and planting situations as well as soft fall under playgrounds.
Reporting	Report problems with assets/services that are and also not part of these Standards, both Council and non Council. Report missing and dead trees as soon as they are discovered to the Public Trees Coordinator.
Stump Grinding	To be completed within 6 weeks of removal.

Edging	Chemical edging as approved less than 50mm wide. Edging includes the control of vegetation around poles, seats, fences, boundaries structures etc. and the removal of all remnant material from paths etc. Mechanical edging shall be vertical and chemical edging to mutually agreed with between Public Trees Maintenance Team and Public Trees Coordinator.
Chemical Application	Only qualified Public Tree Maintenance staff with AQF3 Chemical Application and Safety qualifications are permitted to apply chemicals. An Herbicide/Chemical Application Form is to be completed whenever chemical/herbicide is used. All appropriate signage needs to be installed when chemical spraying occurs.
Site Clean Up	The site is to be left in a clean, tidy manner, safe for pedestrians and road users. All debris, soil, rubble etc. is to be removed from the site and all paved areas, kerbs, footpath and road blown clean of clay and soil.
Hygiene	Clean and/or sterilise all vehicles plant and equipment used including hand tools.
Mandatory Forms	Mandatory Site Inspection Form, Toolbox Meeting Form, Plant Vehicle Checklist Form and Chemical/Herbicide Application Form, to be completed daily or as required.

P | PARK TREES:

Includes all trees located in garden beds, and that are free standing (meaning within turf or paved areas) located within all the properties defined in these Standards. The trees vary in age, species, form, health and vigour. Park trees are an asset to Liverpool City Council and are to be maintained as such.

Parks Maintenance Staff are responsible for carrying out maintenance that reflects the significance of the park trees to Liverpool City Council, maintains the required clearances for pedestrian and vehicular access whilst maintaining the aesthetic quality of the park environment. Provision is to be made for formative and subsequent pruning to improve and enhance this asset, ensuring all dead wood, hanging branches and hazards are addressed. Any tree works that cannot be carried out by Parks Maintenance Staff i.e., maintain the statutory clearances from service authority assets etc. is to be reported to the Public Trees Coordinator for action.

Pruning:

Pruning shall be carried out as part of a maintenance program for the park. The minimum benchmark for pruning shall be:

- Australian Standards Pruning of Amenity Trees AS 4373-2007.

Tree Removals:

Tree removals are only to be made in accordance with Liverpool City Councils Tree Management Policy. Any tree removal requests are to be submitted to the Public Trees Coordinator for recommendation.

Inspections:

An annual inspection is required of trees in the vicinity of high public usage throughout all parks and reserves in Liverpool City Council. Areas to be included are picnic areas, playgrounds, car parks, major walking tracks and other areas as required by the Public Trees Coordinator.

Planting:

All trees removed will be recorded by the Public Trees Coordinator including details on location, species, date, recommended replacement and any other relevant comments. Such details are to be forwarded to the Public Trees Coordinator who shall develop in conjunction with the Parks Maintenance Staff and the community a program for replacement.

Maintenance Standards:

The Parks Maintenance Staff shall ensure that the maintenance tasks described in this Category are carried out and that the assets are maintained at the following minimum standards:

TASK		MAINTENANCE STANDARDS	
Service Cycle	Biennial	<p>As mutually agreed by the Parks Coordinator and Parks Maintenance Team.</p> <p>Unless otherwise specified by the Parks Coordinator, all trees shall be a minimum of one metre high. Before any tree planting occurs a Dial Before You Dig needs to occur to ensure there are no underground services. The Parks Team shall excavate the tree planting hole either manually or mechanically ensuring no underground services are damaged. The hole shall be square, and of diameter/width no less than 2 times the diameter of the root ball width and a depth of equal to the tree root ball. In poorly drained clay soils, the planting hole shall be 25mm shallower, so that the root ball is slightly above grade. Sides of the hole should be thoroughly scarified before the tree is planted to avoid glazing of the planting hole.</p> <p>If the root ball is contained, it shall be removed from the pot, ensuring all ties, strings and bindings are removed from the root ball. All girdling roots are to be teased out or cut, upon placement into the planting hole. The tree, when in the hole should be level with the natural ground level or in poorly drained sites up to 25mm above the natural ground level. The tree shall be able to stand in a straight, vertical position without support. Any soil that has been placed under the root ball of the tree at the right height shall be firmed to ensure that no sinkage occurs after the planting process has been completed.</p> <p>The planting hole shall be backfilled with indigenous soil removed from the tree planting hole. Backfill is not to be incorporated with any other materials such as sawdust, bark or similar. If backfill other than indigenous</p>	
Planting			

Liverpool City Council | Parks Review

	<p>soil is required, the soil texture shall be consistent with that of the indigenous soil. Where excavated soil is heavily compacted, clods shall be broken up to approximately a 25mm maximum diameter prior to backfilling. The backfill shall be lightly firmed to eliminate any voids or air pockets and to ensure close contact with the tree's root mass and soil.</p> <p>The Parks Maintenance Staff shall supply and install where necessary two hardwood tree stakes. These stakes shall be positioned either side of the tree. The stakes shall be driven into the soil at the side of the root ball and not driven into the root ball mass. A hessian tie, no less than 50mm width will be stapled to the stake and wrapped around the trunk to allow sufficient freedom of movement after staking.</p> <p>Control vegetative growth around the base of the tree. Weeding by chemical means is restricted to the use of Chemicals approved by the Parks Coordinator and used in accordance with the manufacturer's instructions. Only qualified Parks Maintenance Staff with AQF3 Chemical Application and Safety qualifications are permitted to apply chemicals. An Herbicide/Chemical Application Form is to be completed whenever chemical/herbicide is used. All appropriate signage needs to be installed when chemical spraying occurs.</p>
Weeding	
Plant Maintenance	<p>Healthy and structurally sound. Removal of fallen and dangerous limbs. Maintain access and sight lines and clearances form services, buildings, etc. All park trees along road frontages shall be under pruned to 3 metres above the footpath and nature strip.</p>
Litter Control	Remove all visible litter, rubbish, hazardous materials and other unwanted objects.
Mulching	<p>Approved, consistent, safe material around tree/watering ring. Parks Maintenance Staff are responsible for the transport, placement, and containment of approved woodchips, mulch or other surface material and the maintenance of a minimum and maximum specified depth of cover at all times, free of weed species. This includes material placed for aesthetic, water conservation, and weed control measures in garden beds and planting situations as well as soft fall under playgrounds.</p>
Stump Grinding	To be completed within 6 weeks of removal request by relevant tree contractor.
Reporting	Report problems with assets/services that are and also not part of these Standards, both Council and non Council.
Edging	<p>Chemical edging where approved less than 150mm wide ring. Approval may be given by the Public Trees Coordinator to increase spray radius where canopies are low, access confined or plantings contiguous. As for adjacent Turf/Garden Bed Asset. Edging includes the control of vegetation around poles, seats, fences, boundaries structures etc. and the removal of all remnant material form paths etc. Mechanical edging shall be vertical and chemical edging to mutually agreed with between relevant team and Parks Coordinator.</p>
Hygiene	Clean and/or sterilise all vehicles plant and equipment used including hand tools.
Mandatory Forms Completed	<p>Mandatory Site Inspection Form, Toolbox Meeting Form, Plant Vehicle Checklist Form and Chemical/Herbicide Application Form, to be completed daily or as required.</p>

Q | SPORTS FIELDS:

Sports fields are areas of Liverpool City Council parks that are developed specifically for active sport (cricket, football, baseball, softball, athletics, soccer, etc.) and recreation activities. These are often of a high intensity use and profile and need to be maintained as such. Specific sports and associations will require precise management regimes that provide an equitable playing surface on varying weeks and games. These activities are played at differing levels, on varying standard grounds, some fenced, others being multi use open areas.

Sports field Maintenance Staff shall liaise with recreation, sports associations and sporting clubs using the grounds in preparing the works program for these sites. Recreation is responsible for the seasonal allocation and casual bookings of sports fields. Sports Field Maintenance Staff are responsible for the regular management, maintenance and upkeep of the Sports Fields Council maintains. This includes mowing, weeding, edging, litter control, surface finish, turf management, irrigation, drainage, and all other assets adjacent to or that form part of sports fields.

Works may include preparing areas of sowing or re sowing and the establishment of turf on sown or re sown areas, maintaining the health and physical appearance of turf, irrigating to maintain optimum soil moisture levels, fertiliser applications to maintain optimum nutrient levels in the soil, soil conditioning, aeration, topdressing to maintain level and safe playing surfaces, controlling turf pests, weeds and diseases.

Sports Field Maintenance Staff are responsible for seasonal change over issues such as goal post removal (where required) etc and any repairs and establishment that may be required.

Maintenance:

Sports Fields Maintenance Staff are responsible for all maintenance works including those associated with the altering of playing surfaces to suit the change in users and sports being played on the surface, the final preparation of any playing surface and structures required to suit the sport being played. Line marking will be completed at the start of the season by Sports Field Maintenance Staff but then will be the responsibility of the clubs throughout the season. Where turf wickets exist, these will be the responsibility of qualified greenkeeping staff.

Sports Field Maintenance Staff shall include, but not be limited to, the following tasks:

- Check condition of turf and playing surface
- Review turf management program
- Check operation of sprinkler systems
- Check drainage systems
- Remove all litter and rubbish from within the fields and surrounds.
- Check all fences and structures and clean or repair as necessary.

Liverpool City Council | Parks Review

- Check program and requirements for changes to wickets, goalposts, etc.
- Report all issues that should come to the attention of the Sports Field Coordinator.
- Be available for daily contact from sporting clubs and on-site meetings as required.
- Prepare and manage a detailed program.
- Report water usage.

The covering and uncovering of concrete/synthetic wickets at seasons changeover are the responsibility of contractors until staff numbers increase to a manageable workload.

Mowing:

Sports Field Maintenance staff are to ensure that any mowing or turf trimming operation is carried out in a manner which does not damage or cause damage to any turf area. Sports Field Maintenance Staff shall ensure a consistent playing surface on match days, considering turf length, moisture levels, etc. Sports Field Maintenance Staff need to advise what height to mow the new summer grass surfaces that are being installed and if specialised machinery is required.

The programming of the turf cutting to be on a consistent cycle to ensure equity in playing conditions for sports that occur over a series of weeks. When inclement weather (winter) prevents access by machinery, Sports Field Maintenance Staff shall make alternative arrangements for mowing in order to meet the specified maintenance standard or as otherwise determined by the Sports field Coordinator.

Surface Finish:

The surface of all turf areas shall be even and free of holes and any protruding objects or other items which may cause injury to any person or equipment. Particular attention is to be paid to items such as in ground watering systems. All sprinkler, heads attachments, and hose connection points shall finish flush with the ground surface. Sports Field Maintenance Staff are responsible for filling or lowering any area of turf and altering the level of any ground watering system to comply with the above equipment.

Turf Management:

Turf management involves a range of specialist operations such as aeration, fertilising, over seeding, etc. on a diversity of Council assets to varying degrees. Sports Field Maintenance Staff are responsible to develop a program that reflects the needs and factors including use, profile, irrigation presence, type of activity, seasonal variations, etc. on turf areas. All works are to be carried out in accordance with accepted turf management industry standards and practices. It is recognised that prolonged wet periods or unreasonable weather will affect turf coverage, subject to the Sports Field Coordinators approval a variance may be permitted.

Liverpool City Council | Parks Review

Sand Based Sports Fields are high profile sporting reserves with a quality playing surface and are located throughout Liverpool City Council at specific sites to provide a quality playing surface. These sports fields have automatic irrigation systems and are constructed with a sand base and require a specific and precise management cycle to ensure their healthy vigour and to sustain the playing surface.

Maintenance Standards:

Sports Field Maintenance Staff shall ensure that the maintenance tasks are carried out and that the assets are maintained at the following minimum standards:

TASK		MAINTENANCE STANDARD
Service Cycle	Weekly	
Turf Management	Healthy turf all year-round exhibiting vigour and capable of withstanding sporting activities. As per approved program. Maintain 95% turf coverage.	
Mowing	Summer use match day Couch: less than 30mm greater than 20mm turf height all summer use period. Summer use match day non-Couch: less than 40mm greater than 25mm turf height all summer use period. Winter use match day less than 50mm greater than 35mm turf height all winter use period. Period of non-use less than 50mm greater than 35mm turf height. No windrowing or visible build-up of cuttings. No flower spikes or seed heads to remain outside mowing program. Sports Field Maintenance Staff are to replace any plantings damaged as a result of mowing, including plantings by community, individuals, Council, etc. If the plantings are a maintenance issue the Sports Field Maintenance Staff are to advise the Parks Coordinator.	
Weeding	Weed when greater than 5% broadleaf and other undesirable weeds as deemed by the Sports Fields Coordinator. Weeding by chemical means is restricted to the use of Chemicals approved by the Parks Coordinator and used in accordance with the manufacturer's instructions. Only qualified Sports Field Maintenance Staff with AQF3 Chemical Application and Safety Qualifications are permitted to apply chemicals. An Herbicide/Chemical Application Form is to be filled out whenever chemical/herbicide is used. All appropriate signage needs to be installed when chemical spraying occurs.	
Edging	Edge when turf has grown greater than 50mm over greater than 50% of turf edge. No single clump intrusion to exceed 50mm. Mechanical edging only. Chemical edging only with prior approval from Sports Fields Coordinator to maximum 50mm width. Edging includes the control of vegetation around poles, seats, fences, boundaries structures etc. and the removal of all remnant material form paths etc. Mechanical edging shall be vertical and chemical edging to mutually agreed with between relevant Sports Field Maintenance Team and Parks Coordinator.	
Litter Control	Remove all visible litter, rubbish, debris, hazardous materials and other unwanted objects.	
Reporting	Report problems with assets/services that are and also not part of these Standards, both Council and non Council.	
Surface Finish	Repair all visible ruts. Safe playing surface.	

Hygiene	Clean and/or sterilise all vehicles plant and equipment used including hand tools.
Mandatory Forms	Mandatory Site Inspection Form, Toolbox Meeting Form, Plant Vehicle Checklist Form and Chemical/Herbicide Application Form, to be completed daily or as required.

R | IRRIGATED AND DRAINED CONSTRUCTED SPORTS FIELD:

Irrigated and Drained Constructed Sports Fields are located throughout Liverpool City Council at specific sites to provide quality playing surfaces. These sports fields have automatic irrigation systems, are drained and constructed on a clay or local soil mix and require a specific and precise management cycle to ensure their healthy vigour and to sustain the playing surface. These sports fields contain automatic irrigation systems to provide for healthy plant growth throughout the year.

Maintenance Standards:

Sports Field Maintenance Staff shall ensure that the maintenance tasks described in this Category are carried out and that the assets are maintained at the following minimum standards:

TASK		MAINTENANCE STANDARD
Service Cycle		Weekly
Turf Management		Healthy turf all year-round exhibiting vigour and capable of withstanding sporting activities. As per approved program. Maintain 95% coverage.
Mowing		Summer use match day Couch: less than 30mm greater than 20mm turf height all summer use period. Summer use match day non-Couch: less than 40mm greater than 25mm turf height all summer use period. Winter use match day less than 50mm greater than 35mm turf height all winter use period. Period of non-use less than 50mm greater than 35mm turf height. No windrowing or visible build-up of cuttings. No flower spikes or seed heads to remain outside mowing program. Sports Field Maintenance Staff are to replace any plantings damaged as a result of mowing, including plantings by community, individuals, Council, etc. If the plantings are a maintenance issue the Sports Field Maintenance Staff are to advise the Parks Coordinator.
Weeding		Less than 5% broadleaf and other undesirable weeds as deemed by the Sports Fields Coordinator. Weeding by chemical means is restricted to the use of Chemicals approved by the Parks Coordinator and used in accordance with the manufacturer's instructions. Only qualified Sports Field Maintenance Staff with AQF3 Chemical Application and Safety qualifications are permitted to apply chemicals. An Herbicide/Chemical Application Form is to be completed whenever chemical/herbicide is used. All appropriate signage needs to be installed when chemical spraying occurs.

Liverpool City Council | Parks Review

Edging	When turf has grown greater than 50mm over greater than 50% of turf edge. No single clump intrusion to exceed 50mm. Mechanical edging only. Chemical edging only with prior approval to maximum 50mm width. Edging includes the control of vegetation around poles, seats, fences, boundaries structures etc. and the removal of all remnant material form paths etc. Mechanical edging shall be vertical and chemical edging to mutually agreed with between the Sports field Maintenance Team and the Parks Coordinator.
Litter Control	Removal of visible litter, rubbish, debris, hazardous materials and other unwanted objects.
Reporting	Report problems with assets/services that are and not part of these Standards, both Council and non - Council.
Surface Finish	Repair all visible wheel ruts. Safe playing surface.
Hygiene	Clean and/or sterilise all vehicles plant and equipment used including hand tools.
Mandatory Forms	Mandatory Site Inspection Form, Toolbox Meeting Form, Plant Vehicle Checklist Form and Chemical/Herbicide Application Form, to be completed daily or as required.

S | VARIABLE PROFILE IRRIGATED AND/OR DRAINED SPORTS FIELD:

Variable Profile Irrigated and/or Drained Sports Fields are located throughout Liverpool City Council at specific sites to provide playing surfaces for organised sport. These sports fields are constructed on a local soil base, have no or limited drainage and irrigation, but have reasonable fall. They require a routine and responsive management cycle to ensure their healthy vigour and to sustain the playing surface. The standard of the playing surface is dependent upon the season and the weather conditions. Some activities will be seasonally dictated, and a routine management program is an integral part of maintenance.

Maintenance Standards:

Sports Field Maintenance Staff shall ensure that the maintenance tasks described in this Category are carried out and that the assets are maintained at the following minimum standards:

TASK	MAINTENANCE STANDARD
Service Cycle	Weekly
Turf Management	Healthy turf all year-round exhibiting vigour and capable of withstanding sporting activities. As per approved program. Maintain 90% coverage.
Mowing	Summer use match day: less than 40mm greater than 35mm turf height all summer use period. Winter use match day less than 70 mm greater than 35mm turf height all winter use period. Period of non-use less than 70mm greater than 35mm turf height. No windrowing or visible build-up of cuttings. No flower spikes or seed heads to remain outside mowing program. Staff are to replace any plantings damaged as

Liverpool City Council | Parks Review

	a result of mowing, including plantings by community, individuals, Council, etc. If the plantings are a maintenance issue the staff are to advise the Parks Coordinator.
Weeding	Less than 5% broadleaf and other undesirable weeds as deemed by the Sports Field Coordinator. Weeding by chemical means is restricted to the use of Chemicals approved by the Parks Coordinator and used in accordance with the manufacturer's instructions. Only qualified staff with AQF3 Chemical Application and Safety training are permitted to apply chemicals. An Herbicide/Chemical Application Form is to be filled out whenever chemical/herbicide is used. All appropriate signage needs to be installed when chemical spraying occurs.
Edging	When turf has grown greater than 50mm over greater than 50% of turf edge. No single clump intrusion to exceed 50mm. Mechanical edging only with prior approval to maximum 50mm width. Edging includes the control of vegetation around poles, seats, fences, boundaries structures etc. and the removal of all remnant material form paths etc. Mechanical edging shall be vertical and chemical edging to mutually agreed with between relevant team and Parks Coordinator.
Litter Control	Remove all visible litter, rubbish, debris, hazardous materials and other unwanted objects.
Reporting	Report problems with assets/services that are and also not part of these Standards, both Council and non Council.
Surface Finish	Repair all visible ruts. Safe playing surface.
Hygiene	Clean and/or sterilise all vehicles plant and equipment used including hand tools.
Mandatory Forms	Mandatory Site Inspection Form, Toolbox Meeting Form, Plant Vehicle Checklist Form and Chemical/Herbicide Application Form, to be completed daily or as required.

T | VARIABLE PROFILE NON-IRRIGATED OR DRAINED SPORTS FIELD:

Variable Profile Non-Irrigated or Drained Sports Fields are located throughout Liverpool City Council at specific sites to provide playing surfaces to organised sport. These sports fields are constructed on a local soil base, have no or limited drainage and require a routine and responsive management cycle to ensure their healthy vigour and to sustain the playing surface. The standard of the playing surface is dependent upon the season and the weather conditions. Some activities will be seasonally dictated, and a routine management program is an integral part of maintenance.

