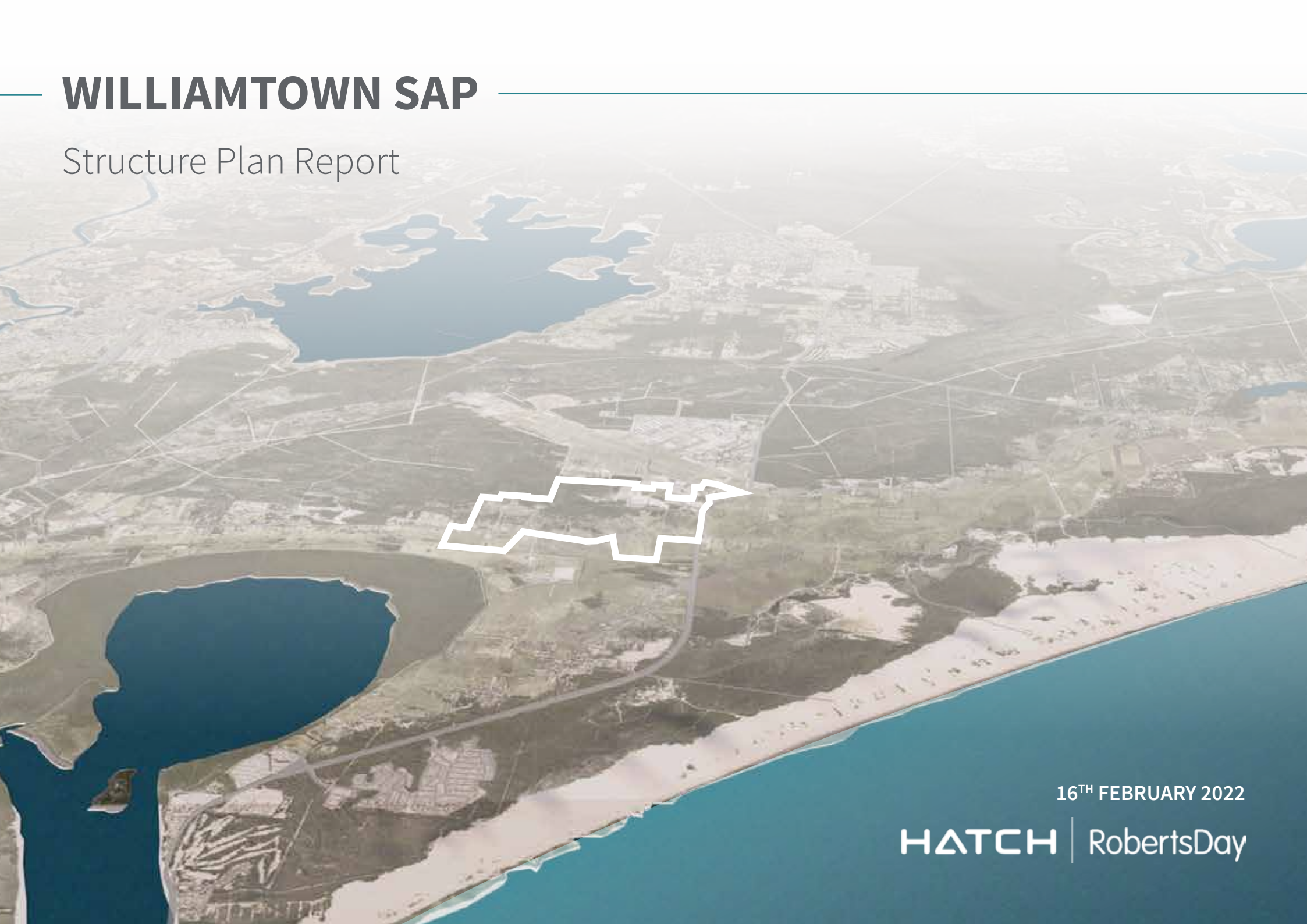
# WILLIAMTOWN SAP

## Structure Plan Report



16TH FEBRUARY 2022

HATCH | RobertsDay

*We acknowledge the Worimi people as the traditional and continuing custodians of Williamtown who have cared for their Country for thousands of generations. We pay respect to their elder's past, present and emerging and recognise their cultural and ancestral connections to the land, skies and waters of the site under investigation throughout this project.*

*We also acknowledge and pay our respects to the people and elders of the D'harawal, Dharug, Eora, Gandangurra, Gur-rin-gai and Yuni nations of Sydney and its regions, as the custodians of the lands upon which we live and work.*

# CONTENTS

# EXECUTIVE SUMMARY

*"The Williamtown SAP is strategically located to become a global gateway and an innovative Defence and Aerospace Precinct adjacent to the Williamtown RAAF Defence Base and Newcastle Airport."*

## *Special Activation Precincts Program*

The Special Activation Precincts (SAP) program facilitates job creation and economic development in designated areas of regional NSW through infrastructure investment and streamlined planning. SAPs are a place-based approach to "activate" strategic locations that are areas of state or regional significance, with the selection criteria based on an assessment of economic enablers, market failures and catalyst opportunities.

The five components of a SAP are:

- government-led studies
- streamlined planning
- government-led development
- infrastructure investment and
- business concierge

## *Williamtown SAP*

The Williamtown SAP covers an area of over 380 hectares and is focused on leveraging its proximity to Newcastle Airport and the adjoining RAAF Base Williamtown which are the largest combined defence and civilian airports in Australia. It is envisaged that the SAP will become the economic focus of the Port Stephens Local Government Area and economically underpin the Hunter Region.

The RAAF Base Williamtown is Australia's premier fast jet fighter base, and the Williamtown SAP will leverage the Hunter Region's existing strengths in defence, aerospace, advanced manufacturing industry and other merging industries to create a national aerospace and defence hub and facilitate employment and investment opportunities.

The Newcastle Airport is a nationally significant global gateway and the proposed upgrades to the runway will further enhance its international connectivity.

The precinct Is strategically located between the Newcastle Airport, Port of Newcastle and the M1 Pacific Highway and will benefit from the improved regional connections including the upgrade of Nelson Bay Road.

Development has been limited to date due to a range of site constraints including flooding, drainage and contamination that require a co-ordinated precinct wide approach.

## *Vision*

The vision is to create Australia's leading defence and aerospace precinct, leveraging off the Australian Defence Force programs, investment in the RAAF Base at Williamtown and proposed upgrades to the Newcastle Airport to create long term employment and drive economic growth in the Hunter Region.
The SAP will provide research and development opportunities aligned with the defence and aerospace industries and a precinct wide response to site constraints including flooding, drainage, and protection of the natural environment. Local Indigenous cultural knowledge will be embedded in the design and delivery of the precinct.

## *The Structure Plan*

The Structure Plan provides a place-based framework to guide future development over the next 40 years and is an important part of the streamlined planning framework.

It was prepared through a collaborative process involving State and Local Government, a multi-disciplinary team of design and technical experts and the local community. It reflects the outcomes of two Enquiry by Design workshops and consultation with both indigenous and non-indigenous residents and community groups.

A flexible urban design framework will deliver the vision and accommodate a range of employment land uses within the Regional Enterprise zone to support, industry, advanced manufacturing, commercial, freight and logistics. The Structure Plan responds to short term market demand for aerospace and defence related industries particularly those that require direct airside access and has the potential to generate 3,700 jobs over 40 years.

A coordinated catchment wide approach to site constraints including flooding and drainage and per and poly fluoroalkyl substances (PFAS) contamination will enable development to progress in a safe and orderly manner.

In particular, the Structure Plan mitigates the flooding impacts through a holistic water sensitive urban design strategy that includes a series of drainage channels, wetlands and bulk filling to provide for safe development and road connectivity with Cabbage Tree Road. The system of wetlands and linear drainage channels form an important part of the urban landscape, providing visual relief and recreational and landscape opportunities.

The Structure Plan reflects Designing with Country principles and weaves together high value cultural and ecological sites within a walkable natural setting, as well providing strategies to interpret and celebrate the Worimi culture and history.

The central feature of the Structure Plan is the green heart, an environmental corridor that protects significant environmental and heritage values, connects to conservation lands and provides future recreational opportunities. A pedestrian loop is located on the periphery of the environmental corridor connecting key destinations with a safe and enjoyable pedestrian experience within a natural landscape setting.

The road network connects to existing and planned roads with multiple access points from both Nelson Bay Road and Cabbage Tree Roads including signalized intersections.

The Northern Catchment builds on the principles of the approved Newcastle Airport Master Plan, and reflects construction undertaken to date. It expands the secure airside area to the south to respond to the forecasted high market demand for airside lots and flexible lot arrangements.

Two freight and logistics sites are identified, a smaller express hub and a second larger secure site. The proposed commercial centre is retained and the network of active nodes is expanded to offer a variety of breakout spaces and social infrastructure. There are opportunities for research and development in close proximity to the airport and easily accessible from Nelson Bay Road.