Maintenance Standards:

Sports Field Maintenance Staff shall ensure that the maintenance tasks described in this Category are carried out and that the assets are maintained at the following minimum standards:

Liverpool City Council | Parks Review

TASK		MAINTENANCE STANDARD	
Service Cycle		Weekly	
Turf Management		Healthy turf all year-round exhibiting vigour and capable of withstanding sporting activities. As per approved program. Maintain 80% coverage.	
Mowing		Summer use match day: less than 40mm greater than 35mm turf height all summer use period. Winter use match day less than 70mm greater than 35mm turf height all winter use period. Period of non – use less than 70mm greater than 35mm turf height. No windrowing or visible build-up of cuttings. No flower spikes or seed heads to remain outside mowing program. Sports Field Maintenance Staff are to replace any plantings damaged as a result of mowing, including plantings by community, individuals, Council, etc. If the plantings are a maintenance issue the staff are to advise the Parks Coordinator.	
Weeding		Less than 5% broadleaf and other undesirable weeds as deemed by the Sports Field Coordinator. Weeding by chemical means is restricted to the use of Chemicals approved by the Parks Coordinator and used in accordance with the manufacturer's instructions. Only qualified staff with AQF3 Chemical Application and Safety training are permitted to apply chemicals. An Herbicide/Chemical Application Form is to be filled out whenever chemical/herbicide is used. All appropriate signage needs to be installed when chemical spraying occurs.	
Edging		When turf has grown greater than 50mm over greater than 50% of turf edge. No single clump intrusion to exceed 50mm. Mechanical edging only with prior approval to maximum 50mm width. Edging includes the control of vegetation around poles, seats, fences, boundaries structures etc. and the removal of all remnant material form paths etc. Mechanical edging shall be vertical and chemical edging to mutually agreed with between relevant team and Parks Coordinator.	
Litter Control		Remove all visible litter, rubbish, debris, hazardous materials and other unwanted objects.	
Reporting		Report problems with assets/services that are and also not part of these Standards, both Council and non Council.	
Surface Finish		Repair all visible ruts. Safe playing surface.	
Hygiene		Clean and/or sterilise all vehicles plant and equipment used including hand tools.	
Mandatory Forms		Mandatory Site Inspection Form, Toolbox Meeting Form, Plant Vehicle Checklist Form and Chemical/Herbicide Application Form, to be completed daily or as required.	

Drainage:

Drainage systems include all pits, pipes, agricultural drains, diverters, spoon drains, retarding basins, and channels constructed within properties to control water entering, leaving or accumulating on the park or open space. The parks or open space drainage system will extend to where it

Liverpool City Council | Parks Review

connects with or enters the general storm water system. The drainage system includes constructed features and natural drainage patterns above ground and all pipes etc. below ground.

There will be areas of involvement with relevant Water Authorities or other authorities who have an overriding involvement in flood mitigation devices.

Parks Maintenance Staff are responsible for the management of all underground, subsoil, and open drains within the park or open space properties. Parks Maintenance Staff shall inspect and keep clean and operating all pits, grates, underground stormwater pipes, subsoil drains and open drains, that service each location and carry out works necessary to ensure the ongoing functioning of the system free of litter, siltation, etc.

Stormwater drains shall be visually inspected between pits and condition reported to the Parks Coordinator. Parks Maintenance Staff shall ensure that all accumulated siltation, dirt, debris, litter and other loose material is removed. Subsoil drains shall be inspected, and their condition reported to the Parks Coordinator at least once per year. Liverpool City Council will be responsible or extension of any subsoil drainage system.

Parks Maintenance Staff shall be responsible for the maintenance and condition of all open drains within Council owned properties. All open drains shall be kept in a tidy condition free of weeds, silt, and rubbish and mown where the surface is designed for such.

Maintenance Standards:

Parks Maintenance Staff shall ensure that the maintenance tasks described in this Category are carried out and that the assets are maintained at the following minimum standards:

TASK		MAINTENANCE STANDARD	
Service Cycle		Three Weekly	
Cleaning		Clean when siltation on bottom of pits is greater than 50mm and/or obstructions greater than 50mm dimension. Pit outlet area reduced by more than 10%.	
Repairs		Replace and repair all damaged and dangerous pit covers. Adjust, repair, test, replace when parts are non-operative, defective or worn.	
Weeding		Weed when coverage of any one bed exceeds 30% or height exceeds 250mm or a single weed occupies a spread area greater than 250cm ² . Weeding by chemical means is restricted to the use of Chemicals approved by the Parks Coordinator and used in accordance with the manufacturer's instructions. Only qualified staff with AQF3 Chemical Application and Safety qualifications are permitted to apply chemicals. An Herbicide/Chemical Application Form is to be filled out whenever chemical/herbicide is used. All appropriate signage needs to be installed when chemical spraying occurs.	

Liverpool City Council | Parks Review

Litter Control	Remove all visible litter, rubbish, debris, hazardous materials and other unwanted objects.
Reporting	Report problems with assets/services that are and not part of these Standards, both Council and non-Council.
Mowing	Mow when height exceeds 125mm by cutting to minimum 45mm height to achieve a regular cut finish. Minimal windrows are allowed. No visible clippings or windrows to remain. Staff are to replace any plantings damaged as a result of mowing, including plantings by community, individuals, Council, etc. If the plantings are a maintenance issue the staff are to advise the Parks Coordinator.
Hygiene	Clean and/or sterilise all vehicles plant and equipment used including hand tools.
Mandatory Forms	Mandatory Site Inspection Form, Toolbox Meeting Form, Plant Vehicle Checklist Form and Chemical/Herbicide Application Form, to be completed daily or as required.

U | IRRIGATION:

Irrigation includes all pipes, fittings, sprinkler heads, tanks, pumps, control valves, control panels. Cloud Master System etc. installed within properties necessary to allow the automatic and specific manual irrigation of various turf areas and garden beds. Irrigation also includes maintenance to all manual fittings and fixtures such as taps, quick coupling valves, fixed manually operated systems, etc. Manual sprinkler systems included are those that operate fixed sprinklers off a permanently plumbed gate valve type system and do not involve hoses, mobile or portable sprinklers.

Sports Field Maintenance Staff are responsible for the safe and effective operation of irrigation systems to ensure that the maintenance standards are achieved on the various assets. Sports Field Maintenance Staff are responsible for the inspection, maintenance and operation of all fixed and unfixed irrigation equipment required to water turf, garden, and treed areas. Sports Field Maintenance Staff shall prepare and maintain a plan of the automatic and manual irrigation systems of each location.

The information required to be recorded on the plans by Sports Field Maintenance Staff includes:

- Location of controllers
- Sprinkler and solenoid locations
- Water meter and isolation valve locations
- Location and connections to tanks and pumps

Sports Field Maintenance Staff are to report to the relevant Parks Coordinator any replacement associated with the sprinkler heads, pop up sprinklers, solenoid valves and other items subject to wear and tear. Where required, the work includes adjusting the level of sprinklers to match existing ground levels to ensure that no hazard is presented to the public. Damaged sprinkler heads should be replaced and operating within 24 hours.

The following specific tasks shall be performed at regular intervals:

- Check general condition and operation of sprinkler system.

Liverpool City Council | Parks Review

- Maintain battery back up in an operational condition
- Check sprinkler heads to ensure efficient operation
- Ensure all sprinkler heads are maintained free of turf and level with the surrounding turf
- Inspect and clean all water supply fittings including valves, pipes, etc. and check operation
- Ensure local sprinkler control systems are correctly set and fully operational
- Program and reprogram all controllers
- Identify locations of all sprinklers, controls and solenoids
- Report within one hour any damage, defects or any situation that may render the facility inoperable.

Automatic controllers shall be set and adjusted to allow for daylight savings other specific occasions etc.
All plumbing works associated with irrigation systems shall be carried out by an appropriately qualified plumber approved by the Parks Coordinator using approved materials and only in accordance with the appropriate plumbing regulations. A licensed electrician shall carry out any required electrical works.

Maintenance standards:

Sports Field Maintenance Staff shall ensure that the maintenance tasks described in this Category are carried out and that the assets are maintained at the following minimum standards:

TASK		MAINTENANCE STANDARD	
Inspection/Service Cycle		Weekly (in season)	
Surface Finish		All sprinkler, heads attachments, and hose connection points shall finish flush with the ground surface. Sports Field Maintenance Staff are responsible for filling or lowering any area of turf and altering the level of any ground watering system to comply with the above equipment. No visible wheel ruts on playing surface.	
Weeding		To ensure effective operation of the irrigation system and visibility of sprinkler heads and valve boxes. Weeding by chemical means is restricted to the use of Chemicals approved by the Parks Coordinator and used in accordance with the manufacturer's instructions. Only qualified Sports Field Maintenance Staff with AQF3 Chemical Application and Safety training can apply chemicals. An Herbicide/Chemical Application Form is to be completed whenever chemical/herbicide is used. All appropriate signage needs to be installed when chemical spraying occurs.	
Repairs		Adjust, repair, test, replace when parts are non – operative, defective or worn. Ensure all irrigation systems are fully operational and in good repair. Test safety switches as per manufacturers recommendations.	
Reporting		Report problems with assets/services that are and also not part of these Standards, both Council and non Council.	
Litter Control		Remove all visible litter, rubbish, debris, hazardous materials and other unwanted objects.	

Liverpool City Council | Parks Review

Hygiene	Clean and/or sterilise all vehicles plant and equipment used including hand tools.
Mandatory Forms	Mandatory Site Inspection Form, Toolbox Meeting Form, Plant Vehicle Checklist Form and Chemical/Herbicide Application Form, to be completed daily or as required.

V | WAR MEMORIALS AND CEMETERIES:

War Memorials and Cemeteries are located throughout Liverpool City Council. The War Memorials and Cemeteries are a combination of traditional statues and sculptures through to murals and poles etc. These sites are significant and as such needs to be maintained to a high standard.

Parks Maintenance Staff are responsible for the cleaning, checking and routine maintenance of all War Memorials and Cemeteries. Where damage has occurred, Parks Maintenance Staff are to make the area safe and advise the Parks Coordinator immediately. Any graffiti is to be immediately reported to the Facilities Maintenance Coordinator and removal will be at the direction of the Facilities Maintenance Coordinator.

Maintenance standards:

Parks Maintenance Staff shall ensure that the maintenance tasks described in this Category are carried out and that the War Memorials and Cemeteries are maintained in accordance with the following minimum standards.

TASK	MAINTENANCE STANDARD
Service Cycle	Fortnightly and/or before Memorial Services occur
Cleaning	Dust, dirt, etc. only and only mild clean at the direction of the relevant Parks Coordinator.
Repairs	Make area safe and advise relevant Parks Co-ordinator immediately of damage.
Edging	Edge when turf has grown greater than 50mm over greater than 50% of turf edge. No single clump intrusion to exceed 50mm. Mechanical edging only. Edging includes the control of vegetation around poles, seats, fences, boundaries structures etc. and the removal of all remnant material form paths etc. Mechanical edging shall be vertical and chemical edging to mutually agreed with between relevant Parks Maintenance Team and Parks Coordinator.
Litter Control	Remove all visible litter, rubbish, debris, hazardous materials and other unwanted objects.
Reporting	Report problems with assets/services that are and also not part of these Standards, both Council and non Council.
Weeding	Weed when greater than 20% undesirable weeds including broad leaf weeds as determined by the Parks Coordinator. Weeding by chemical means is restricted to the use of Chemicals approved by the Parks Coordinator

Liverpool City Council | Parks Review

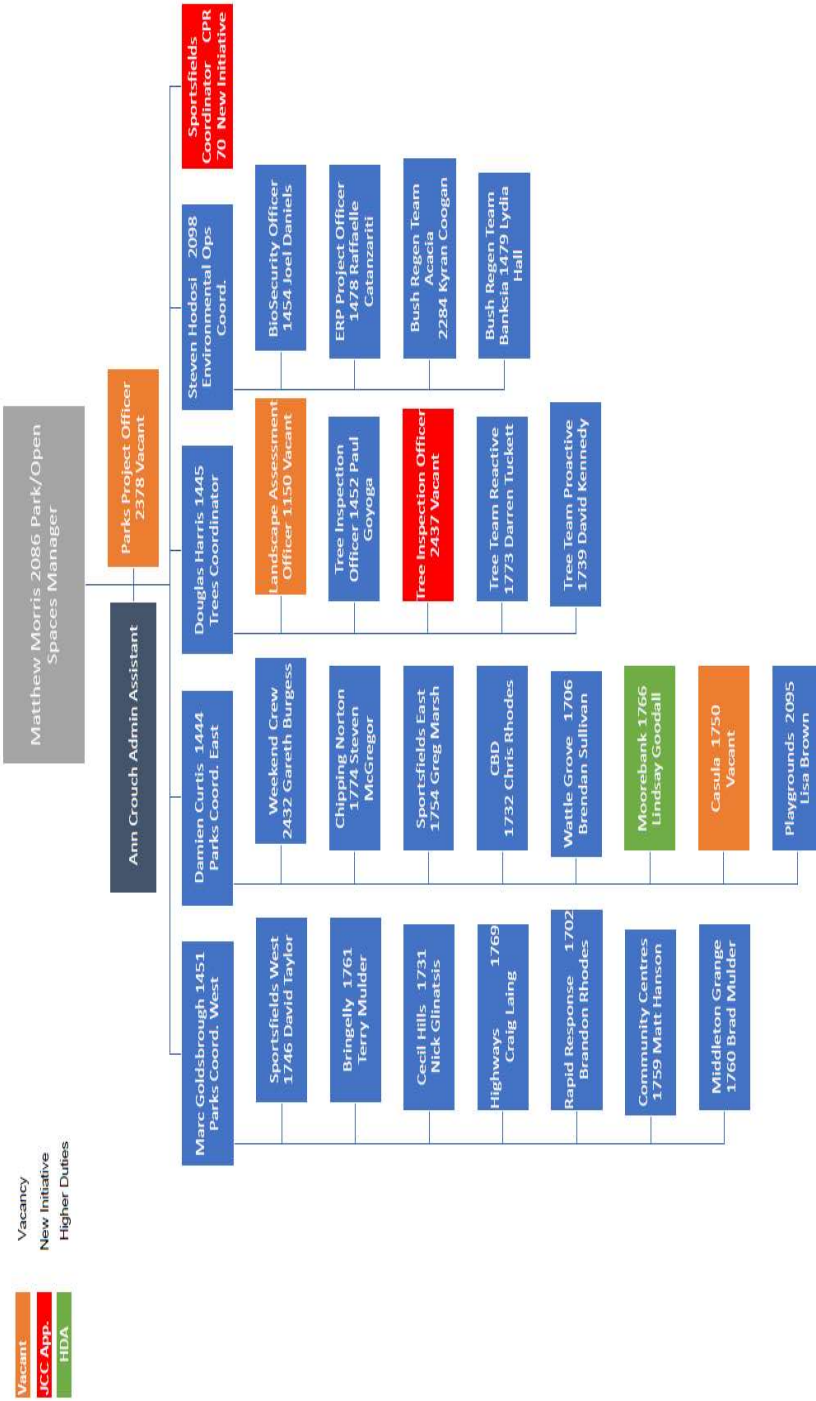
	and used in accordance with the manufacturer's instructions. Only qualified Parks Maintenance Staff with AQF3 Chemical Application and Safety qualifications can apply chemicals. An Herbicide/Chemical Application Form is to be completed whenever chemical/herbicide is used. All appropriate signage needs to be erected when chemical spraying occurs.
Mulching	Parks Maintenance Staff are responsible for the transport, placement, and containment of approved woodchips, mulch or other surface material and the maintenance of a minimum and maximum specified depth of cover always, free of weed species. This includes material placed for aesthetic, water conservation, and weed control measures in garden beds and planting situations as well as soft fall under playgrounds.
Hygiene	Clean and/or sterilise all vehicles plant and equipment used including hand tools.
Mowing	Mow when height exceeds 60mm by cutting to minimum 35mm length all year to achieve a regular cut finish. No visible clippings or windrows to remain. Parks Maintenance Staff are to replace any plantings damaged as a result of mowing, including plantings by community, individuals, Council, etc. If the plantings are a maintenance issue the Parks Maintenance Staff are to advise the Parks Coordinator.
Plant Maintenance	Inspect plants for signs of disease, pest infection and stunted growth – remove affected plants or treat as necessary. Plant and mulch replacement as required. Stake straightening, replacement and removal as required. Fertilising and pruning as required. Plant replacement and thinning as required. Dead plants may need to be periodically removed.
Planting	Infill planting should be carried out as required using the original planting schedules to guide species selection and planting densities.
Mandatory Forms	Mandatory Site Inspection Form, Toolbox Meeting Form, Plant Vehicle Checklist Form and Chemical/Herbicide Application Form, to be completed daily or as required.

Appendix B | Team Structure

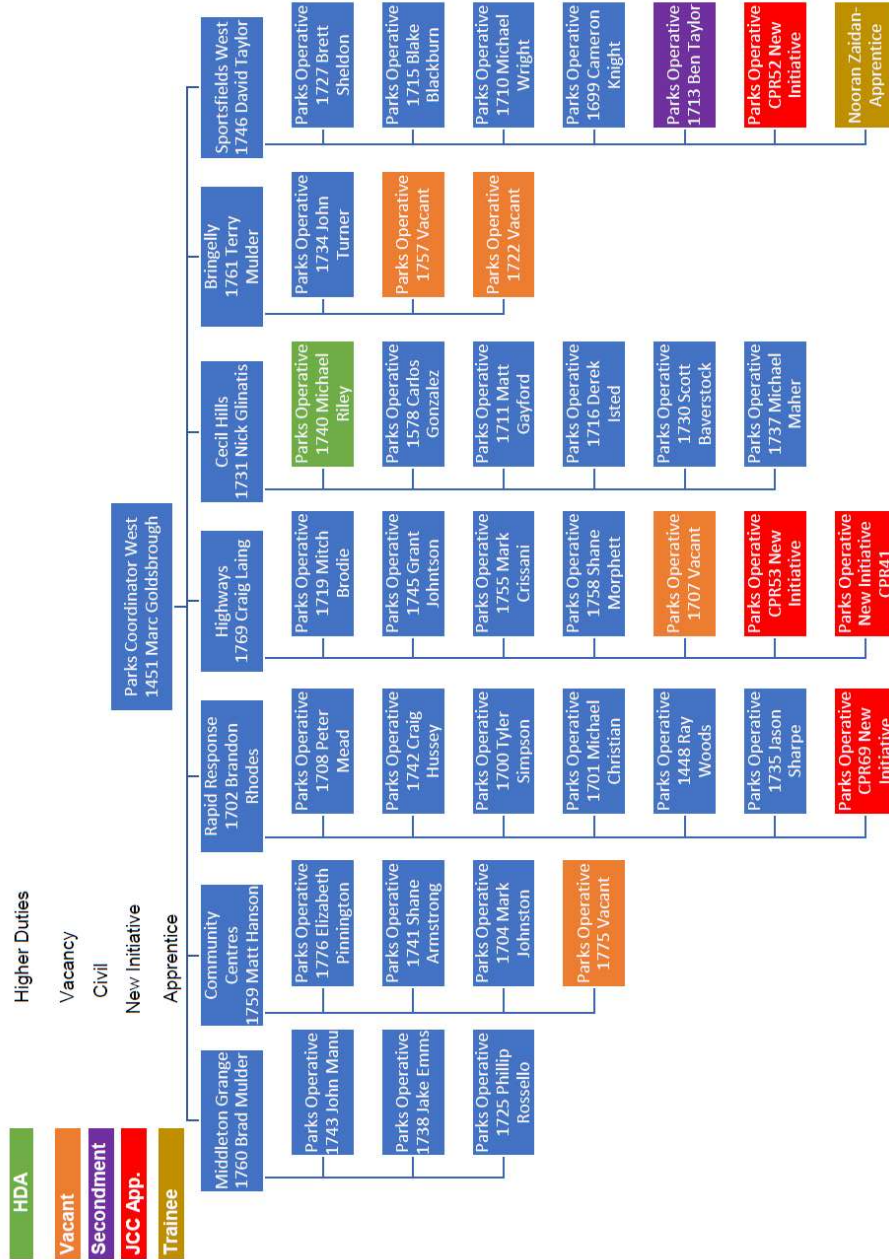
LOCALISED TEAMS APPROACH			
CBD	COMMUNITY CENTRES	BUSH TEAM 1	TREE TEAM PROACTIVE
CHIPPING NORTON	MOOREBANK	BUSH TEAM 2	RAPID RESPONSE
MIDDLETOWN GRANGE	BRINGELLY	CECIL HILLS	CASUAL POOL
WATTLE GROVE	CASULA	WEEKEND CREW	PLAYGROUNDS
SPORTSFIELDS WEST	HIGHWAYS	TREE TEAM RESPONSE	SPORTSFIELDS EAST