The Southern Catchment is divided into two sub-catchments with a central green spine that provides a visual and physical connection to the environmental corridor and celebrates Devon House as a cultural landmark.

An innovative series of drainage channels and wetlands will mitigate flooding impacts and provide a safe development platform. The lush green wetlands are a key feature of the Southern Catchment providing a strong connection to nature, and amenity for adjoining land uses.

A flexible road and block structure design will ensure the Structure Plan can respond to market demand and accommodate a range of land uses and lot sizes.

Ultimately, the SAP will become a national defence and aerospace precinct building on Australia's largest combined defence and civilian airport.

The Structure Plan creates a well-connected, vibrant employment precinct with a diverse range of commercial, cultural, social activities and infrastructure attracting people to work, visit and enjoy the precinct 7 days a week.

It will be an innovative training and education hub accessible by public transport with high quality urban form, leading architectural solutions and a diverse range of open spaces.

# 01

# CONTEXT

# STRATEGIC CONTEXT

*The Williamtown SAP is strategically positioned to play a major role as a global gateway at international, national and regional scales.*

### NEED FOR COORDINATED APPROACH

- There is a range of precinct wide constraints that has limited private sector development.
- Market sounding has identified that enabling infrastructure and a coordinated government approach to address land use planning constraints will be required to attract investment. See section on Constraints and Opportunities on pages 18-19 for more information about responding to the constraints.

### INTERNATIONAL CONTEXT

Newcastle Airport is identified as a nationally significant global gateway with great potential to enhance its international connectivity. Annual passenger numbers are projected to increase to 2.6 million by 2036. $66m has been allocated to upgrade the runway enabling the airport to service international locations across the Asia-Pacific region and beyond. The global gateways of Newcastle Port and Newcastle Airport provide great opportunities for increased connections and movement of people and goods directly to the Asia Pacific and locally throughout the Hunter Region.

### NATIONAL & REGIONAL

The RAAF Base Williamtown and Newcastle Airport are the largest combined defence and civilian aerodromes in Australia. Co-located centrally within the SAP, the RAAF Base and airport are recognised as a significant defence and aerospace precinct for Australia and the region.

The Williamtown RAAF Base is the main fighter pilot training base in Australia and will house most of the planned F-35A Joint Strike Fighter squadron as well as servicing advanced fighters from countries across the Asia Pacific. The RAAF Base has been in operation since the 1930s and has developed as a major employer within the Greater Newcastle Area employing over 3,500 people. Major upgrades to the RAAF Base to accommodate new Joint Strike Fighters (F-35) will create a cluster of economic activity and new jobs for the region.

The Australian Government is investing $270 billion in Defence capabilities over the next 10 years, with $65 billion allocated to air domain. This creates significant opportunities to expand the existing Williamtown Aerospace Centre and Astra Aerolab, into a nationally significant and unique industry precinct providing high-tech land use, defence and aero-space related industries. The defence and aerospace precinct will attract new and existing businesses with specialised opportunities for large scale international defence contractors, small and medium enterprises, as well as research and development institutions generating significant employment opportunities and new cashflow opportunities into the region.

## ON AN **INTERNATIONAL** SCALE

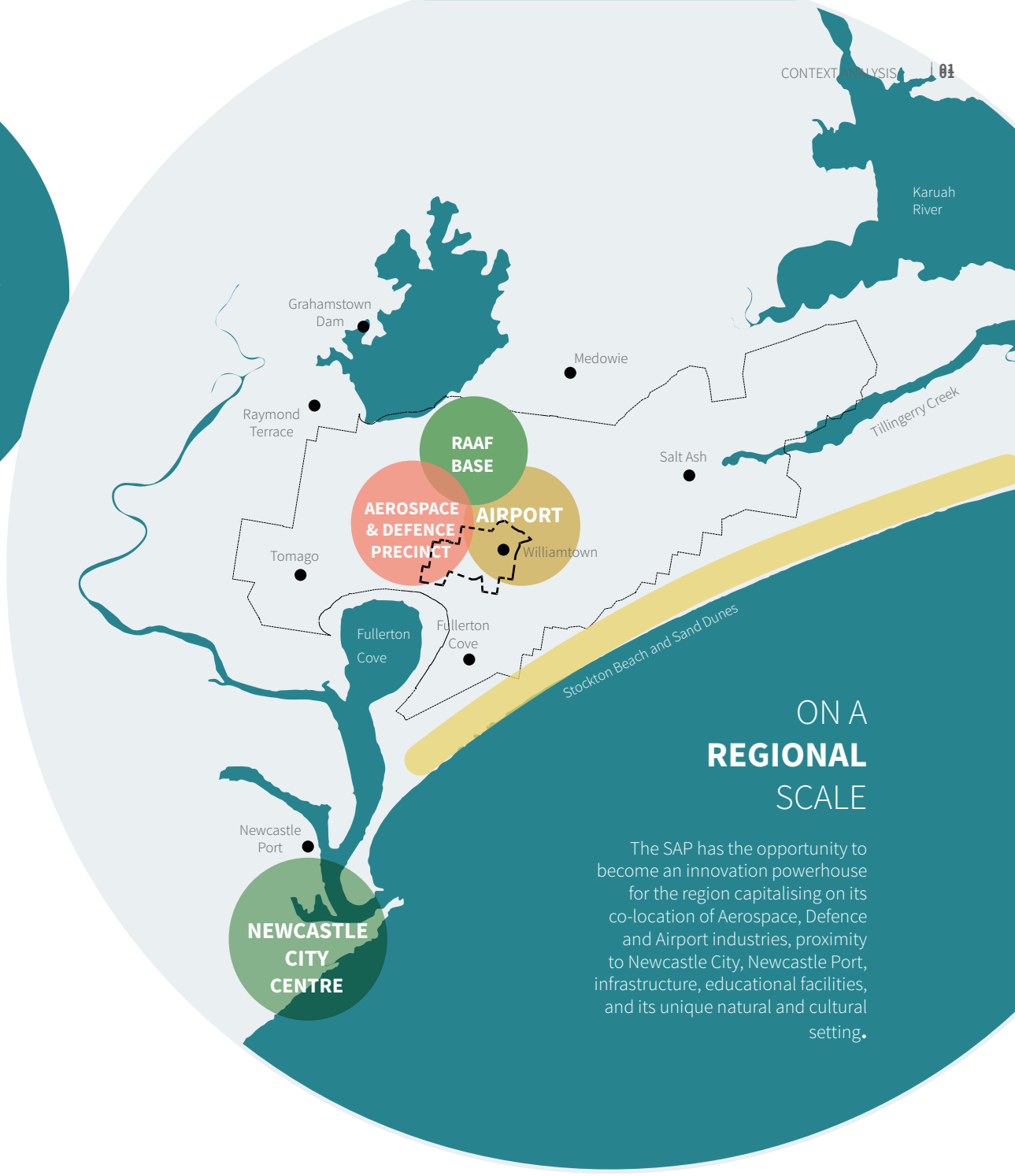
The SAP provides a unique opportunity to support international services and movement of people and goods into the Asia Pacific.

The Newcastle Airport provides the expansion opportunity for **direct international passenger and freight travel** increasing economic attractiveness and population activation.

## ON A **NATIONAL** SCALE

The SAP is home to the largest **combined defence and civilian aerodromes in Australia**. Williamtown RAAF Base is a fighter pilot training base which will house most of the planned F-35A Joint Strike Fighter squadron in Australia.

The combined innovation of aerospace, defence and collocated uses creates an opportunity for attracting talented and educated people from all over Australia.




## ON A **REGIONAL** SCALE

The SAP has the opportunity to become an innovation powerhouse for the region capitalising on its co-location of Aerospace, Defence and Airport industries, proximity to Newcastle City, Newcastle Port, infrastructure, educational facilities, and its unique natural and cultural setting.

# REGIONAL CONTEXT

***The Williamtown SAP is located within the Port Stephens LGA and is approximately 25 kilometres from the Newcastle CBD and 180 kms from the Sydney CBD.***

The population of Port Stephens LGA is forecast to increase to 82,050 by 2041 with the Greater Newcastle region population increasing to 660,200.

Early settlement of Fullerton Cove, Salt Ash and Williamtown occurred in the early 1880's and has historically occupied the area for pastoral uses, with the Williamtown area home to a large number of dairy farms and small factories towards the late 19th century. Into the 20th century, the general area developed into a viable dairy industry following the establishment of the Raymond Terrace Cooperative Dairy and Produce Company Ltd.

From the 1880s, a number of mineral leases were also taken out related to the exploration of coal reserves associated with the Tomago Coal measures. A number of quarries and sand mines developed within the area, with some still in operation today. A large area to the north of Tilligerry Creek still remains undeveloped having been reserved for coal mining purposes since 1883.