Liverpool City Council | Parks Review

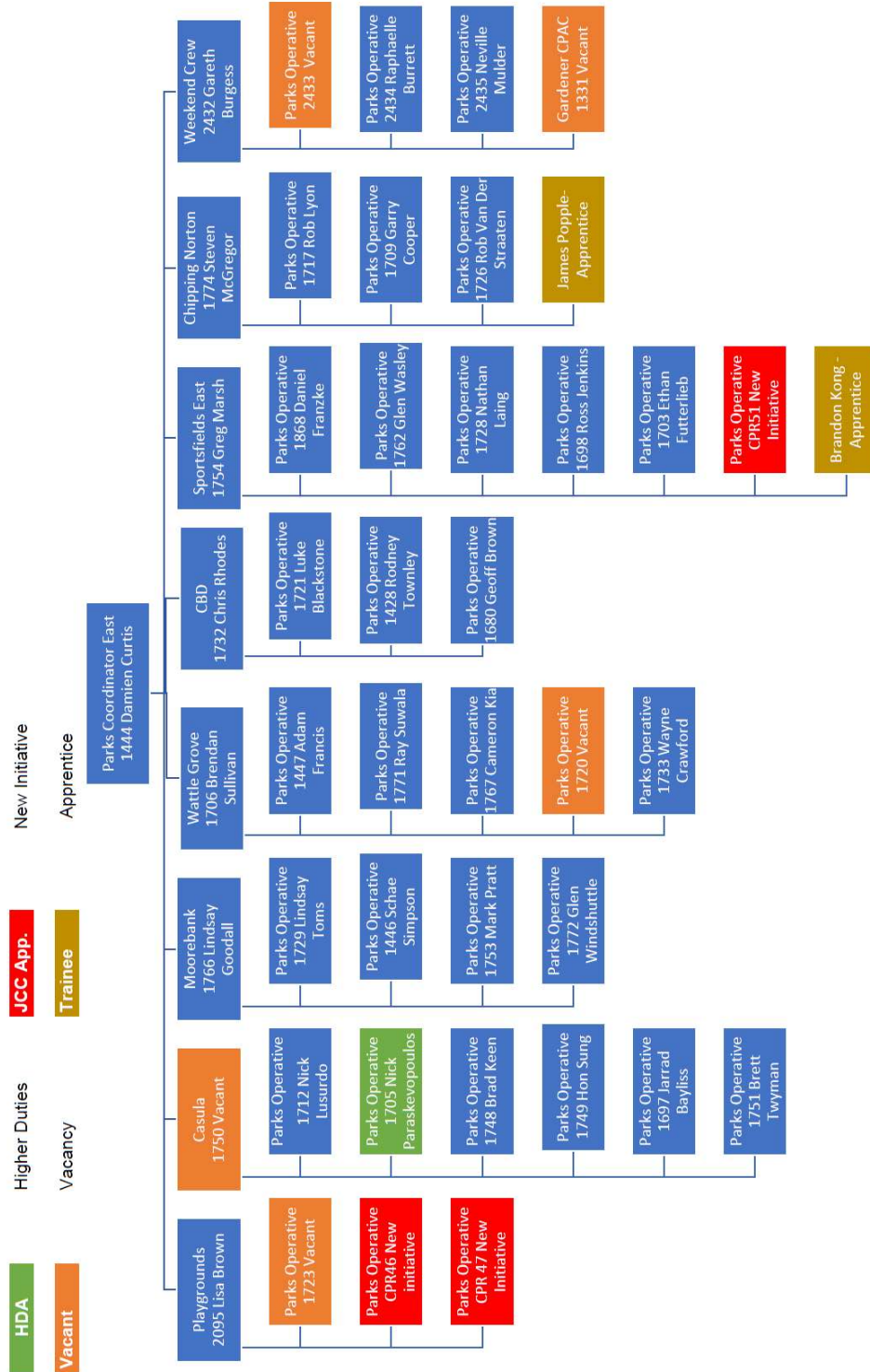
Appendix C | Current Organizational Structure



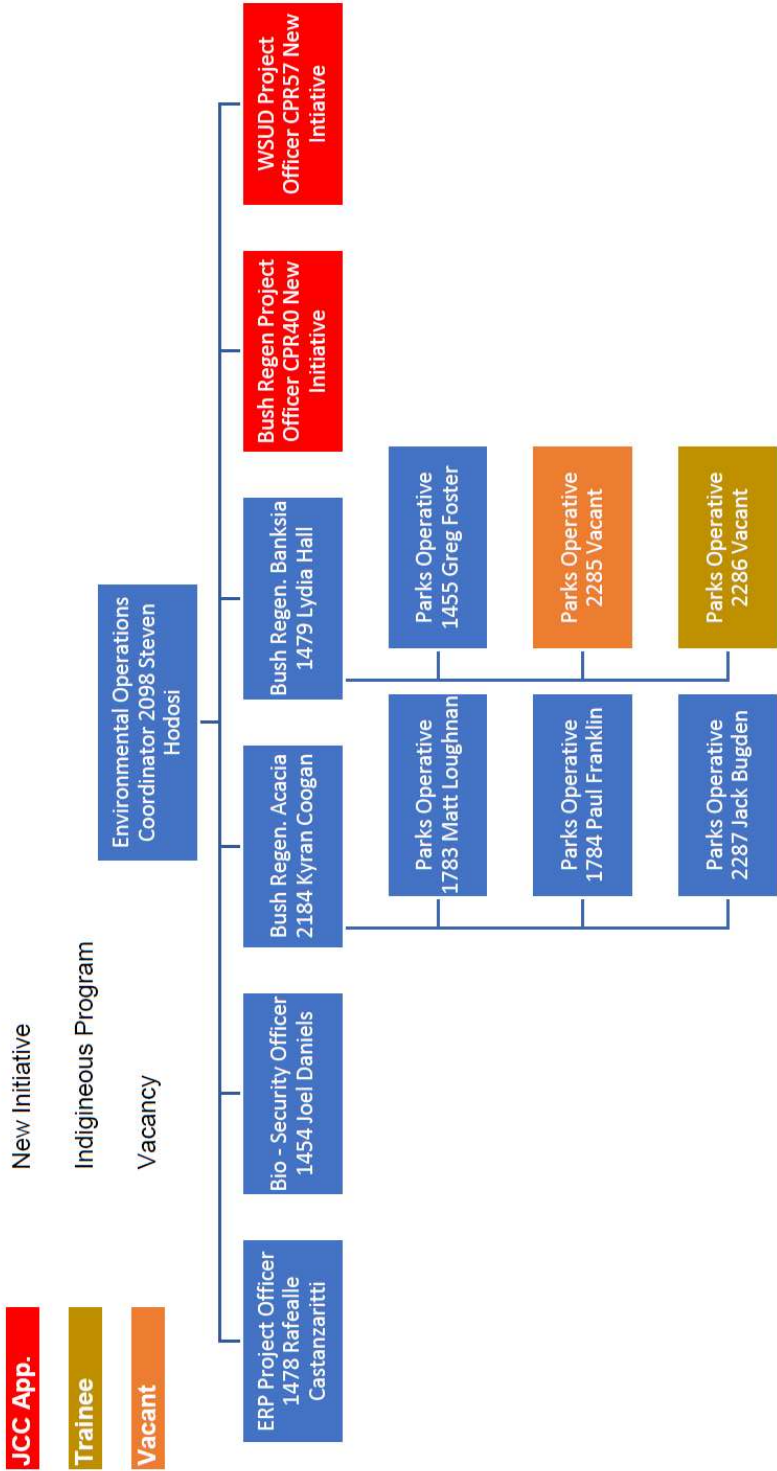
Liverpool City Council | Parks Review



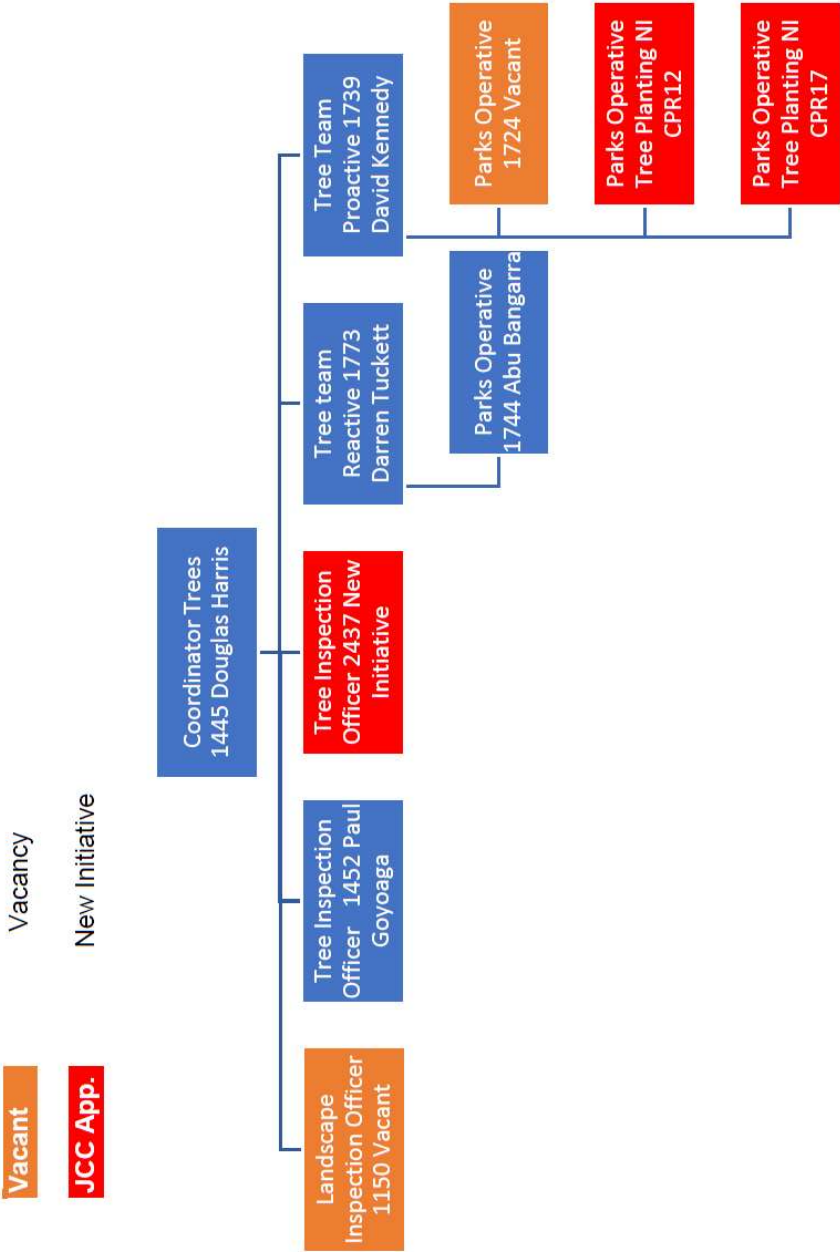
Liverpool City Council | Parks Review



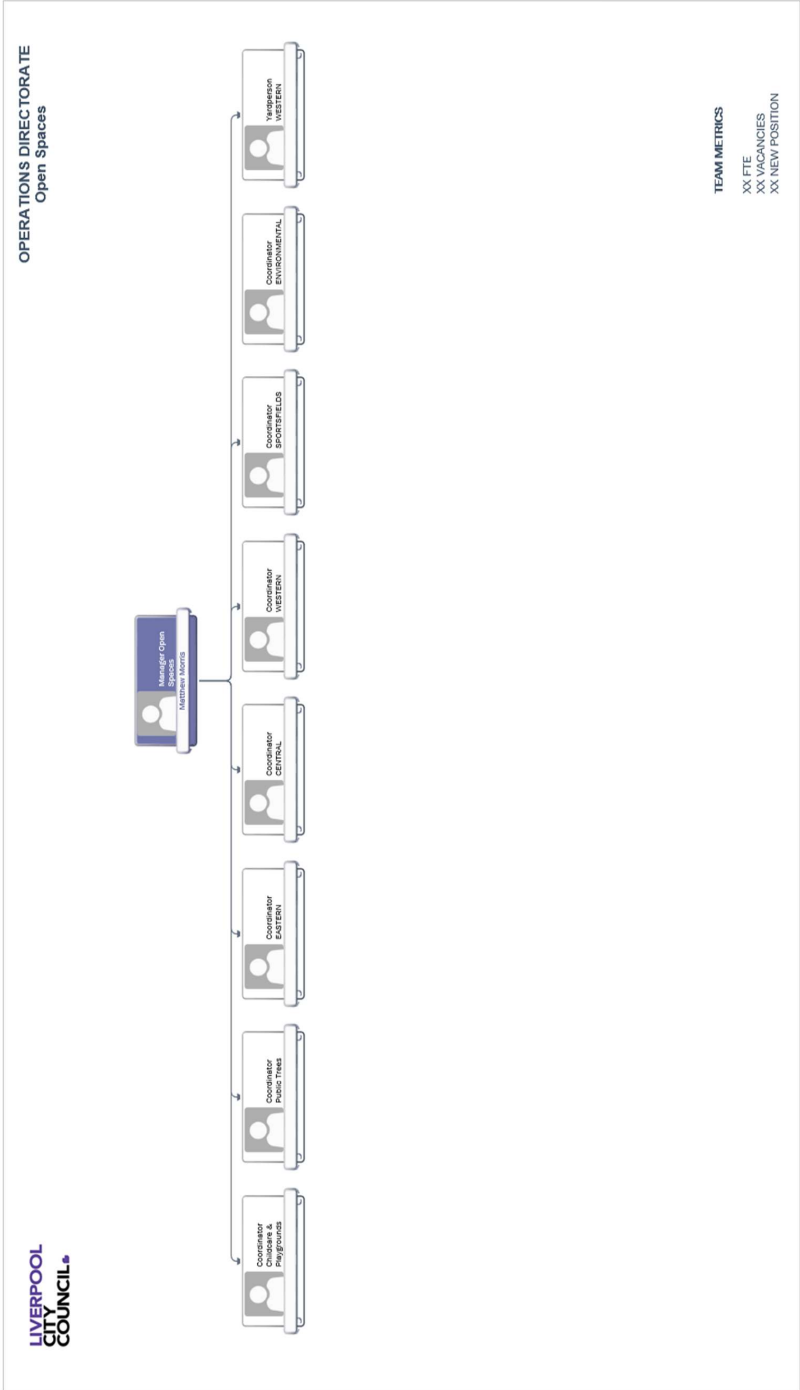
Liverpool City Council | Parks Review

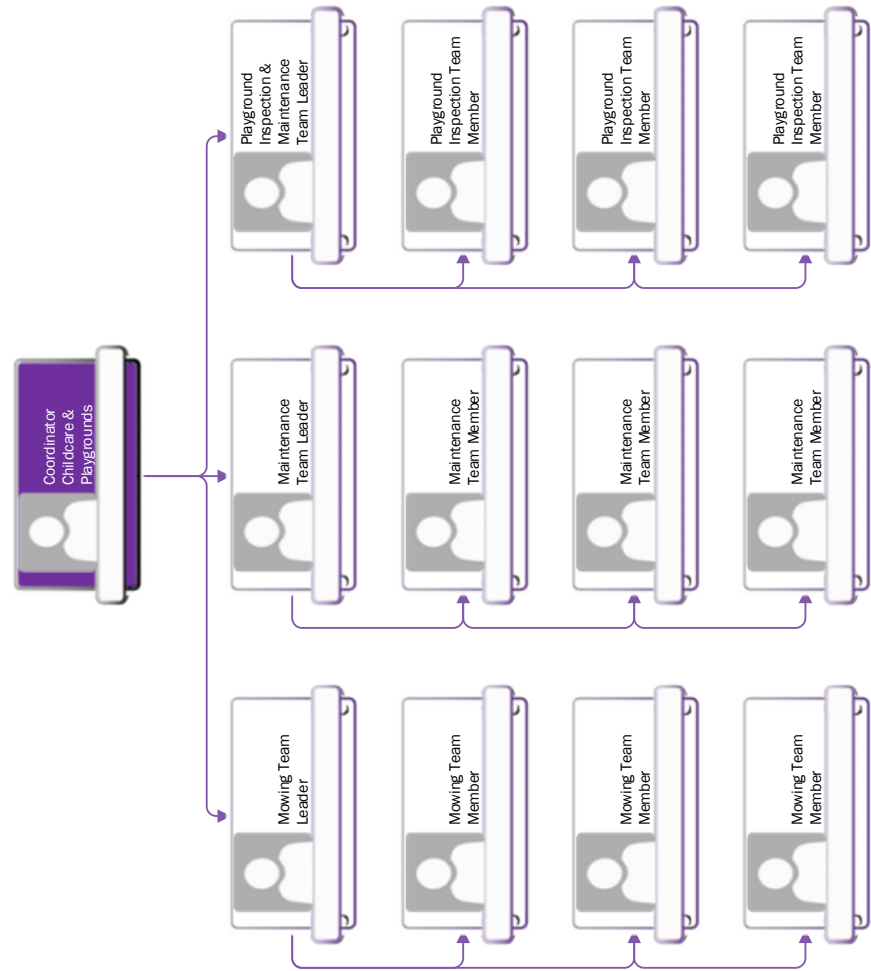


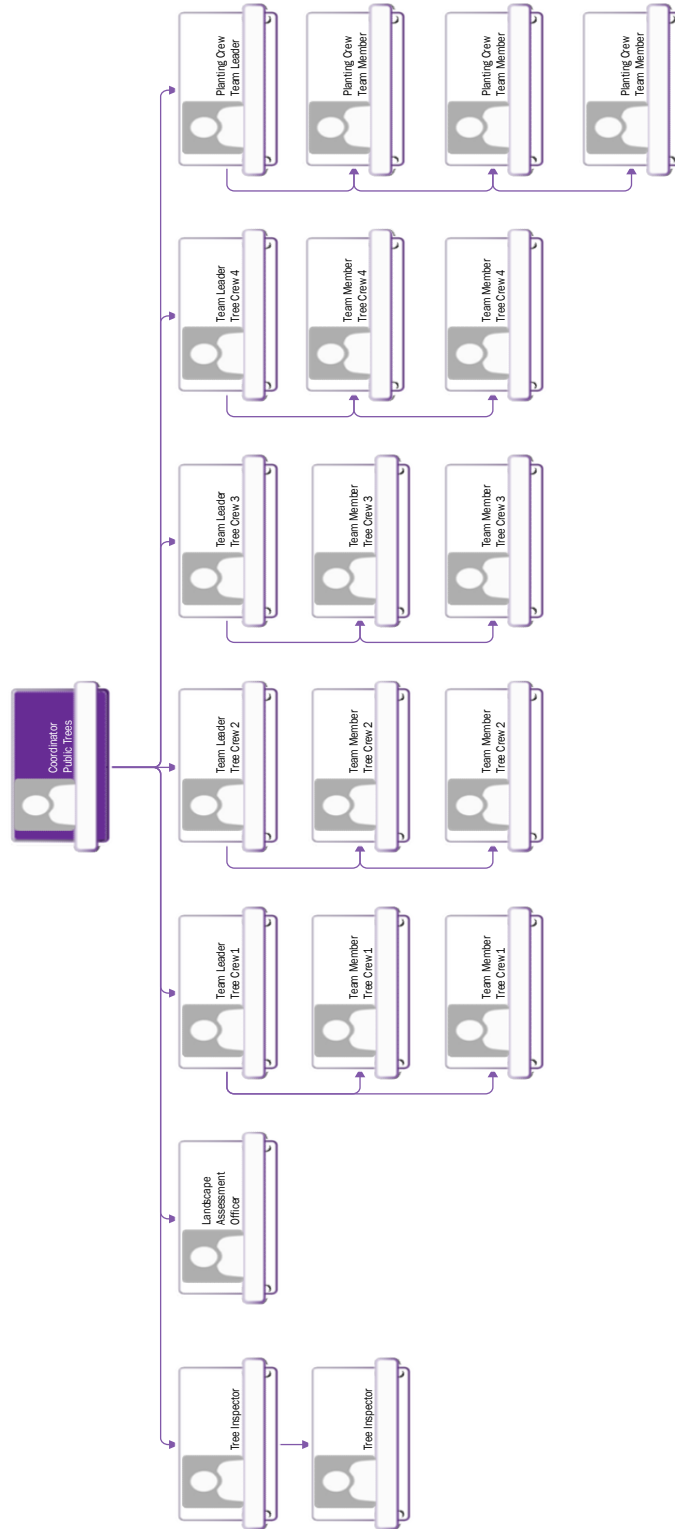
Liverpool City Council | Parks Review



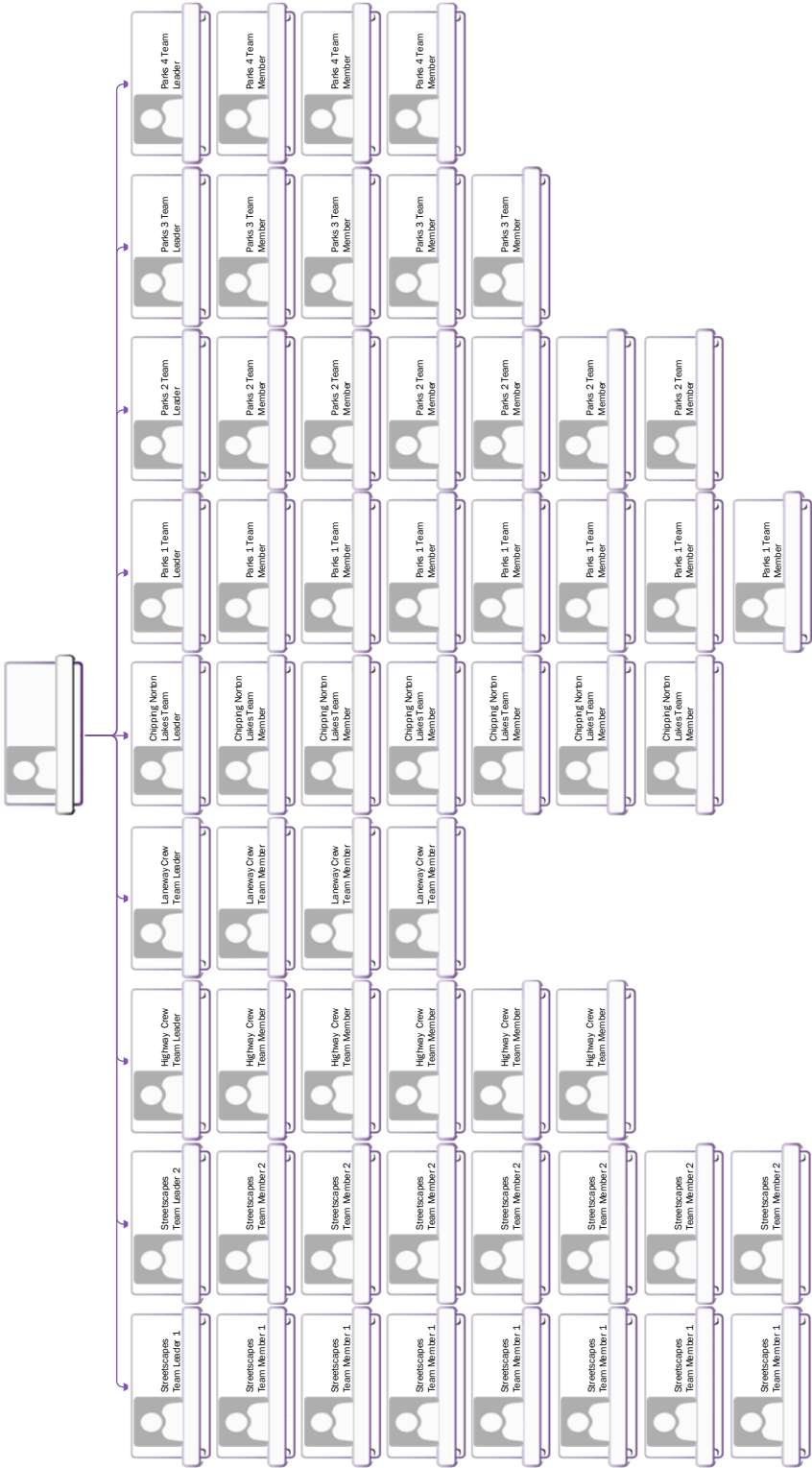
Appendix D | (Future State) Proposed Organizational Structure







Liverpool City Council | Parks Review



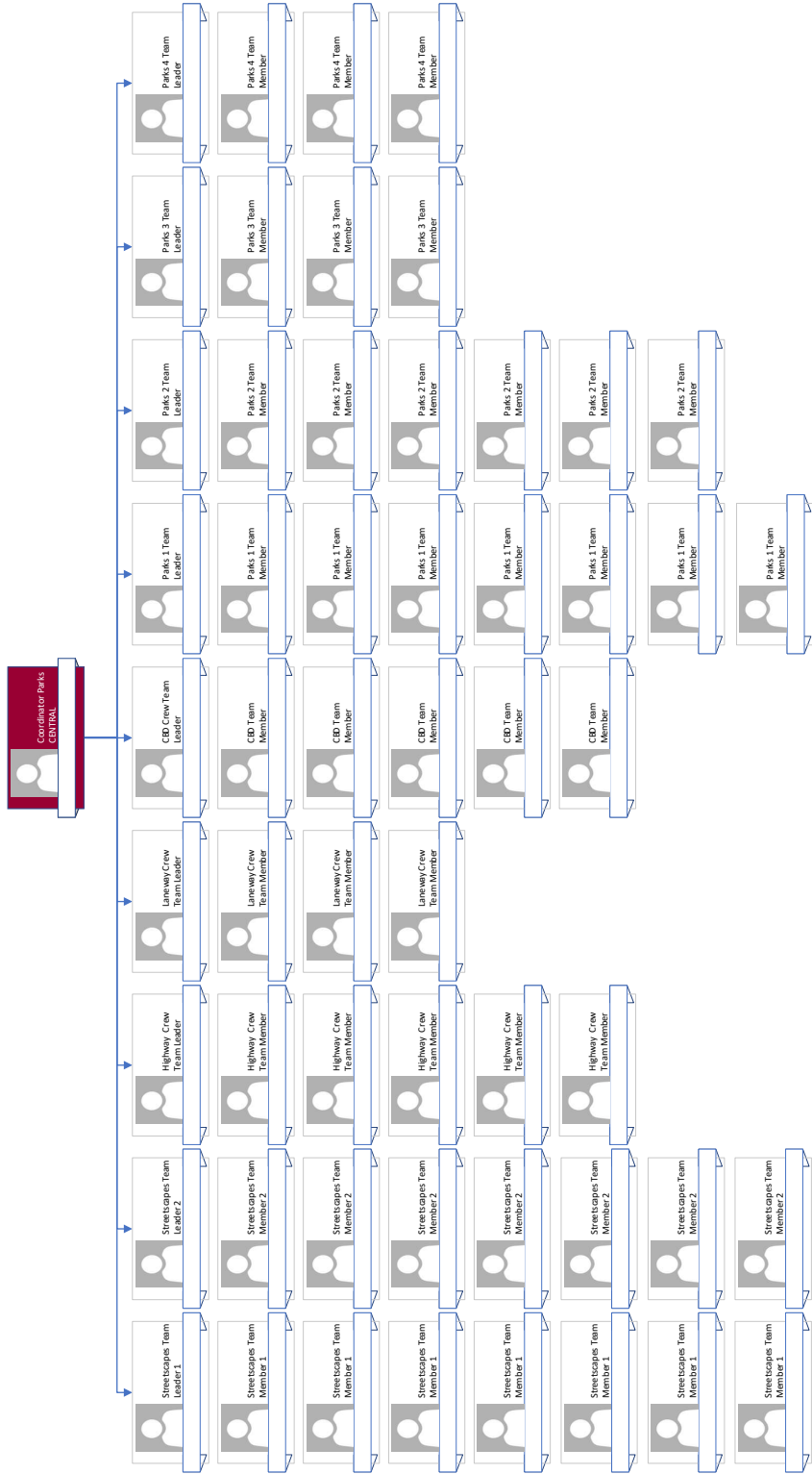
Liverpool City Council | Parks Review

OPERATIONS DIRECTORATE
Open Spaces | Parks Western (L2)

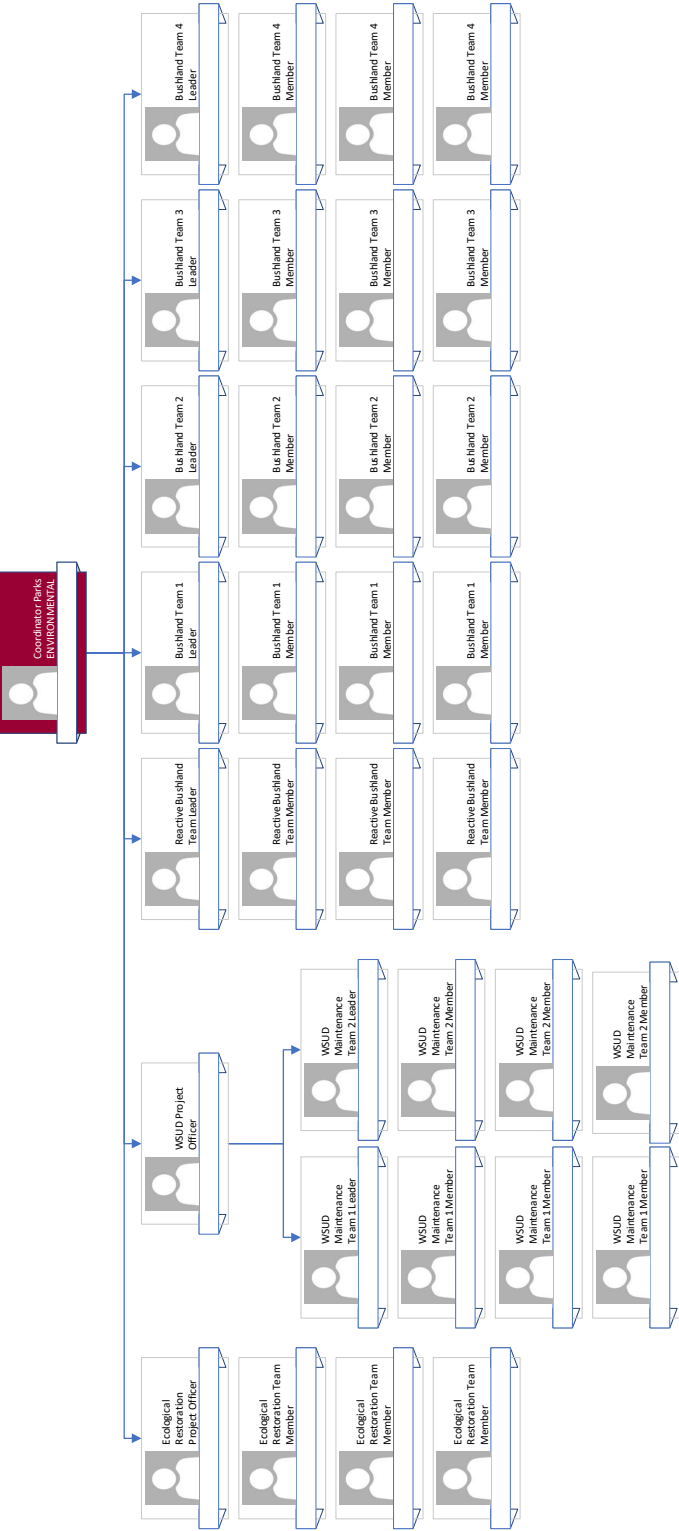


TEAM METRICS
XX FTE
XX VACANCIES
XX NEW POSITION

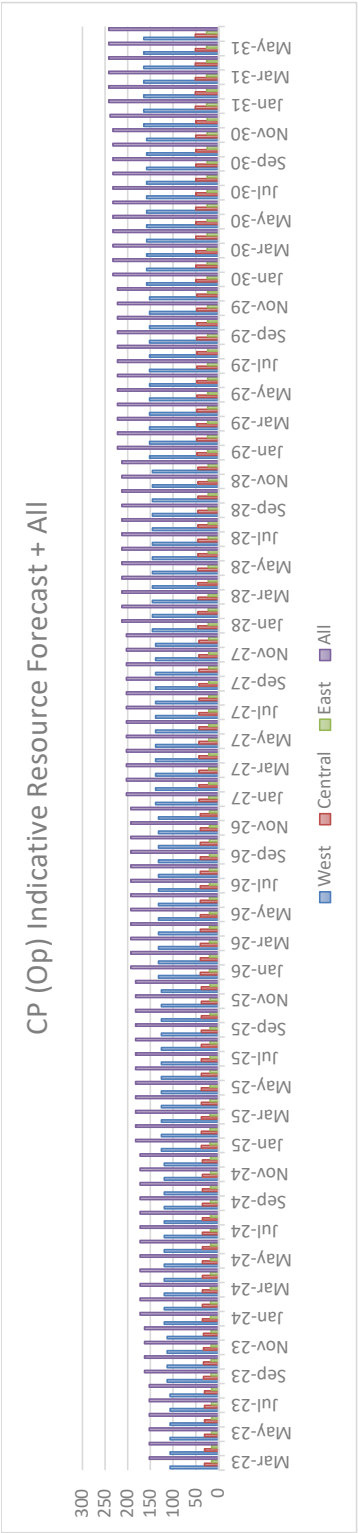
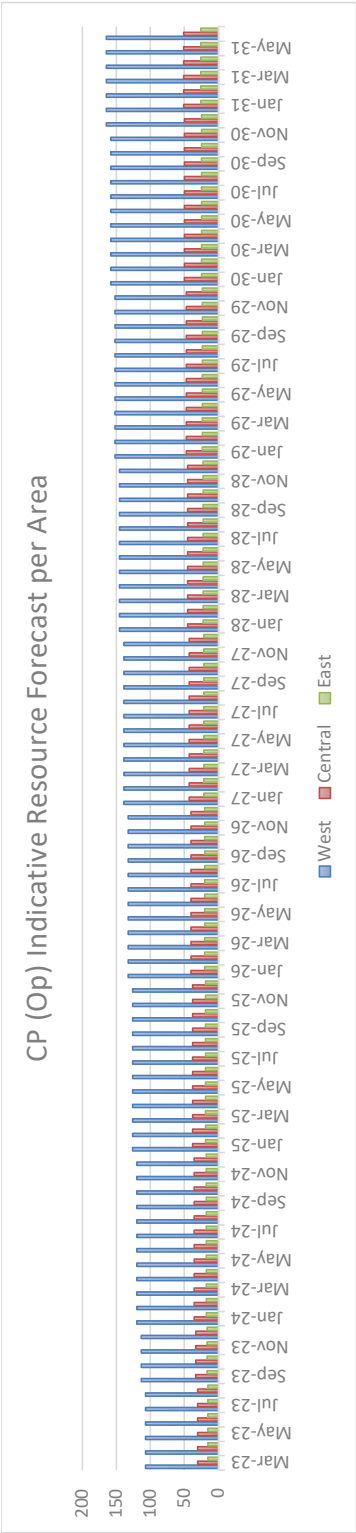
Liverpool City Council | Parks Review



Liverpool City Council | Parks Review



Appendix D | Resource Levelling Breakdown





Appendix E | Predictive Plant Requirements through to 2031

	Plant	Quantity	Estimated Cost
<i>Parks Eastern District Co-Ordinator</i>			
<i>Chipping Norton Lakes Regional Park Foreshore</i>			
<i>Team Leader</i>		1	
<i>Team Members</i>		6	
<i>Current Plant</i>			
<i>Wide Area Mower Toro 4000D</i>		1	\$ 110,000.00
<i>Kubota 72</i>		1	\$ 37,000.00
<i>Single Cab Truck</i>		1	\$ 110,000.00
<i>Atom Lawn Edger</i>		1	\$ 1,100.00
<i>Whipper Snipper</i>		2	\$ 1,798.00
<i>Chain Saws</i>		2	\$ 1,000.00
<i>Pole Saw</i>		2	\$ 1,000.00
<i>Back Pack Blower</i>		1	\$ 1,100.00
<i>Hand Held Blower</i>		1	\$ 400.00
<i>Trailer</i>		1	\$ 30,000.00
<i>Stihl Combo</i>		1	\$ 749.00
<i>Hedger</i>		1	\$ 400.00
<i>Additional Plant</i>			
<i>Wide area Mower Toro 4000D</i>		1	\$ 110,000.00
<i>Kubota 72</i>		1	\$ 37,000.00
<i>Dual Cab Trucks with Arrow Boards</i>		2	\$ 240,000.00
<i>Trailer</i>		1	\$ 30,000.00
<i>Atom Edgers</i>		2	\$ 2,200.00
<i>Whipper Snipper</i>		2	\$ 1,798.00

Liverpool City Council | Parks Review

<i>Backpack Blowers</i>	2	\$ 2,200.00
<i>18 V Knapsacks</i>	2	\$ 400.00
		\$ 423,598.00
<i>Parks Mowing Crew Team 1</i>		
<i>Team Leader</i>	1	
<i>Team Members</i>	7	
<i>Current Plant</i>		
<i>Outfronts Mower</i>	3	\$ 120,000.00
<i>Single Cab Trucks</i>	2	\$ 220,000.00
<i>Kubotas</i>	2	\$ 80,000.00
<i>Hand Held Blowers</i>	2	\$ 800.00
<i>Backpack Blowers</i>	2	\$ 2,200.00
<i>Atom Lawn Edgers</i>	2	\$ 2,200.00
<i>Brushcutters</i>	4	\$ 3,600.00
<i>Hedge Trimmers</i>	2	\$ 800.00
<i>Chainsaws</i>	2	\$ 1,000.00
<i>Additional Plant</i>		
<i>Dual Cab Trucks with Signage</i>	2	\$ 240,000.00
<i>Slasher tractor</i>	1	\$ 145,000.00
<i>Backpack Blowers</i>	1	\$ 1,100.00
<i>Whipper Snipper</i>	1	\$ 900.00
<i>Atom Lawn Edgers</i>	1	\$ 1,100.00
<i>Kawaski Mill 200 Litre spray tank</i>	1	\$ 50,000.00
		\$ 438,100.00
<i>Parks Mowing Crew Team 2</i>		
<i>Team Leader</i>	1	
<i>Team Members</i>	6	
<i>Current Plant</i>		
<i>Single Cab Trucks</i>	2	\$ 220,000.00

Liverpool City Council | Parks Review

<i>Tractor/slasher</i>	1	\$	145,000.00
<i>Kubotas</i>	2	\$	80,000.00
<i>Trailers</i>	2	\$	60,000.00
<i>Stihl Combo</i>	1	\$	1,600.00
<i>Atom Lawn Edgers</i>	2	\$	2,200.00
<i>Chainsaws</i>	2	\$	1,000.00
<i>Backpack Blowers</i>	1	\$	1,100.00
<i>Hand Held Blowers</i>	1	\$	500.00
<i>Hedge Trimmers</i>	2	\$	800.00
<i>Additional Plant</i>			
<i>Twin Cab Trucks with Arrow Board</i>	2	\$	240,000.00
<i>Whipper Snipper</i>	1	\$	900.00
<i>Atom Lawn Edgers</i>	1	\$	1,100.00
<i>Backpack Blowers</i>	1	\$	1,100.00
		\$	243,100.00
<i>Parks Mowing Crew Team 3</i>			
<i>Team Leader</i>	1		
<i>Team Members</i>	4		
<i>Current Plant</i>			
<i>Dual Cab Truck</i>	1	\$	120,000.00
<i>Single Cab Trucks</i>	2	\$	220,000.00
<i>Trailers</i>	3	\$	90,000.00
<i>Kubotas</i>	3	\$	120,000.00
<i>Hedge Trimmers</i>	2	\$	800.00
<i>Brushcutters</i>	5	\$	4,500.00
<i>Backpack Blowers</i>	1	\$	1,100.00
<i>Hand Held Blowers</i>	2	\$	800.00
<i>Atom Lawn Edgers</i>	3	\$	3,300.00
<i>Chainsaws</i>	3	\$	1,500.00
<i>Additional Plant</i>			
<i>Dual Cab Trucks with Signage</i>	2	\$	240,000.00