Newcastle Airport opened in 1935 to relieve pressure on the aerodrome located at Broadmeadow and provide for Newcastle's growth. In 1941, the airport was requisitioned as an auxiliary wartime base for the Royal Airforce, now referred to as RAAF Base Williamtown. Once established, the RAAF base had four runways with hangers and camp areas.

The RAAF Base Williamtown and Newcastle Airport remain major land uses and significant employers within the Investigation Area. The RAAF Base employs approximately 3,500 people and the Newcastle Airport supports over 5,600 full-time employees across the tourism and Airport cluster (2018/19 Annual Report - Newcastle Airport). Newcastle Airport is the largest airport in regional NSW with more than 1.27 million passengers and provides links to Brisbane, Melbourne, Gold Coast and Canberra, as well as internationally to Auckland. Funding has now been announced for an upgrade to the runway which is likely to result in a significant increase in passenger numbers.

More recent developments include the Williamtown Aerospace Centre and Astra Aerolab which are strategically located adjacent to the RAAF Base and Newcastle Airport, providing specialist business services for defence and the airport and providing the platform to create a national and international defence hub and support the expansion and clustering of the emerging aerospace industry. In addition, these land uses create opportunities to increase employment through attracting footloose defence, aerospace and advanced manufacturing businesses.

The Tomago Sandbed Water Supply scheme was established in 1939 following investigation into the sand beds in 1915 to early 1920s as a source of potable water for Newcastle. The system required construction of a number of major pumping stations and a series of smaller bore pumping units and is a major source of water supply for the Hunter Region.

During the 20th Century, the Investigation Area saw steady growth. Settlement of the area generally followed a similar pattern of agricultural developments as the mid 1900s with small clusters of properties in larger settlement areas of Williamtown and Salt Ash, and larger rural properties scattered between Stockton and Fullerton Cove.

There are a number of existing and proposed extraction industries and industrial activities including the Fullerton Cove Quarry, Mackas Sand Project, Salt Ash Quarry, Cabbage Tree Road Sand Quarry and Tomago Industrial Area with an application for Solar Farm on Cabbage Tree Road currently being considered.

Figure 001. Regional Context Map

# POLICY CONTEXT

*The pages opposite focus on key strategic documents and outline relevance and potential application to the Williamtown SAP Structure Planning.*

## DRAFT HUNTER REGIONAL PLAN 2041

Prepared by the NSW Government, the Draft Hunter Regional Plan (HRP) sets the framework, vision and direction for strategic planning and land use for the Hunter Region for the next 20 years. The plan outlines 7 main objectives for the region including:

- Diversify the Hunter's mining, energy and industrial capacity;
- Ensure economic self-determination for Aboriginal communities;
- Increase green infrastructure and quality public spaces and improve the natural environment;
- Reach net zero and increase resilience and sustainable infrastructure;
- Build an inter-connected and globally focused Hunter.

**Key actions relating to the Williamtown SAP include:**

- Prioritise industrial areas in locations that are accessible to inter-regional networks and provide capacity for logistics, circular economy and emerging industrial sectors.
- Provide capacity for micro to medium-sized enterprises.
- Facilitate the transition towards a circular built environment.
- Design to connect to established open space network.
- Take account of the location and extent of areas of high environmental value.
- Align any aviation and port related development proposals with the growth of defence, aeronautics and aerospace-related industries at Williamtown.

## HUNTER REGIONAL PLAN 2036

Prepared by the NSW Government, the Hunter Regional Plan (HRP) is a 20 year blueprint for the future of the Hunter. The Plan identifies a vision to create a leading regional economy in Australia, with a vibrant metropolitan city at the heart. In delivering on the vision, the plan outlines four main goals for the region:

- A leading regional economy in Australia;
- A biodiversity-rich natural environment;
- Thriving communities; and
- Greater housing choice and jobs.

**Key actions relating to the Williamtown SAP include:**

- Investigate opportunities for logistics and freight growth and other complementary land uses around airports, leveraging investments at Taree and Newcastle airports
- Facilitate development opportunities on land surrounding Newcastle Airport at Williamtown to cluster emerging high-technology industry, defence and aerospace activities
- Working with Local Aboriginal Land Councils to identify priority sites that can create a pipeline of potential projects; and
- Working with Local Aboriginal Land Councils to identify priority sites that can create a pipeline of potential projects
- Identifying landholdings and map the level of constraint at a strategic scale for each site to develop options for the potential commercial use of the land.