Liverpool City Council | Parks Review

<i>Ventrac All Terrain Mower</i>	1	\$ 80,000.00
<i>Trailer for Ventrac</i>	1	\$ 30,000.00
<i>Blower for Ventrac</i>	1	\$ 15,000.00
		\$ 365,000.00
<i>Parks Mowing Crew Team 4</i>		
<i>Team Leader</i>	1	
<i>Team Members</i>	3	
<i>Current Plant</i>		
<i>Single Cab Trucks</i>	3	\$ 110,000.00
<i>Trailers</i>	3	\$ 90,000.00
<i>Kubotas</i>	2	\$ 80,000.00
<i>Bobcat</i>	1	\$ 90,000.00
<i>Tractor/slasher</i>	1	\$ 135,000.00
<i>Atom Lawn Edgers</i>	2	\$ 2,200.00
<i>Brushcutters</i>	3	\$ 2,700.00
<i>Chainsaws</i>	2	\$ 1,000.00
<i>Hedge Trimmers</i>	2	\$ 800.00
<i>Hand Held Blowers</i>	1	\$ 1,000.00
<i>Stihl Combo</i>	1	\$ 1,600.00
<i>Additional Plant</i>		
<i>Dual Cab Trucks with Signage</i>	2	\$ 240,000.00
		\$ 240,000.00
<i>Streetscapes Team 1</i>		
<i>Team Leader</i>	1	
<i>Team Members</i>	3	
<i>Additional Plant</i>		
<i>Single Cab Trucks with Signage</i>	2	\$ 220,000.00
<i>Trailers</i>	2	\$ 60,000.00
<i>Kubotas</i>	2	\$ 80,000.00
<i>Whipper Snipper</i>	2	\$ 1,800.00
<i>Atom Lawn Edgers</i>	2	\$ 2,200.00
<i>Backpack Blowers</i>	1	\$ 1,100.00

Liverpool City Council | Parks Review

<i>Hand Held Blowers</i>	1	\$ 500.00
<i>Stihl Combo</i>	1	\$ 1,600.00
<i>Hedge Trimmers</i>	1	\$ 400.00
<i>Stand pipe</i>	1	\$ 3,000.00
<i>Chainsaws</i>	1	\$ 500.00
		\$ 371,100.00
<i>Streetscapes Team 2</i>		
<i>Team Leader</i>	1	
<i>Team Members</i>	3	
<i>Additional Plant</i>		
<i>Single Cab Trucks with Signage</i>	2	\$ 220,000.00
<i>Trailers</i>	2	\$ 60,000.00
<i>Kubotas</i>	2	\$ 80,000.00
<i>Whipper Snipper</i>	2	\$ 1,800.00
<i>Atom Lawn Edgers</i>	2	\$ 2,200.00
<i>Backpack Blowers</i>	1	\$ 1,100.00
<i>Hand Held Blowers</i>	1	\$ 500.00
<i>Stihl Combo</i>	1	\$ 1,600.00
<i>Hedge Trimmers</i>	1	\$ 400.00
<i>Chainsaws</i>	1	\$ 500.00
		\$ 368,100.00
<i>Streetscapes Team 3</i>		
<i>Team Leader</i>	1	
<i>Team Members</i>	3	
<i>Additional Plant</i>		
<i>Single Cab Trucks with Signage</i>	2	\$ 220,000.00
<i>Trailers</i>	2	\$ 60,000.00
<i>Kubotas</i>	2	\$ 80,000.00

Liverpool City Council | Parks Review

<i>Whipper Snipper</i>	2	\$ 1,800.00
<i>Atom Lawn Edgers</i>	2	\$ 2,200.00
<i>Backpack Blowers</i>	1	\$ 1,100.00
<i>Hand Held Blowers</i>	1	\$ 500.00
<i>Stihl Combo</i>	1	\$ 1,600.00
<i>Hedge Trimmers</i>	1	\$ 400.00
<i>Chainsaws</i>	1	\$ 500.00
		\$ 368,100.00
Streetscapes Team 4		
<i>Team Leader</i>	1	
<i>Team Members</i>	3	
<i>Additional Plant</i>		
<i>Single Cab Trucks with Signage</i>	2	\$ 220,000.00
<i>Trailers</i>	2	\$ 60,000.00
<i>Kubotas</i>	2	\$ 80,000.00
<i>Whipper Snipper</i>	2	\$ 1,800.00
<i>Atom Lawn Edgers</i>	2	\$ 2,200.00
<i>Backpack Blowers</i>	1	\$ 1,100.00
<i>Hand Held Blowers</i>	1	\$ 500.00
<i>Stihl Combo</i>	1	\$ 1,600.00
<i>Hedge Trimmers</i>	1	\$ 400.00
<i>Chainsaws</i>	1	\$ 500.00
		\$ 368,100.00
Lane Way Crew		
<i>Team Leader</i>	1	
<i>Team Members</i>	3	
<i>Additional Plant</i>		
<i>Dual Cab Truck with signage</i>	1	\$ 120,000.00
<i>Trailers</i>	1	\$ 30,000.00
<i>Kubotas</i>	1	\$ 40,000.00
<i>Stihl Combo</i>	1	\$ 1,600.00

Liverpool City Council | Parks Review

<i>Backpack Blowers</i>	2	\$	2,200.00
<i>Hedge Trimmers</i>	1	\$	400.00
<i>Whipper Snipper</i>	2	\$	1,800.00
<i>Atom Lawn Edgers</i>	1	\$	1,100.00
<i>15 litre 18V Sprayers</i>	2	\$	400.00
		\$	197,500.00
<i>Highway Crew</i>			
<i>Team Leader</i>	1		
<i>Team Members</i>	5		
<i>Current Plant</i>			
<i>Dual Cab Truck with Arrow Board</i>	2	\$	240,000.00
<i>Double cabin ute with arrow board</i>	1	\$	60,000.00
<i>Trailers</i>	2	\$	60,000.00
<i>Kubotas</i>	2	\$	80,000.00
<i>Whipper Snipper</i>	4	\$	3,600.00
<i>Atom Lawn Edgers</i>	3	\$	3,300.00
<i>Backpack Blowers</i>	2	\$	2,200.00
<i>Hand Held Blowers</i>	2	\$	1,000.00
<i>Hedge Trimmers</i>	4	\$	1,600.00
<i>Chainsaws</i>	1	\$	500.00
<i>Stihl Combo</i>	1	\$	1,600.00
<i>Parks Central District Co-Ordinator</i>			
<i>Staff/Plant</i>	<i>Quantity</i>	<i>Estimated Cost</i>	
<i>Liverpool CBD Crew</i>			
<i>Team Leader</i>	1		
<i>Team Members</i>	5		
<i>Current Plant</i>			
<i>Single Cab Trucks</i>	1	\$	120,000.00
<i>Single cab ute</i>	1	\$	40,000.00
<i>Kubotas 72</i>	1	\$	40,000.00
<i>Kubotas 55</i>	1	\$	25,000.00
<i>Backpack Blowers</i>	2	\$	2,200.00

Liverpool City Council | Parks Review

<i>Hand Held Blowers</i>	2	\$ 1,000.00
<i>Stihl Combo</i>	2	\$ 3,300.00
<i>Pole Trimmer Electric Stihl</i>	1	\$ 1,700.00
<i>Atom Lawn Edgers</i>	2	\$ 2,200.00
<i>Hedge Trimmers</i>	3	\$ 1,200.00
<i>Chainsaws</i>	2	\$ 1,000.00
<i>15 litre 18V Sprayers</i>	2	\$ 400.00
<i>2000 Litre Water Shuttle</i>	1	\$ 5,000.00
<i>Additional Plant</i>		
<i>Dual Cab Truck with signage</i>	1	\$ 120,000.00
<i>Trailers</i>	1	\$ 30,000.00
<i>Kawaski Mill 200 Litre spray tank</i>	1	\$ 50,000.00
<i>Whipper Snipper</i>	1	\$ 900.00
<i>Backpack Blowers</i>	1	\$ 1,100.00
		\$ 202,000.00
<i>Parks Mowing Crew Team 1</i>		
<i>Team Leader</i>	1	
<i>Team Members</i>	7	
<i>Additional Plant</i>		
<i>Dual Cab Truck with signage</i>	2	\$ 240,000.00
<i>Ventrac All Terrain Mower</i>	1	\$ 80,000.00
<i>Kubotas</i>	2	\$ 80,000.00
<i>Slasher/tractor</i>	2	\$ 270,000.00
<i>Trailers</i>	3	\$ 90,000.00
<i>Single Cab Trucks with Signage</i>	1	\$ 110,000.00
<i>Hand Held Blowers</i>	1	\$ 500.00
<i>Backpack Blowers</i>	2	\$ 2,200.00
<i>Whipper Snipper</i>	3	\$ 2,700.00
<i>Atom Lawn Edgers</i>	3	\$ 3,300.00
<i>Chainsaws</i>	2	\$ 1,000.00
<i>Stihl Combo</i>	1	\$ 1,600.00

Liverpool City Council | Parks Review

<i>Hedge Trimmers</i>	2	\$ 800.00
<i>15 litre 18V Sprayers</i>	2	\$ 400.00
		\$ 882,500.00
<i>Parks Mowing Crew Team 2</i>		
<i>Team Leader</i>	1	
<i>Team Members</i>	7	
<i>Additional Plant</i>		
<i>Dual Cab Truck with signage</i>	2	\$ 240,000.00
<i>Kubotas</i>	2	\$ 80,000.00
<i>Slasher/tractor</i>	1	\$ 135,000.00
<i>Trailers</i>	3	\$ 90,000.00
<i>Hand Held Blowers</i>	1	\$ 500.00
<i>Backpack Blowers</i>	2	\$ 2,200.00
<i>Whipper Snipper</i>	3	\$ 2,700.00
<i>Atom Lawn Edgers</i>	3	\$ 3,300.00
<i>Chainsaws</i>	2	\$ 1,000.00
<i>Stihl Combo</i>	1	\$ 1,600.00
<i>15 litre 18V Sprayers</i>	2	\$ 400.00
<i>Hedge Trimmers</i>	2	\$ 800.00
		\$ 557,500.00
<i>Parks Mowing Crew Team 3</i>		
<i>Team Leader</i>	1	
<i>Team Members</i>	3	
<i>Additional Plant</i>		
<i>Dual Cab Truck with signage</i>	1	\$ 120,000.00
<i>Kubotas</i>	1	\$ 40,000.00
<i>Slasher/tractor</i>	1	\$ 135,000.00
<i>Trailers</i>	1	\$ 30,000.00
<i>Hand Held Blowers</i>	1	\$ 500.00
<i>Backpack Blowers</i>	2	\$ 2,200.00
<i>Whipper Snipper</i>	3	\$ 2,700.00

Liverpool City Council | Parks Review

<i>Atom Lawn Edgers</i>	3	\$	3,300.00
<i>Chainsaws</i>	2	\$	1,000.00
<i>Stihl Combo</i>	1	\$	1,600.00
<i>15 litre 18V Sprayers</i>	2	\$	400.00
<i>Hedge Trimmers</i>	2	\$	800.00
		\$	337,500.00
<i>Streetscapes Team 1</i>			
<i>Team Leader</i>	1		
<i>Team Members</i>	3		
<i>Additional Plant</i>			
<i>Single Cab Trucks with Signage</i>	2	\$	220,000.00
<i>Trailers</i>	2	\$	60,000.00
<i>Kubotas</i>	2	\$	80,000.00
<i>Whipper Snipper</i>	2	\$	1,800.00
<i>Atom Lawn Edgers</i>	2	\$	2,200.00
<i>Backpack Blowers</i>	1	\$	1,100.00
<i>Hand Held Blowers</i>	1	\$	500.00
<i>Stihl Combo</i>	1	\$	1,600.00
<i>Hedge Trimmers</i>	1	\$	400.00
<i>Chainsaws</i>	1	\$	500.00
		\$	368,100.00
<i>Streetscapes Team 2</i>			
<i>Team Leader</i>	1		
<i>Team Members</i>	3		
<i>Additional Plant</i>			
<i>Single Cab Trucks with Signage</i>	2	\$	220,000.00
<i>Trailers</i>	2	\$	60,000.00
<i>Kubotas</i>	2	\$	80,000.00
<i>Whipper Snipper</i>	2	\$	1,800.00
<i>Atom Lawn Edgers</i>	2	\$	2,200.00
<i>Backpack Blowers</i>	1	\$	1,100.00
<i>Hand Held Blowers</i>	1	\$	500.00

Liverpool City Council | Parks Review

<i>Stihl Combo</i>	1	\$ 1,600.00
<i>Hedge Trimmers</i>	1	\$ 400.00
<i>Chainsaws</i>	1	\$ 500.00
		\$ 368,100.00
<i>Streetscapes Team 3</i>		
<i>Team Leader</i>	1	
<i>Team Members</i>	3	
<i>Additional Plant</i>		
<i>Single Cab Trucks with Signage</i>	2	\$ 220,000.00
<i>Trailers</i>	2	\$ 60,000.00
<i>Kubotas</i>	2	\$ 80,000.00
<i>Whipper Snipper</i>	2	\$ 1,800.00
<i>Atom Lawn Edgers</i>	2	\$ 2,200.00
<i>Backpack Blowers</i>	1	\$ 1,100.00
<i>Hand Held Blowers</i>	1	\$ 500.00
<i>Stihl Combo</i>	1	\$ 1,600.00
<i>Hedge Trimmers</i>	1	\$ 400.00
<i>400 L Buggy</i>	1	\$ 50,000.00
<i>Chainsaws</i>	1	\$ 500.00
		\$ 418,100.00
<i>Lane Way Crew</i>		
<i>Team Leader</i>	1	
<i>Team Members</i>	3	
<i>Additional Plant</i>		
<i>Dual Cab Truck with signage</i>	1	\$ 120,000.00
<i>Trailers</i>	1	\$ 30,000.00
<i>Kubotas</i>	1	\$ 40,000.00
<i>Stihl Combo</i>	1	\$ 1,600.00
<i>Backpack Blowers</i>	2	\$ 2,200.00
<i>Hedge Trimmers</i>	1	\$ 400.00
<i>Whipper Snipper</i>	2	\$ 1,800.00
<i>Atom Lawn Edgers</i>	1	\$ 1,100.00
<i>15 litre 18V Sprayers</i>	2	\$ 400.00

Liverpool City Council | Parks Review

		\$ 197,500.00
<i>Weekend Crew</i>		
<i>Team Leader</i>	1	
<i>Team Members</i>	3	
<i>Additional Plant</i>		
<i>Dual Cab Truck with signage</i>	1	\$ 120,000.00
<i>Trailers</i>	1	\$ 30,000.00
<i>Toro</i>	1	\$ 40,000.00
<i>Atom Lawn Edgers</i>	2	\$ 2,200.00
<i>Whipper Snipper</i>	2	\$ 1,800.00
<i>Backpack Blowers</i>	1	\$ 1,100.00
<i>Hand Held Blowers</i>	1	\$ 500.00
<i>Hedge Trimmers</i>	1	\$ 400.00
<i>Chainsaws</i>	1	\$ 500.00
<i>Stihl Combo</i>	1	\$ 1,600.00
		\$ 198,100.00
<i>Parks Western District Co-Ordinator</i>		
<i>Staff/Plant</i>	Quantity	Estimated Cost
<i>Rural Roads Mowing Crew Team 1</i>		
<i>Team Leader</i>	1	
<i>Team Members</i>	7	
<i>Current Plant</i>		
<i>JCB Excavator</i>	1	\$ 380,000.00
<i>Ventrac All Terrain Mower</i>	1	\$ 80,000.00
<i>Additional Plant</i>		
<i>Dual Cab Truck with signage</i>	2	\$ 240,000.00
<i>Tractor slasher</i>	1	\$ 135,000.00
<i>Ventrac All Terrain Mower</i>	1	\$ 80,000.00
<i>Trailers</i>	2	\$ 60,000.00
<i>Backpack Blowers</i>	2	\$ 2,200.00
<i>Blower attachment for ventrac</i>	1	\$ 15,000.00
<i>Whipper Snipper</i>	3	\$ 2,700.00
<i>15 litre 18V Sprayers</i>	2	\$ 400.00

Liverpool City Council | Parks Review

<i>Chainsaws</i>	2	\$ 1,000.00
		\$ 536,300.00
<i>Parks Mowing Crew Team 1</i>		
<i>Team Leader</i>	1	
<i>Team Members</i>	4	
<i>Current Plant</i>		
<i>Single Cab Trucks</i>	2	\$ 220,000.00
<i>Trailers</i>	2	\$ 60,000.00
<i>Kubotas</i>	2	\$ 80,000.00
<i>Atom Lawn Edgers</i>	2	\$ 2,200.00
<i>Stihl Combo</i>	2	\$ 1,600.00
<i>Brushcutters</i>	4	\$ 3,600.00
<i>Backpack Blowers</i>	1	\$ 1,100.00
<i>Hand Held Blowers</i>	2	\$ 1,000.00
<i>Hedge Trimmers</i>	2	\$ 800.00
<i>Chainsaws</i>	2	\$ 1,000.00
<i>Additional Plant</i>		
<i>Tractor slasher</i>	1	\$ 135,000.00
<i>Dual Cab Truck with signage</i>	2	\$ 240,000.00
		\$ 375,000.00
<i>Parks Mowing Crew Team 2</i>		
<i>Team Leader</i>	1	
<i>Team Members</i>	5	
<i>Additional Plant</i>		
<i>Trailers</i>	2	\$ 60,000.00
<i>Ventrac All Terrain Mower</i>	2	\$ 160,000.00
<i>Atom Lawn Edgers</i>	2	\$ 2,200.00
<i>Stihl Combo</i>	2	\$ 3,200.00
<i>Brushcutters</i>	4	\$ 3,600.00
<i>Backpack Blowers</i>	1	\$ 1,100.00

Liverpool City Council | Parks Review

<i>Hand Held Blowers</i>	2	\$ 1,000.00
<i>Hedge Trimmers</i>	2	\$ 800.00
<i>Chainsaws</i>	2	\$ 1,000.00
<i>Tractor slasher</i>	1	\$ 135,000.00
<i>Dual Cab Truck with signage</i>	2	\$ 240,000.00
<i>Blower for Ventrac</i>	1	\$ 15,000.00
		\$ 622,900.00
<i>Streetscapes Team 1</i>		
<i>Team Leader</i>	1	
<i>Team Members</i>	7	
<i>Additional Plant</i>		
<i>Dual Cab Truck with signage</i>	2	\$ 240,000.00
<i>Trailers</i>	2	\$ 60,000.00
<i>Kubotas</i>	2	\$ 160,000.00
<i>Stihl Combo</i>	1	\$ 1,600.00
<i>Backpack Blowers</i>	2	\$ 2,200.00
<i>Hedge Trimmers</i>	1	\$ 400.00
<i>Whipper Snipper</i>	2	\$ 1,800.00
<i>Atom Lawn Edgers</i>	1	\$ 1,100.00
<i>15 litre 18V Sprayers</i>	2	\$ 400.00
<i>Chainsaws</i>	2	\$ 1,000.00
<i>Hedge Trimmers</i>	2	\$ 800.00
<i>Atom Lawn Edgers</i>	2	\$ 2,200.00
<i>Whipper Snipper</i>	3	\$ 2,700.00
		\$ 474,200.00
<i>Lane Way Crew</i>		
<i>Team Leader</i>	1	
<i>Team Members</i>	3	
<i>Additional Plant</i>		
<i>Single Cab Truck with signage</i>	2	\$ 220,000.00
<i>Trailers</i>	1	\$ 30,000.00
<i>Kubotas</i>	1	\$ 40,000.00
<i>Stihl Combo</i>	1	\$ 1,600.00

Liverpool City Council | Parks Review

Parks Manager	<i>Backpack Blowers</i>	2	\$ 2,200.00
	<i>Hedge Trimmers</i>	1	\$ 400.00
	<i>Whipper Snipper</i>	2	\$ 1,800.00
	<i>Atom Lawn Edgers</i>	1	\$ 1,100.00
	<i>15 litre 18V Sprayers</i>	2	\$ 400.00
			\$ 297,500.00
	<i>Staff/Plant</i>	<i>Quantity</i>	<i>Estimated Cost</i>
	<i>Parks Co-Ordinator Eastern District</i>	1	
	<i>Leaseback Vehicle</i>		
Tree Section	<i>Parks Co-Ordinator Central District</i>	1	
	<i>Leaseback Vehicle</i>		
	<i>Parks Co-Ordinator Western District</i>	1	
	<i>Leaseback Vehicle</i>		
	<i>Sporting Fields Co - ordinator</i>	1	
	<i>Leaseback Vehicle</i>		
	<i>Community Centres, Childcare Centre and Playground Maintenance Co- ordinator</i>	1	
	<i>Leaseback Vehicle</i>		
	<i>Staff/Plant</i>	<i>Quantity</i>	<i>Estimated Cost</i>
Tree Section	<i>Tree Inspector</i>	1	
	<i>Leaseback Vehicle</i>	1	
	<i>Landscape Assessment Officer</i>	1	
	<i>Arbor Crew Team 1 -Team Leader</i>	1	
	<i>Team Members</i>	5	
	<i>Current Plant</i>		
	<i>Single Cab Truck</i>	1	\$ 110,000.00
	<i>Chipper</i>	1	\$ 135,000.00
	<i>Chain saws</i>	4	\$ 7,000.00
	<i>Polesaw</i>	1	\$ 1,000.00
	<i>Blower</i>	1	\$ 1,000.00

Liverpool City Council | Parks Review

<i>Additional Plant</i>		
<i>Dual Cab Truck with Arrowboard</i>	1	\$ 240,000.00
<i>Chain saws</i>	2	\$ 3,000.00
<i>Hand Blower</i>	2	\$ 1,000.00
<i>Polesaw</i>	1	\$ 2,000.00
<i>Chain saws</i>	4	\$ 1,100.00
<i>Twin cab Ute</i>	1	\$ 60,000.00
		\$ 307,100.00
<i>Arbor Crew Team 2 Team Leader</i>	1	
<i>Team Members</i>	5	
<i>Current Plant</i>		
<i>Single Cab Truck</i>	1	\$ 110,000.00
<i>Chipper</i>	1	\$ 135,000.00
<i>Chain saws</i>	4	\$ 7,000.00
<i>Polesaw</i>	1	\$ 1,000.00
<i>Blower</i>	1	\$ 1,000.00
<i>Additional Plant</i>		
<i>Dual Cab Truck with Arrowboard</i>	1	\$ 120,000.00
<i>Chipper</i>	1	\$ 135,000.00
<i>Chain saws</i>	2	\$ 3,000.00
<i>Hand Blower</i>	2	\$ 1,000.00
<i>Polesaw</i>	1	\$ 2,000.00
<i>Chain saws</i>	4	\$ 1,100.00
<i>Twin cab Ute</i>	1	\$ 60,000.00
		\$ 322,100.00
<i>Tree Planting Crew</i>		
<i>Team Leaders</i>	1	
<i>Team Members</i>	3	
<i>Additional Plant</i>		
<i>Dual Cab Utes with Arrowboard</i>	1	\$ 60,000.00
<i>Hand Augers</i>	2	\$ 2,000.00
<i>Chain saws</i>	4	\$ 1,100.00
<i>Polesaw</i>	1	\$ 2,000.00

Liverpool City Council | Parks Review

Single Cab Truck with auger attachment	1	\$ 180,000.00
Hand Blower	1	\$ 500.00
Backpack Blower	1	\$ 1,100.00
		\$ 246,700.00
Sporting Fields Co - ordinator		
Staff/Plant	Quantity	Estimated Cost
Sports Detailing East Team 1		
Team Leaders	1	
Team Members	3	
Current Plant		
Dual Cab Truck with Arrowboard	1	\$ 120,000.00
Kubota	1	\$ 40,000.00
Trailer	1	\$ 30,000.00
Whippers	2	\$ 1,800.00
Atom Lawn Edgers	2	\$ 2,200.00
Stihl Multi Saw	1	\$ 1,600.00
Slasher Mower	1	\$ 135,000.00
Kawasaki Mill 200 Litre Spray tank	1	\$ 50,000.00
Backpack Blower	2	\$ 2,200.00
18V 15 L Sprayers	2	\$ 400.00
Sports Detailing East Team 2		
Team Leaders	1	
Team Members	3	
Current Plant		
Dual Cab Truck with Arrowboard	1	\$ 120,000.00
Kubota	1	\$ 40,000.00
Trailer	1	\$ 30,000.00
Whippers	2	\$ 1,800.00
Atom Lawn Edgers	2	\$ 2,200.00
Stihl Multi Saw	1	\$ 1,600.00
Backpack Blower	2	\$ 2,200.00
18V 15 L Sprayers	2	\$ 400.00

Liverpool City Council | Parks Review

Additional Plant		
Slasher Mower	1	\$ 135,000.00
		\$ 135,000.00
Sports Detailing West Team 1		
Team Leaders	1	
Team Members	3	
Current Plant		
Dual Cab Truck with Arrowboard	1	\$ 120,000.00
Trailer	1	\$ 30,000.00
Whippers	2	\$ 1,800.00
Atom Lawn Edgers	2	\$ 2,200.00
Stihl Multi Saw	1	\$ 1,600.00
Kubota mower	1	\$ 40,000.00
Backpack Blower	2	\$ 2,200.00
18V 15 L Sprayers	2	\$ 400.00
Additional Plant		
Slasher tractor	1	\$ 135,000.00
		\$ 135,000.00
Sports Detailing West Team 2		
Team Leaders	1	
Team Members	3	
Current Plant		
Dual Cab Truck with Arrowboard	1	\$ 120,000.00
Trailer	1	\$ 30,000.00
Backpack Blower	2	\$ 2,200.00
Whippers	2	\$ 1,800.00
Kubota mower	1	\$ 40,000.00
Atom Lawn Edgers	2	\$ 2,200.00
Stihl Multi Saw	1	\$ 1,600.00
18V 15 L Sprayers	2	\$ 400.00
Additional Plant		
Slasher Tractor	1	\$ 135,000.00
		\$ 135,000.00

Liverpool City Council | Parks Review

<i>Sporting Fields Tractor Driver 1</i>	1	
<i>Current Plant Large Wide Arm Tractor</i>	1	\$ 195,000.00
<i>Sporting Fields Tractor Driver 2</i>	1	
<i>Current Plant Large Wide Arm Tractor</i>	1	\$ 195,000.00
<i>Sporting Fields Tractor Driver 3</i>	1	
<i>Additional Plant</i>	1	
<i>Large Wide Arm Tractor</i>		\$ 210,000.00
		\$ 210,000.00
<i>Rosedale Oval/GreenWay/Cirrilio</i>		
<i>Team Leaders</i>	1	
<i>Team Members</i>	9	
<i>Current Plant</i>		
<i>Trail behind sprayer</i>	1	\$ 15,000.00
<i>5 reel cyclinder mower</i>	1	\$ 90,000.00
<i>Small Sprayer Cdax</i>	1	\$ 3,000.00
<i>Whippers</i>	1	\$ 900.00
<i>Kubota mower</i>	1	\$ 40,000.00
<i>Wicket Mowers</i>	3	\$ 20,000.00
<i>Rollers</i>	2	\$ 30,000.00
<i>Stihl Multi Saw</i>	1	\$ 1,600.00
<i>HedgeTrimmer</i>	1	\$ 400.00
<i>Chain saws</i>	2	\$ 1,000.00
<i>Hand Held Blower</i>	1	\$ 500.00
<i>Backpack Blower</i>	1	\$ 1,100.00
<i>Fountain Line Marker</i>	1	\$ 2,500.00
<i>Additional Plant</i>		
<i>Dual Cab Truck with Arrowboard</i>	1	\$ 120,000.00
<i>Ride on Cylinder Mower triplex</i>	1	\$ 75,000.00
<i>Rollers</i>	2	\$ 60,000.00
<i>Cylinder Mowers</i>	2	\$ 15,000.00
<i>Super sopers</i>	2	\$ 3,500.00
<i>Kubotas</i>	3	\$ 120,000.00
<i>Whippers</i>	2	\$ 3,600.00

Liverpool City Council | Parks Review

<i>Atom Lawn Edgers</i>	4	\$	4,400.00
<i>18V 15 L Sprayers</i>	4	\$	800.00
<i>Backpack Blower</i>	3	\$	3,300.00
<i>Single cab Ute With Sprayer</i>	1	\$	80,000.00
<i>Aerator pro core walking rig</i>	1	\$	58,000.00
<i>Kubota mower 52 inch</i>	1	\$	25,000.00
<i>Combi Saw</i>	1	\$	1,600.00
<i>Hand Held Blower</i>	1	\$	400.00
<i>Trailer</i>	1	\$	30,000.00
<i>Box Trailer</i>	1	\$	3,000.00
<i>Sit on Amazon Vacuum Chipper</i>	1	\$	80,000.00
<i>Kawasaki Mill Buggy</i>	1	\$	25,000.00
		\$	708,600.00
<i>Chilcare, Community Centres and PlayGrounds Co-Ordinator</i>			
<i>Staff/Plant</i>	<i>Quantity</i>	<i>Estimated Cost</i>	
<i>Community Centre and Childcare Centre Maintenance Crew East</i>			
<i>Team Leader</i>	1		
<i>Team Member</i>	3		
<i>Current Plant</i>			
<i>Single Cab Utes</i>	1	\$	35,000.00
<i>Ride on Mower</i>	1	\$	25,000.00
<i>Blowers</i>	2	\$	1,000.00
<i>Atom Lawn Edgers</i>	2	\$	2,200.00
<i>Whipper Snipper</i>	2	\$	1,800.00
<i>Stihl Multi Saw</i>	1	\$	1,600.00
<i>Hedgers</i>	2	\$	800.00
<i>Dual Cab Ute with Arrowboard</i>	1	\$	60,000.00
<i>Community Centre and Childcare Centre Maintenance Crew West</i>			
<i>Team Leader</i>	1		
<i>Team Member</i>	3		
<i>Current Plant</i>			
<i>Single Cab. Utes</i>	2	\$	70,000.00
<i>Additional Plant</i>			

Liverpool City Council | Parks Review

<i>Twin Cab Utes</i>	1	\$	60,000.00
<i>Ride on Mower 55</i>	1	\$	25,000.00
<i>Hand Held Blowers</i>	1	\$	400.00
<i>Back Back Blower</i>	1	\$	1,100.00
<i>Atom Lawn Edgers</i>	2	\$	2,200.00
<i>Whipper Snipper</i>	2	\$	1,800.00
<i>Chainsaw</i>	1	\$	500.00
<i>18V Sprayer</i>	2	\$	400.00
<i>Stihl Multi Saw</i>	1	\$	1,600.00
<i>Hedgers</i>	2	\$	800.00
		\$	93,800.00
<i>Play Ground Inspectors</i>	4		
<i>Current Plant</i>			
<i>Single Cab Utes</i>	2	\$	70,000.00
<i>Ladders</i>	2	\$	600.00
<i>Hand Blowers</i>	2	\$	1,000.00
<i>Tool Set</i>	2	\$	400.00
<i>Additional Plant</i>			
<i>Single Cab. Utes</i>	2	\$	70,000.00
<i>Hand Blowers</i>	2	\$	1,000.00
<i>Ladders</i>	2	\$	600.00
<i>Tool Set</i>	2	\$	400.00
<i>7V Ryobi Spray Units</i>	4	\$	400.00
<i>Ryobi Spray Unit Charger</i>	4	\$	800.00
		\$	73,200.00
<i>Bushland, WSUDS and ERP Coordinator</i>			
<i>Staff/Plant</i>	Quantity	Estimated Cost	
<i>Biosecurity Officer</i>	1		
<i>Bushland Team 3</i>			
<i>Team Leader</i>	1		
<i>Team Members</i>	3		
<i>Additional Plant</i>			

Liverpool City Council | Parks Review

<i>Multi tool</i>	1	\$ 1,600.00
<i>Chainsaw</i>	2	\$ 1,000.00
<i>Brushcutter</i>	4	\$ 4,800.00
<i>Spray Unit 18V</i>	2	\$ 400.00
<i>Tipper Truck with Arrow Board</i>	1	\$ 80,000.00
<i>Twin Cab Utes with Arrow Board</i>	1	\$ 60,000.00
<i>Blowers</i>	2	\$ 1,000.00
<i>Hand Held auger</i>	1	\$ 1,000.00
		\$ 149,800.00
<i>Bushland Team 4</i>		
<i>Team Leader</i>	1	
<i>Team Members</i>	3	
<i>Additional Plant</i>		
<i>Multi tool</i>	1	\$ 1,600.00
<i>Chainsaw</i>	2	\$ 1,000.00
<i>Brushcutter</i>	4	\$ 4,800.00
<i>Spray Unit 18 V</i>	2	\$ 400.00
<i>Blowers</i>	2	\$ 1,000.00
<i>Hand Held auger</i>	1	\$ 1,000.00
<i>Tipper Trucks with Arrow Board</i>	1	\$ 80,000.00
<i>Twin Cab Utes with Arrow Board</i>	1	\$ 60,000.00
		\$ 149,800.00
<i>ERP Program Project Team</i>		
<i>Team Leader</i>	1	
<i>Team Members</i>	3	
<i>Additional Plant</i>		
<i>Tipper Truck with Arrow Board</i>	1	\$ 80,000.00
<i>Twin Cab Utes with Arrow Board</i>	1	\$ 60,000.00
<i>Multi tool</i>	1	\$ 1,600.00
<i>Chainsaw</i>	2	\$ 1,000.00

Liverpool City Council | Parks Review

<i>Brushcutter</i>	4	\$	4,800.00
<i>Spray Unit 18v</i>	2	\$	400.00
		\$	147,800.00
<i>WSUD Maintenance Crew 1</i>			
<i>Team Leader</i>	1		
<i>Team Members</i>	3		
<i>Additional Plant</i>			
<i>Twin Cab Truck with Arrow Board</i>	1	\$	120,000.00
<i>Trailer</i>	1	\$	30,000.00
<i>Ventrac</i>	1	\$	80,000.00
<i>Whipper Snipper</i>	4	\$	4,800.00
<i>Blowers</i>	2	\$	1,000.00
<i>Spray Unit 15v</i>	2	\$	400.00
<i>Hand Held auger</i>	1	\$	1,000.00
<i>Combi saw</i>	1	\$	1,600.00
		\$	238,800.00
<i>WSUD Maintenance Crew 2</i>			
<i>Team Leader</i>	1		
<i>Team Members</i>	3		
<i>Additional Plant</i>			
<i>Twin Cab Truck with Arrow Board</i>	1	\$	120,000.00
<i>Trailer</i>	1	\$	30,000.00
<i>Ventrac</i>	1	\$	80,000.00
<i>Whipper Snipper</i>	4	\$	4,800.00
<i>Blowers</i>	2	\$	1,000.00
<i>Spray Unit 18V</i>	2	\$	400.00
<i>Hand Held auger</i>	1	\$	1,000.00
<i>Multisaw</i>	1	\$	1,600.00
		\$	238,800.00
<i>Bushland Reactive Team</i>			
<i>Team Leader</i>	1		

Liverpool City Council | Parks Review

<i>Team Members</i>	3	
<i>Additional Plant</i>		
<i>Twin Cab Truck with Arrow Board</i>	1	\$ 120,000.00
<i>Whipper Snipper</i>	4	\$ 4,800.00
<i>Multi tool</i>	1	\$ 1,600.00
<i>Blowers</i>	1	\$ 1,000.00
<i>Hand Held auger</i>	1	\$ 1,000.00
<i>Chainsaw</i>	1	\$ 500.00
<i>Spray Unit 15v</i>	2	\$ 400.00
		\$ 129,300.00
<i>Total predicted plant and equipment spend to 2031</i>		\$ 12,638,798.00



CLIMATE CHANGE POLICY

Adopted: *(Current date)*

TRIM 278118.2022



CLIMATE CHANGE POLICY

DIRECTORATE: Infrastructure & Environment

BUSINESS UNIT: City Environment

1. PURPOSE/OBJECTIVES

The purpose of this Policy is to outline Council's commitment to managing climate change through emissions reduction actions across Council's operations and our community.

The Policy aligns with State climate change policy as well as Council's net zero emission reduction pathways outlined in the Sustainable Resilient Liverpool Strategy and Climate Action Plan.

The objectives of this Policy are to:

1. Achieve net-zero carbon emissions from Council's operations.
2. Provide effective and strong leadership to the Liverpool community in responding to climate change and building a sustainable city.
3. Assist our community to reach the NSW target of net-zero emissions by 2050.

2. POLICY COMMITMENT STATEMENTS

The commitments in this Policy are aligned with Council's Sustainable Resilient Liverpool Strategy and the Climate Action Plan.

Council is committed to the following principles.

Commitment Principle 1

Achieve net-zero carbon emissions from Council's operations by 2050.

To reduce its emissions, Council will aim to:

- ensure that all functions and activities of Council consider climate change across the organisation's operations;
- increase energy efficiency and reduce operating costs of all Council operations;
- reduce corporate energy use;
- minimise fuel consumption and transition to an electric fleet; and
- source energy from low carbon emission sources.

Commitment Principle 2

Provide effective and strong leadership to the Liverpool community in responding to climate change and building a sustainable city.

This will be achieved by:

- ensuring all new infrastructure and buildings deliver best practice low carbon, low urban heat, climate resilience, water and energy efficient outcomes;
- climate resilient water supply and conservation by minimising potable water use in our operations;
- reducing Council's greenhouse gas emissions from electricity use, transport, resource consumption and waste management; and
- developing community infrastructure and programs that provide for safe, efficient, affordable and low-carbon mobility.

Commitment Principle 3

Assist our community to reach the NSW target of net-zero emissions by 2050.

To support the community achieve this target, Council will:

- deliver programs and services that support community and business transition to net zero emissions;
- utilise Council assets and activities as enablers for broader community emission reductions;
- utilise land-use planning instruments to reduce urban heat, potable water use, and greenhouse gas emissions; and
- incorporate best practice urban heat resilience and green infrastructure, including increased canopy cover, street vegetation and urban heat refuges.

3. RESPONSIBILITIES

These commitments are a shared responsibility across many sections of Council, as outlined in the Climate Action Plan. They involve working collaboratively with external stakeholders including government departments, regional organisations, industry and the community.

4. RELEVANT LEGISLATIVE REQUIREMENTS

Local Government Act 1993

Environmental Planning & Assessment Act 1979

5. RELATED POLICIES & PROCEDURE REFERENCES

- NSW State government 'Net Zero Plan Stage 1, 2020-2030'
- Greater Sydney Regional Plan A Metropolis of Three Cities
- Western City District Plan
- Liverpool LSPS
- Sustainable Resilient Liverpool
- Liverpool Climate Action Plan
- NSW Electricity Strategy
- NSW Climate Change Policy Framework
- NSW DPIE Net Zero Plan Stage 1: 2020 2030
- Future Transport 2056

6. DEFINITIONS

Climate change – any change in the climate over time, due to either natural variability or human activities.

Emissions - The release of greenhouse gases and/or their precursors into the atmosphere.

Greenhouse gas emissions (GHGs) – refers to emissions of carbon dioxide, methane, nitrous oxide, sulphur hexafluoride, a hydrofluorocarbon gas, a perfluorocarbon gas or any other gas prescribed by legislation for the purposes of this definition.

Net-zero emissions: Also known as ‘carbon neutrality’ or ‘climate neutrality’. Occurs when the level of greenhouse gases emitted into the atmosphere from human activities equals the level ‘removed’ from the atmosphere.

Resilience – climate resilience refers to organisations, community, individuals increasing and building capacity to cope with climate change, to recover from the effects of climatic changes and to adapt to climate change using a combination of sustainable adaptation and mitigation measures.

AUTHORISED BY

Council Resolution

EFFECTIVE FROM

This date is the date the policy is adopted by Council resolution.

REVIEW DATE

This policy will be reviewed every two years.

VERSIONS

The current and previous version of the policy should be set out in the following table.

Version	Amended by	Changes made	Date	TRIM Number

THIS POLICY HAS BEEN DEVELOPED IN CONSULTATION WITH

Liverpool City Council’s key directorates City Presentation; Corporate Services; Economy & Commercial Development; Infrastructure & Environment; Planning & Compliance. External stakeholders consulted included the Environment Advisory Committee, The Youth Council, and Western Sydney Region of Councils (WSROC). The policy went on public exhibition in May/June 2022 in accordance with the Local Government Act 1993.

ATTACHMENTS

- Liverpool Climate Action Plan



LIVERPOOL CLIMATE ACTION PLAN

August 2022



Contents

Contents.....	2
Executive Summary.....	3
Strategic Context.....	4
Current Liverpool Community.....	6
Current Liverpool Council.....	7
Six key moves.....	8
An Action Plan to get there.....	11
Monitoring Performance.....	22
Monitoring performance.....	23
Asset Performance Standards.....	24
Glossary of terms.....	25

Executive Summary

Context

In 2020, Liverpool Council developed the *Sustainable Resilient Liverpool Strategy*. The report identified potential emission reduction pathways for Liverpool Council Operations and the Community.

The report identified 6 Key Moves for Climate Action:

1. Council as a Leader
2. Liverpool Collaboration Area
3. Zero Carbon & Affordable Growth
4. Climate Resilient Water Supply
5. New Mobility Future
6. Targeted Approach to Waste

This *Climate Action Plan Report* identifies the key actions and priorities that sit behind these key moves and how Council can achieve the emission reduction pathways.

Additionally, this report builds on or responds to the following:

- Changes to the global, NSW state and local policy context settings
- Council resolution towards developing a Climate Action Plan
- Liverpool's specific planning and economic context as well as role in Greater Sydney

These actions will enable:

- The Liverpool community achieve net zero emissions by 2050
- The Liverpool City Council achieve net zero emissions across its operations by 2036.

Prioritising Actions

This action plan

- Reinforces sustainability as a key consideration in the priorities and programs pursued by council.
- Seeds future programs for individual council teams. It provides clear direction and helps prioritise actions and next steps including additional studies that may be required for council implementation.

The plan provides a framework for Council to prioritise actions based on:

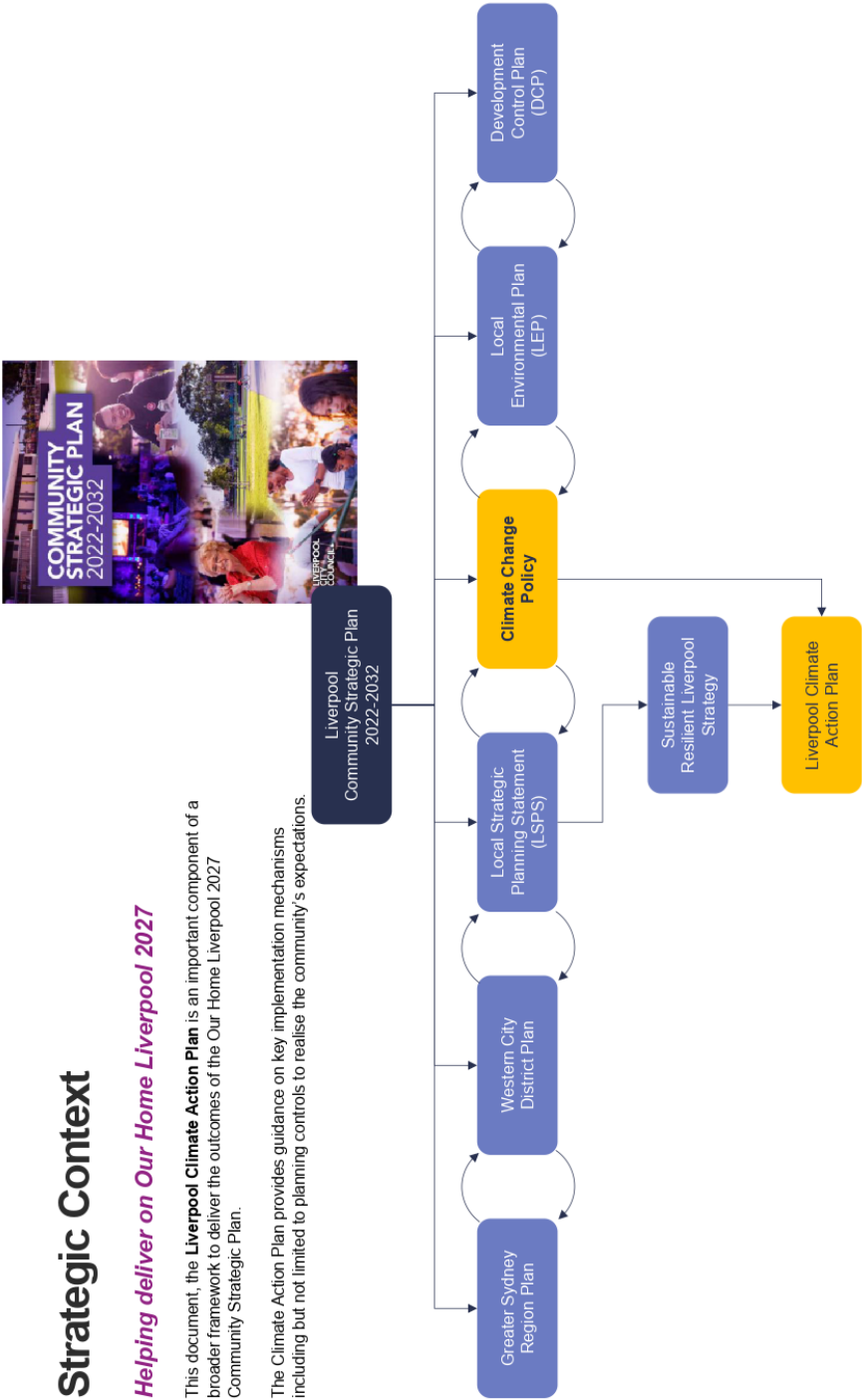
- Timeframe for implementation
- Sustainability Impact
- High level feasibility

The actions are designed to build and expand on Council's existing pipeline of sustainability programs and initiatives across its own operations and the community.

A Live Climate Action Plan

A suitable monitoring framework will be critical for Council to measure progress and refine the Climate Action Plan as required.

As the climate action is implemented, a data monitoring framework will be used to monitor and track the progress of actions and outcomes. Actions shall be monitored through various refined platforms including 'Resilient Sydney'.



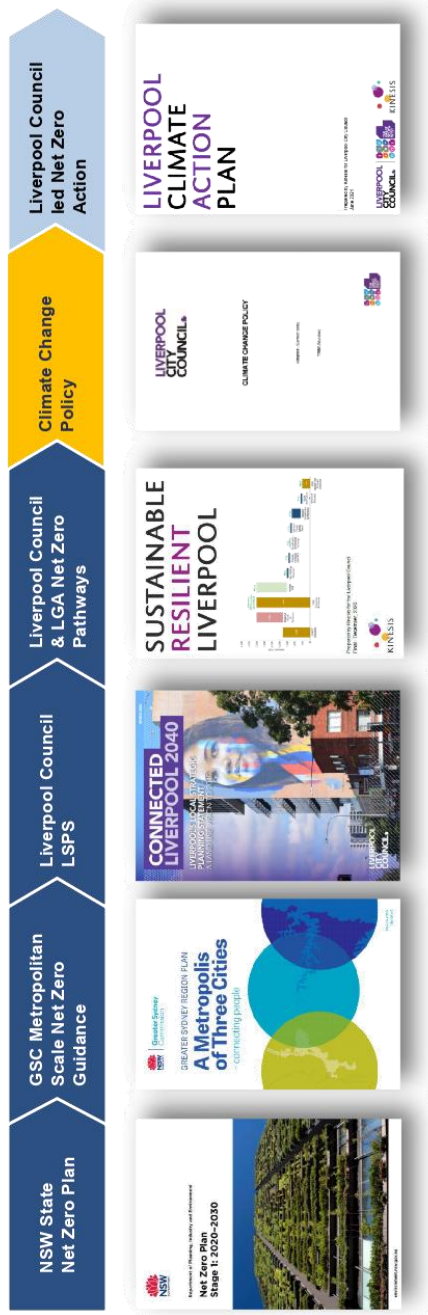
Dovetailing Liverpool's Climate Change Policy and Climate Action Plan with NSW State Priorities

Liverpool's Climate Change Policy was developed to be an overarching document to specify Council's sustainability commitments and principles. The Policy and accompanying Climate Action Plan was prepared in response to a Council resolution from the 24 February 2021 Council meeting. The Policy and Plan builds on state and regional policy as well as Liverpool's own net zero pathways work to progress climate action across Liverpool.

- **Liverpool Local Strategic Planning Statement:** The Liverpool LSPS review in 2019 identified sustainability as key planning concern for council. Specifically managing the future growth and development in a manner consistent with addressing Climate change.
- **Liverpool community & council emission reduction strategy:** The Sustainable Resilient Liverpool Strategy has identified emission reduction pathways for Council and community.
- **The priority actions for implementation:** The Liverpool Climate Action Plan provides clear next steps and actions for realizing the emission reduction pathways in the Liverpool community and council.

- **NSW State level targets and direction:** The NSW State Government has released a Net Zero Emissions Plan with state wide targets to achieve net zero emissions by 2050 and sustainability directions for the state to pursue.

- **Metropolitan planning guidance:** The Greater Sydney Commission (GSC) Region Plan and District Plan provides guidance and considerations for local governments to incorporate in their planning process to achieve net zero emissions across the Sydney Metropolitan Region.



Current Liverpool Community

Current resource consumption and emissions patterns in the Liverpool LGA helps identify key areas of opportunity, develop responsive strategies, the impact of which can be monitored and adapted as required. Where available, 2019/20 data has been used. Where unavailable, historic 2016/17 data has been used. This information provides current data context and highlights areas of opportunity across the local government area that have been considered in developing the strategies and actions. As the action plan is implemented, a data monitoring framework will be used to update this information and track progress.

 **2 Million**
Thousand tonnes of CO2-e emissions generated by the Liverpool Community in 2019/20

Electricity consumption makes up 52% of total emissions. Transport is next highest, producing 32% of community emissions. Waste contributes a further 13% of total emissions.

Per dwelling residential emissions of the Liverpool LGA approximatedly equal to the average across the Greater Sydney region.

 **17%**
Higher electricity use than the average household in Greater Sydney in 2019/20

The average household in the Liverpool LGA consumes over 6,000 kWh per annum. Larger single dwellings in outer suburbs generally consume more energy. Electricity consumption is evenly split across the residential and non-residential sectors.

17%
Of households in Liverpool LGA had solar PV as of July 2020

As a comparison point, only 11% of dwellings across Greater Sydney have installed solar PV. Having said that, Liverpool LGA's solar PV take up was still lower than some comparable local government areas in Sydney's fringe in FY2019/20. Additionally, BASIX data suggests only 5% of new homes were built with solar PV in 2017/18, suggesting that lower penetration may persist in the LGA.

 **15GL**
Of water is used by the Liverpool community in 2019/20

62% of mains water (from Sydney Water network) is consumed in the residential sector and nearly half of all the water used in a household is for non-potable uses such as irrigation, toilets and laundry. Industrial water uses account for a 17% of demand. Demand per dwelling is comparable to the Greater Sydney average

 **60%**
Of household red bin made up of food and garden organics waste in 2016/17

The average household in Liverpool generates 620kg of waste per year, roughly in line with the waste generation of an average household in Greater Sydney. Reducing waste to landfill especially by diverting and treating organics waste will make a significant contribution to reducing emissions.

 **2x**
the car use of average household in Greater Sydney in 2019/20

55% of households own two or more cars. This exceeds the Greater Sydney Average of 45%. Residents travel over 20,000km per year on average by private vehicle, with 70% using private vehicles as the primary mode of transport to work.

 **<10%**
Canopy cover in Liverpool centres in 2018/19

Some Liverpool suburbs have even lower canopy cover, <5% in some areas. There is a causal relationship between higher urban tree canopy cover with lower land surface temperatures. Liverpool's centres currently have canopy cover rates falling well below the LGA average of 11% and the Government Architects' recommended 15-25% canopy coverage for high to medium density areas. Greening is a Premier's Priority and cooling Liverpool is a key objective of the Western City Deal.

 **38%**
Of employment within Liverpool is accounted for by local workers.

A further 33% commute to the neighbouring LGAs – Campbelltown, Fairfield, Camden and Canterbury Bankstown. Geography and access to public transport contribute to Liverpool's car reliance. Over 70% of the short to medium trips to work are made using a car. Switching to more sustainable transport options can make a significant difference in emissions and deliver household cost savings.

Current Liverpool Council

Current resource use and emissions of Council's operations helps identify key areas of opportunity, develop responsive strategies, the impact of which can be monitored and adapted as required. 2016/17 data has been used for this analysis.

It should be noted that since 2016/17, Council has advanced its streetlighting and solar PV program. As such, as this Climate Action Plan is implemented, a data monitoring framework will be essential to update this information and track progress.





29,000

Tonnes of CO2-e emissions generated by Liverpool Council Operations in FY17


Streetlighting accounts for 53% of Liverpool's corporate emissions excluding council operated waste facilities. The council fleet accounts for a further 8% of corporate emissions. Other significant emitters are the Whittam Leisure Centre and the Moore Street administration building.



70%

Renewable energy under new power purchase agreements

Liverpool City Council currently purchases 35% of its power from renewable sources using power purchase agreements. Expanding this program can be considered in addition to the solar capital works program to deliver emissions reduction.



143 kW

Of solar PV capacity installed on Council's assets

Council has been installing solar PV panels on it's assets with 143kW installed with further capital works planned for an expansion of the solar program



53

Passenger and light commercial vehicles by 2030

Liverpool City Council is aiming to expand its fleet of passenger and light commercial vehicles from 12 to 53 by 2030. After streetlighting, fleet is the largest source (8%) of Council's total emissions. Transitioning to electric vehicles presents a significant opportunity for Council's emissions reduction.

Six key moves

Liverpool Council is aiming for Community wide emissions to reach Net Zero by 2050, in line with the State Government Targets. Modelling shows with offsets, Council's corporate assets can reach Net-Zero by 2036. Sustainable Resilient Liverpool Strategy identified 6 key moves for Liverpool Council to lead on in order to reach emissions targets and deliver local climate action:

1. **Council as a Leader** continuing to deliver efficiency, renewable energy and water reuse opportunities across all assets to demonstrate leadership and save money.
2. **Sydney's First High Performance, Low Carbon Precinct** delivered in the Liverpool Collaboration Area.
3. **Zero Carbon & Affordable Growth** - ensure all new buildings across the local government area deliver low carbon, low water, climate resilient, affordable outcomes.
4. **Climate Resilient Water Supply** to address urban heat and greening across all growth and renewal areas of the LGA
5. **New Mobility Future** that responds to changing transport patterns, the needs of residents, technological innovation in the transport sector and the investment in 15th avenue corridor and Western Sydney Aerotropolis.
6. **Targeted Approach to Waste** diverting organics waste through new services, infrastructure and embed circular economy principles for a new approach to waste.

The 6 key moves were developed based on emission reduction pathways for both Council operations and the broader community. These pathways are outlined on the following pages.

This **Climate Action Plan** outlines specific actions that can be led by Council within each of these key moves. While these actions can be led by Council, implementing many of these actions will require collaboration and coordination across Council, residents, business and state government.

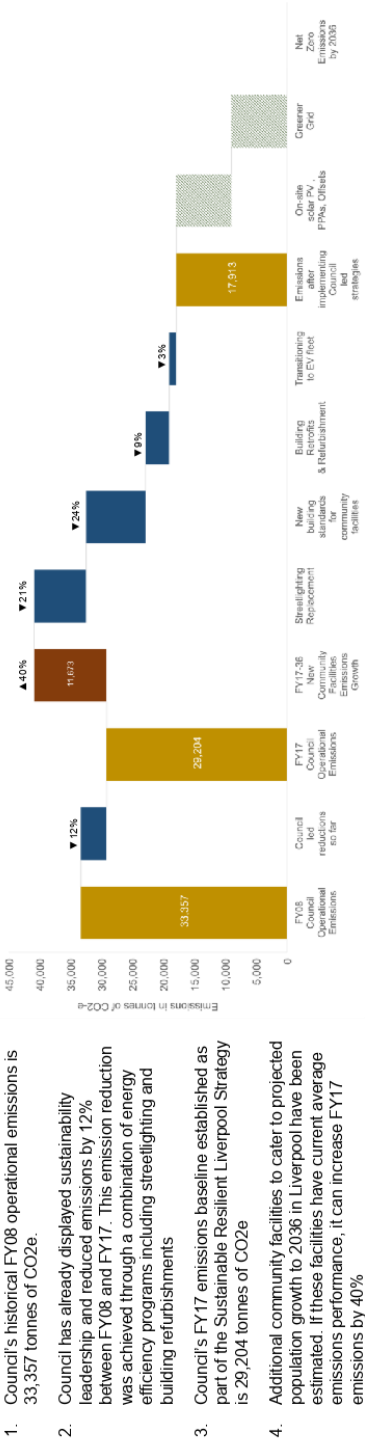
The development of this action plan included collaboration and consultation with key Council staff in order to shape the actions to take forward.



COUNCIL OPERATIONS EMISSION REDUCTION PATHWAY

Council's pathway to net zero emissions is outlined in the diagram to the right. This pathway captures Council's current sustainability leadership, future programs and external factors such as the decarbonisation of the electricity grid.

Each column of Council's net zero pathway is numbered and explained below.



1. Council's historical FY08 operational emissions is 33,357 tonnes of CO2e.
2. Council has already displayed sustainability leadership and reduced emissions by 12% between FY08 and FY17. This emission reduction was achieved through a combination of energy efficiency programs including streetlighting and building refurbishments
3. Council's FY17 emissions baseline established as part of the Sustainable Resilient Liverpool Strategy is 29,204 tonnes of CO2e
4. Additional community facilities to cater to projected population growth to 2036 in Liverpool have been estimated. If these facilities have current average emissions performance, it can increase FY17 emissions by 40%
5. Council is nearing completion of its streetlighting replacement program and this is expected to deliver a 21% emission reduction on the forecast 2036 business as usual emissions.
6. If projected new community facilities are built to suggested best practice emissions performance standards, it can deliver a 24% reduction on emissions. These best practice performance standards are outlined in the
7. Asset Performance Standards section later in this report.
8. Building on the strategic refurbishment of the Moore St offices, Council can find additional building efficiencies including switching from gas to electricity in its assets and reduce its emissions by 9%.
9. Council is also looking to leverage the expected decarbonisation of the electricity grid by switching from petrol to electric vehicles (EV). Transitioning to EVs will deliver a 3% emission reduction.
10. Council led strategies are expected to deliver a 57% emissions reduction relative to the forecast 2036 emissions if no strategies were implemented.
11. Council is assessing additional sites for solar PV as well as exploring potential power purchase agreements that ensure its operations run-on clean energy.
12. The expected decarbonisation of the electricity grid from the closure of coal power stations and their substitution with renewables will also reduce Council's electricity emissions.
13. The combination of these strategies is expected to deliver net zero emissions across Council operations.

COMMUNITY EMISSION REDUCTION PATHWAY

The Liverpool community's pathway to net zero emissions is outlined below. This pathway outlines strategies that can be led by Council (such as planning controls), others that require collaboration with the community (such as retrofits and EV take-up) as well as external factors such as the decarbonisation of the electricity grid (or greener grid). Each column of the community's net zero pathway is numbered and explained below.

1. In FY17 community emissions were 1,801 KT of CO₂e.
2. Forecast growth in population and dwellings would result in a 1,703 KT CO₂e increase in emissions if no reduction strategies were implemented.
3. Council's FY36 emissions reference established as part of the modelling process is 3,504 tonnes of CO₂e. Reductions will be compared to this figure.
4. The expected decarbonisation of the electricity grid from the closure of coal power stations and their substitution with renewables will reduce the communities' emissions by 57% from the reference.
5. Implementing higher building standards to improve energy efficiency will reduce baseline emissions by 3%.
6. Retrofitting existing buildings with energy efficient measures will result in a further 3% reduction.
7. Reduced private vehicle use reduces emissions by 3%.
8. Electrification of gas fixtures and the addition of hydrogen to the gas mix will result in a 1% decrease from the reference.
9. The expected uptake of EV's alongside the decarbonised grid results in a 16% reduction compared to the reference scenario.
10. Waste minimisation and recovery strategies offer a 3% reduction in emissions from the reference scenario
11. The combination of these strategies is expected to deliver an 85% reduction in emissions based on the reference scenario by 2036.



An Action Plan to get there

This section informs the development of strategies that drive emission reduction and resource efficiency in order to move Council and the community towards net zero emissions.

While this is not an implementation plan, the following table outlines key actions and next steps to support the delivery of the 6 key strategies using practical approaches to reduce emissions and water use and appropriate tools and policies available for Council to take forward. The implementation scope and timeline of these actions are dependent on financial considerations including their business case, resourcing and budgets available.

A monitoring system can help Council track the impact of various actions and refine the strategy as necessary.

These actions will require collaboration and coordination across Council, partners in the Western Sydney Regional Organisation of Councils (WSROC), residents, business and state government agencies. The actions below are structured so Council can take on one of 4 roles in the implementation process:

- Owner/ Operator** – Council manages, leads, delivers and communicates commitment, progress and outcomes towards climate action.
- Regulator** – Council develops an informed position and influences others who have the responsibility to make the decision and act through regulation including planning controls.
- Collaborative Infrastructure delivery** – Council is an informed critical partner in the delivery of infrastructure projects in Liverpool with mutual benefits for partners such as utilities, developers and state agencies.
- Service Provider** - Council provides services and builds the capacity within the community to take climate action.

Strategies outlined in this Action Plan have been prioritised based on

The implementation timeframe:

Indicative timeframes have been determined for the actions based on industry reports and Kinesis experience. These are subject to resourcing considerations and council organisational intelligence.

- Short (0-2 years)
- Medium (2-5 years)
- Long (5-10 years)

The sustainability impact

Kinesis has modelled the sustainability impact of each action. These have been categorised as low to high. High impact actions will enhance sustainability objectives the most, including lowering emissions and increasing water efficiency.

- Low impact
- Medium impact
- High impact

Indicative economic and social cost vs benefits

Industry reports including marginal abatement cost curves and Kinesis experience with infrastructure providers have been used to determine the relative cost/ benefit of each action. A qualitative assessment of each action's feasibility within the timeframe for each action is outlined below:

- Low feasibility – generally more difficult to deliver and low benefits
- Medium feasibility – moderately difficult to deliver and moderate benefits
- High feasibility – deliverable and desirable (high benefits)

In general, low feasibility actions were not included in the action plan.

Council Operations Action Plan

Action	Action Status	Council Role	Detail	Feasibility Commentary	Time frame	Stakeholder Considerations	Next Steps	Council lead agency (To be confirmed)
Solar PV on council assets Key Move 1	Underway	Owner/Operator	Council has already installed 143 kW of solar PV on various assets.	High feasibility Year on year solar PV capital costs have been decreasing and on-site solar reduces electricity bills.	Short	<ul style="list-style-type: none"> Council assets team 	<ul style="list-style-type: none"> Explore additional solar PV – future capital works are planned for this. Conduct feasibility study to identify additional council owned sites for solar PV installation. 	<ul style="list-style-type: none"> City Presentation Economy & Commercial Development I&E
Streetlighting replacement Key Move 1	Underway	Collaborative Infrastructure Delivery	Council has partnered with Endeavour Energy and WSROC through the Light Years Ahead program.	High feasibility LED costs have decreased over time. Collaborative funding from WSROC & Endeavour. Results in electricity cost savings.	Short	<ul style="list-style-type: none"> Endeavour Energy WSROC 	<ul style="list-style-type: none"> Complete streetlighting replacement program. 	<ul style="list-style-type: none"> Planning & Compliance Corporate Services
Power Purchase Agreement Key Move 1	Procurement review ongoing	Collaborative Infrastructure Delivery	Council has partnered with WSROC in a power purchase agreement that powers 35% of Council's electricity use with renewable energy.	Medium feasibility Cost-benefit analysis to be compared against on-site solar. There is a sustainability benefit for energy usage in sites that cannot install rooftop solar PV.	Short	<ul style="list-style-type: none"> SSROC WSROC Private sector industries 	<ul style="list-style-type: none"> Complete current procurement review of PPA. Conduct cost benefit analysis against on-site solar PV. 	<ul style="list-style-type: none"> Corporate Services

Action	Action Status	Council Role	Detail	Feasibility Commentary	Time frame	Stakeholder Considerations	Next Steps	Council lead agency (To be confirmed)
Efficient council assets Key Move 1	Underway	Owner/Operator	Continue existing programmes to upgrade council assets with efficient fixtures and fittings. Ensure new builds align with high level best practice performance standard provided in the Appendix.	High feasibility LED costs have decreased over time. This will result in electricity cost savings.	Medium	<ul style="list-style-type: none"> Council assets team 	<ul style="list-style-type: none"> Develop new building standards (NABERS targets) for council assets. Some high level performance standards are provided in the appendix.) Continue refurbishment program. 	<ul style="list-style-type: none"> City Presentation Economy & Commercial Development I&E
Transition to a low carbon fleet Key Move 1 Key Move 5	Requires feasibility assessment	Owner/Operator Collaborative Infrastructure Delivery	Transition the council fleet to electric vehicles. Provide EV charging infrastructure shared with community.	High feasibility EV costs are expected to rapidly decline over the coming years. EV's already offer substantial running cost advantages compared to traditional vehicles and will soon be cheaper.	Long	<ul style="list-style-type: none"> TNSW NSW DPIE WSROC 	<ul style="list-style-type: none"> Develop EV strategy Begin transition of council fleet from petrol vehicles to EVs Collaborate with TNSW to locate public EV charging infrastructure in additional commuter car parks & council car parks. 	<ul style="list-style-type: none"> City Presentation Corporate Services City Presentation Planning & Compliance

Action	Action Status	Council Role	Detail	Feasibility Commentary	Time frame	Stakeholder Considerations	Next Steps	Council lead agency (To be confirmed)
Recycled water for greening Key Move 4	Requires feasibility assessment	Collaborative Infrastructure Delivery	Drought proof council parks and open space with recycled water. Apply best practice initiatives applied in Phillips Park.	Medium feasibility Cost benefit analysis to compare using potable water.	Medium	<ul style="list-style-type: none"> Sydney Water 	<ul style="list-style-type: none"> Feasibility assessment for recycled water to be used in Council's various public open space assets Collaborate with Sydney Water to connect Council assets to Hoxton Park recycled water network 	<ul style="list-style-type: none"> Planning & Compliance Community & Culture City Presentation

Council Actions Cost benefit and Prioritisation

	Prioritisation	Payback period (years)	Timeframe (years)	Sustainability impact (% reduction in emissions or water use)
Streetlighting replacement	1	5-6 years	< 2 years	21%
Solar PV on council assets	2	6-7 years	< 2 years	10%
Power Purchase Agreement	3	N/A	< 2 years	10%
Efficient council assets	4	5-6 years	2- 5 years	33%
Recycled water for greening	5	5-6 years	10 years	34%
Transition to all electric fleet	6	>40 years*	10 years	3%

* Note that EV capital costs are changing rapidly and expected to reach parity with petrol vehicles within the decade. This will improve the payback significantly. The transition to electric vehicles can be considered as a longer term strategy. The current emission reduction from electric vehicles only relates to transition of light vehicles within Council's fleet. Emission reduction from transition of heavy vehicles has not been considered.

Community Action Plan

Action	Council Role	Detail	Feasibility Commentary	Time frame	External Stakeholders	Next Steps	Council lead agency (To be confirmed)
High Performance Buildings Standards for new development Key Move 1 Key Move 2	Regulator	Develop BASIX targets and minimum NABERS targets that simulate best practice sustainability for all new development at Liverpool	<p>Medium feasibility</p> <ul style="list-style-type: none"> Marginal cost of delivering interventions for higher BASIX can be <1% of median house and unit price. Typical utility cost savings from delivering efficient new buildings are between \$500-\$1000 per household per year. 	Short	<ul style="list-style-type: none"> NSW DPIE WSROC Major developers 	<ul style="list-style-type: none"> Collaborate with DPIE and WSROC to explore potential uplift to new building standards for the Liverpool LGA. These targets should consider the variability of building typologies and design across the LGA. Kinesis recommends further testing of the BASIX tool should be undertaken to verify such targets in the context to specific building design. Prepare development controls which establish requirements for non-residential buildings through NCC pathways Develop planning controls which mandate dual plumbing for recycled water connectivity in all new buildings. Collaborate with State Government for SEPP changes that supports high performance buildings. Collaborate with State Government and GSC to define the characteristics of high performance precincts. 	Planning Team, liaison with DPIE

Action	Council Role	Detail	Feasibility Commentary	Time frame	External Stakeholders	Next Steps	Council lead agency (To be confirmed)
EV provision in all new buildings Key Move 5	Regulator	<ul style="list-style-type: none"> Future proof all new development in Liverpool to plan for community uptake of electric vehicles. 	<p>High feasibility</p> <ul style="list-style-type: none"> Estimated at approximately \$750 per space. Average Liverpool's household can save approximately \$1,100 per annum in fuel costs. 	Short	<ul style="list-style-type: none"> TfNSW regarding NSW Electric Vehicle Strategy WSROC Endeavour Energy 	<ul style="list-style-type: none"> Amend LEP/DCP to mandate EV charging outlets and infrastructure in all new development. An example clause for provision of EV charging in new buildings is outlined in the Waverley Development Control Plan. Engage with WSROC and Endeavour to discuss the expected growth in Electric Vehicles and provision of necessary electricity infrastructure requirements. 	Planning Team Transport Team

Action	Council Role	Detail	Feasibility Commentary	Time frame	External Stakeholders	Next Steps	Council lead agency (To be confirmed)
Develop urban heat resilience/ greening standards for implementation across the LGA Key Move 3 Key Move 4	Regulator	Increase resilience to urban heat by incorporating greening and cooling design in planning controls	<p>High feasibility and critical</p> <ul style="list-style-type: none"> The Western City Deal and specifically the Resilience to Climate Change Grant provides the relevant funding opportunity. Residents of Liverpool face increasing utility costs from air conditioning to tackle summer heat conditions. 	Short	<ul style="list-style-type: none"> WSROC Urban Heat Toolkit Western City Deal 	<ul style="list-style-type: none"> Amend LEP/DCP to incorporate development controls or incentives to encourage vegetation, green roofs, green walls and materials with a high solar reflectance away from public domain in particular on western and northern building facades. These would be developed as part of the WSROC urban heat toolkit. Planning requirements for access to public open space. Public domain plan to accommodate minimum appropriate canopy cover targets across different parts of the LGA. Funding for staff who possess the required expertise in sustainability and vegetation e.g. Arborists. Develop Council operated nursery to that specialises in the collection of seed (and transplantable juvenile trees) from areas where trees are permitted to be cleared and re-introduces these species as new street trees in the road reserve and as new trees in nearby open space. 	Planning Team Western City Deal Team Urban Design Team

Action	Council Role	Detail	Feasibility Commentary	Time frame	External Stakeholders	Next Steps	Council lead agency (To be confirmed)
Prepare energy infrastructure to achieve Net Zero Emissions Key Move 1 Key Move 3	Collaborative Infrastructure delivery	<ul style="list-style-type: none"> Ensure the electricity network can handle expected growth and future trends in solar PV uptake 	<p>High feasibility</p> <ul style="list-style-type: none"> The short term outlook for electricity prices continues to be high (Jacobs for AEMO, Retail electricity price history and projected trends) Solar PV and battery prices continue to decrease (Bloomberg New Energy Outlook 2020) The payback period for installing solar PV in a typical dwelling is 5-8 years. (Kinesis analysis) 	Medium	<ul style="list-style-type: none"> Endeavour Energy Large industrial asset owners 	<ul style="list-style-type: none"> Meet with Endeavour Energy to discuss expected growth in solar PV and network opportunities including energy storage. Meet with large industrial asset owners including data centres operators to encourage solar PV installation. Establish performance targets for new development to facilitate solar PV Identify key existing sites and stakeholders for grid scale solar PV. 	Sustainability Team Planning Team
Drought resilient water infrastructure Key Move 3 Key Move 4	Collaborative Infrastructure delivery	<p>Increase the drought resilience of the LGA by expanding recycled water infrastructure.</p> <p>Connect the majority of public open space areas and additional greening proposed to recycled water networks</p>	<p>Moderate feasibility</p> <ul style="list-style-type: none"> Approximately \$1000 per dwelling to connect to the recycled water network. Sydney Water has plans for the Hoxton Park Recycled Water Network and may be able to create a business case for additional recycled water networks in Liverpool given the growth projections. 	Medium	<ul style="list-style-type: none"> Sydney Water Private water utilities Council parks team 	<ul style="list-style-type: none"> Engage with Sydney Water and private sector providers to determine feasibility and intentions for recycled water in major project areas across the LGA starting with the Collaboration Area. Engage with DPPE regarding the growth area SEPP to facilitate recycled water across new greenfield areas. Council parks team to assess the current water usage, costs and aim to connect the majority of public open space areas to recycled water networks offered by Sydney Water. Consider a LGA wide catchment/flood study that looks at removing formal channelised drainage infrastructure and reintroducing unpaved watercourses. 	Liaison with Sydney Water Parks and Reserves Team Sustainability Team Planning Team Flood plan team

Action	Council Role	Detail	Feasibility Commentary	Time frame	External Stakeholders	Next Steps	Council lead agency (To be confirmed)
Create accessibility based parking controls Key Move 1 Key Move 5	Regulator	<p>Current parking rates do not respond to varying levels of car ownership in the LGA.</p> <p>Create accessibility-based parking rates for different parts of the LGA based on current and future public transport access and car ownership patterns.</p>	<p>High feasibility</p> <ul style="list-style-type: none"> High density residential development is expected in Liverpool's centres. Parking is a significant construction cost. \$50,000 to \$100,000 per parking space in some cases. Parking rates that respond to car ownership patterns can reduce parking construction and associated costs. In the future, excess parking will become a wasted asset 	Medium	<ul style="list-style-type: none"> Major developers TfNSW 	<ul style="list-style-type: none"> Develop accessibility based parking rates for different parts of the Liverpool LGA. There are existing tools including the Kinesis Parking Platform to enable this. Parking rates should respond to public transport availability and resident concerns. Develop a car share strategy. This can be informed through monitoring of existing car share infrastructure in the Liverpool CBD. Meet with major developers and TfNSW to develop the concept of maximum parking rates for different parts of the LGA. Develop parking infrastructure designs that enables parking structures to be repurposed into the future. Incorporate the refined rates and parking structure design into LEP/DCP. 	Planning Team Transport Team

Action	Council Role	Detail	Feasibility Commentary	Time frame	External Stakeholders	Next Steps	Council lead agency (To be confirmed)
Circular economy approach to waste Key Move 6	Service Provider	Expand Council's waste services to facilitate a circular economy approach with focus on removing organics from landfill. Council should also work with developers to reduce construction and demolition waste.	<p>Moderate feasibility</p> <ul style="list-style-type: none"> Current Council waste audits show that nearly 50% of an average landfill bin is composed of organics waste. Council is already operating FOGO, this program should continue to expand Circular Economy is a part of the Council's Ten year waste strategy and will continued to see ongoing development. 	Medium	<ul style="list-style-type: none"> Waste Service Providers Agribusiness Local Business 	<ul style="list-style-type: none"> Expand the implementation of FOGO waste service for residential properties across the local government area after the program starts in 2024. While assessing potential service providers for FOGO waste processing, Council may also consider modular organics waste processing technology that converts food and garden organics waste into feedstock for agriculture. Partner with agribusiness industries in Western Sydney to accept organics waste processing outputs. Seek dialogue with developers regarding the feasibility of improved construction practices to reduce waste e.g. reduced usage of steel frames and 	Council Waste Team Council Liaison with Agribusiness Industry Business Development team

Monitoring Performance

A Live Climate Action Plan

Council can ensure this Climate Action Plan remains live and relevant through an appropriate data monitoring framework.

Community monitoring

Council currently uses the Resilient Sydney monitoring platform to track and monitor its community wide resources, emissions and renewable energy. This provides Council with data intelligence to monitor trends in LGA wide resource use and emissions, and track and report towards its net zero emissions goals.

It is recommended that Council continue to leverage the existing Resilient Sydney Platform to monitor the impact of its actions on the community resource use and emissions.

Council monitoring

In addition to community monitoring, it will be critical for Council to be accountable to the targets it has set for its council assets and operations. This will help Council realise cost savings and provide community leadership. Council-led Strategies will have significant impact in the near term delivering significant emissions reductions between 2020 and 2036.

A combined monitoring framework to track the impact of actions across Council operations as well as the community would effectively digitise the framework prescribed in this Climate Action Plan, provide a single source of truth for data and drive engagement across council teams. It would reduce the required effort to accurately measure and report on changes in emissions and social trends. This will better enable council to both assess the effectiveness of action and identify changes in community needs. Council can conduct an ROI/ RFO process to understand and procure potential providers for this combined monitoring framework.

LIVERPOOL'S COMMUNITY EMISSIONS DASHBOARD
(RESILIENT SYDNEY PLATFORM)



Monitoring performance.

While the sustainability and infrastructure strategies outlined in this report are designed with resilience and adaptation in mind, the expected outcomes will vary with changes in yield, mix of use and market responses.

As a result, it will be important for Council to identify performance metrics, relevant targets and monitor both the private sector developer's response to these requirements, as well as the performance of these strategies on the ground.

In addition, while this report focuses on energy and water performance outcomes, broader social and economic benefits need to be tracked in order to understand the broader benefits of environmental performance outcomes, including car ownership, travel patterns and pedestrian activity.

Based on the outcomes outlined in this report, the following key metrics have been identified for tracking and monitoring by Council (see Table right). These metrics provide the key indicators for whether or not the recommendations in this report are being delivered and the expected outcomes are being achieved.

To enable Council to respond to this data and adapt through the planning and implementation phases of the strategy, we recommend the establishment of a monitoring platform to help Council capture this data and track the impact of the its actions. This platform should provide:

- The ability to capture the draft metrics from public and Council datasets
- Benchmarked metrics allow to show how decisions will impact individual centres, precincts and the broader LGA.
- The ability to run scenarios to review and adjust solutions for changes in land use forecasts, infrastructure and market responses, i.e. the ability to review planning controls, update infrastructure management of the landfill site, update engagement strategy with the community, etc. against the recommendations and metrics outlined in this report.

Metric	Units	Potential Source	Sector	Link to Strategy
Core Environmental Metrics				
BASIX	• BASIX Score	DPIE BASIX Data	Council and Community	Increase BASIX Targets & Recycled Water
NABERS	• NABERS Score		Council and Community	
	<ul style="list-style-type: none"> • Solar capacity (kW/dwelling and total kW installed) • Solar capacity (kW/council asset and total kW installed) • New build solar installation (% of new dwellings and new council assets) • Total solar installations (% of all dwellings and council assets) 			Increase BASIX Targets and renewables penetration
Solar PV		DPIE BASIX Data and APVI	Council and Community	
Water use	<ul style="list-style-type: none"> • Total water use • Recycled water use • % of dwellings connected to recycled water 	Sydney Water and private water utilities	Council and Community	Increase BASIX Targets & Recycled Water.
Parking Rate	• Spaces/dwelling	DA / BASIX Data	Community	Parking
Charging access	• Charging sites/park	Council data	Council and Community	EV
Landscaped Area	• % of site area	DA / BASIX Data	Community	Public Domain
Green roof area	• % of site area	DA	Community	Public Domain
Canopy Cover	• % of site area (at mature tree)	DA	Community	Public Domain
Broader Social & Economic Metrics (To be determined)				
Car ownership	• Vehicles/household	ABS Census	Community	
Containment	• % people who travel to work locally or from home.	Journey to Work (ABS Census)	Community	
Active transport	• Number of trips by walking and cycling	Council trackers ABS Census	Community	
Urban Heat Index	• UHI	DPIE	Community	

Asset Performance Standards

Kinesis has analysed emissions and water consumption data from existing assets to establish performance standards for future builds. These have been taken from the best performing 15% of assets. Where limited assets of a class exist, the best performing asset was used as a benchmark.

Asset Class	Emissions intensity (Tonnes of CO2e per m2)	Best practice electricity intensity (kWh per m2)
Animal Shelters	0.005	5.2
Car Parks, Parking Lots and Decks	0.01	12.2
Childcare Centres	0.04	41.7
Civic/Municipal Centres, Administration Buildings, Offices	0.07	72.9
Community Buildings/Halls	0.015	15.6
Depots (Rose Street Depot)	0.5	528
Fire Stations	0.02	23
Libraries	0.08	85.0
Museums, Galleries	0.06	67.0
Recreation/Leisure Centres	0.12	130.0
Aquatic Centres	0.22	181.0

Glossary of terms

Term	Meaning
GSC	Greater Sydney Commission
LGA	Local Government Area
LSPS	Local Strategic Plan
Solar PV	Solar Photovoltaics (solar panels)
EV	Electric Vehicle
PPA	Power Purchase Agreement

Related policies & procedure references

- NSW State government 'Net Zero Plan Stage 1, 2020-2030'.
- Greater Sydney Regional Plan A Metropolis of Three Cities
- Western City District Plan
- Liverpool LSPS
- Sustainable Resilient Liverpool
- Liverpool Climate Action Plan
- NSW Electricity Strategy
- NSW Climate Change Policy Framework
- NSW DPIE Net Zero Plan Stage 1: 2020 2030
- Future Transport 2056