## NEWCASTLE METRO PLAN 2036

Prepared by the Department of Planning and Environment, The Plan sets out strategies and actions that will drive sustainable growth across Greater Newcastle The plan outlines four main goals for the region:

- Create a workforce skilled and ready for the new economy
- Enhance environment, amenity and resilience for quality of life
- Deliver housing close to jobs and services
- Improve connections to jobs, services and recreation

**Key actions relating to the Williamtown SAP include:**

- Grow the airport, aerospace and defence precinct at Williamtown
- Work with Transport for NSW to develop a travel demand management plan for the Defence and Airport Related Employment Zone and options for optimising movement, place outcomes and minimising congestion
- Identify transport corridors that can cater for improved bus services to Williamtown to support increased worker and passenger movements
- Work with Port Stephens and Newcastle City councils to align local plans to protect transport corridors and ensure proposed changes in land uses minimise the cumulative impact on the operation of the road network.
- Protect the Williamtown aerospace and defence precinct from inappropriate land uses (including bulky-goods and specialised retail premises).


## GOVERNMENT ARCHITECT: IMPLEMENTING GOOD DESIGN

As intended by the Government Architect NSW (GANSW), this document will be used by the Design team to better implement the design process and more readily position ourselves; to add value, demonstrate measured outcomes. Also, we will use it in inter-agency conversations, to emphasise an interdisciplinary approach and to advocate for better design outcomes.

**Key Actions relating to the Williamtown SAP include:**

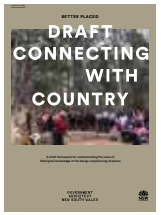
Create: Innovating and Ideas- The Structure Plan identifies holistic solutions to individual site constraints only achievable through genuine integration backed by evidence base of global best practice case studies and innovation.


## GOVERNMENT ARCHITECT: GREENER PLACES

The Draft GANSW document discusses how to design, plan, and implement green infrastructure in urban areas throughout NSW; supporting the Premier's Priorities 11 & 12 (NSW).

**Key Actions relating to the Williamtown SAP include:**

- Open space for recreation: The GANSW recommendation towards a performance based approach to quantity and quality of open space is consistent with the SAP's approach to critically review the recreational needs of visitors and workers in terms of unique health and wellbeing aspirations. Accessibility will be a challenge for the Williamtown SAP.
- Urban tree canopy: green infrastructure for climate adaptation and resilience- the Williamtown SAP acknowledges the economic benefits of the urban tree canopy to meet its growth and sustainability targets.
- Bushland and waterways: green infrastructure for habitat and ecological health- The Williamtown SAP considers design solutions for urban habitats defined by the GANSW as connection zones, core areas and urban waterways in particular. It is envisioned that they could be designed to approach the conservation of urban habitat and biodiversity in a holistic way that not only directs strategic planning but also acts at the management level; particularly in terms of RD role in creating a narrative to bring the community closer to nature and give meaning and purpose to projects and places of urban habitat value.




## GOVERNMENT ARCHITECT: CONNECTING WITH COUNTRY

The GANSW document acknowledges the focus on the Sydney basin and notes that further work is required to determine the appropriateness of these principles and framework for other areas of NSW. The SAP-specific work of ERM will provide this further detail.

The purpose of the GANSW document calls for collaborative partnerships and thinking that is beyond business as usual. It guides how culture can appropriately become visible in the design and planning of our built environment. It asks our industry to take up the challenge of thinking and working differently, and making decisions that prioritise Country.

**Key Actions relating to the Williamtown SAP include:**

- Genuine and purposeful engagement empowering indigenous leadership and guidance of built projects.
- Co design- The Williamtown SAP has necessitated collective problem-solving.
- Reciprocal relationships with Country- The Williamtown SAP adapts and synchronises with Country in order to solve environmental challenges.
- Caring for Country- The Aboriginal people refer to the importance of the ongoing health and wellbeing of Country. The Structure Plan future-proofs the SAP and future community through integrated, innovative and flexible design.

# LOCAL CONTEXT

*Located in the suburb of Williamtown within the Port Stephens LGA, the Structure Plan's local context is defined by its proximity to the RAAF Base and the Newcastle Airport, as well as natural assets such as the Hunter Wetlands National Park, Tiligerry State Conservation Area, and nearby surrounding suburbs such as Fullerton Cove, Raymond Terrace, Salt Ash and the Tomago Industrial Area.*

Newcastle Airport

Stockton Dunes

Hunter Wetlands National Park

Surrounding Native Bushland

Figure 002. Local Context Map

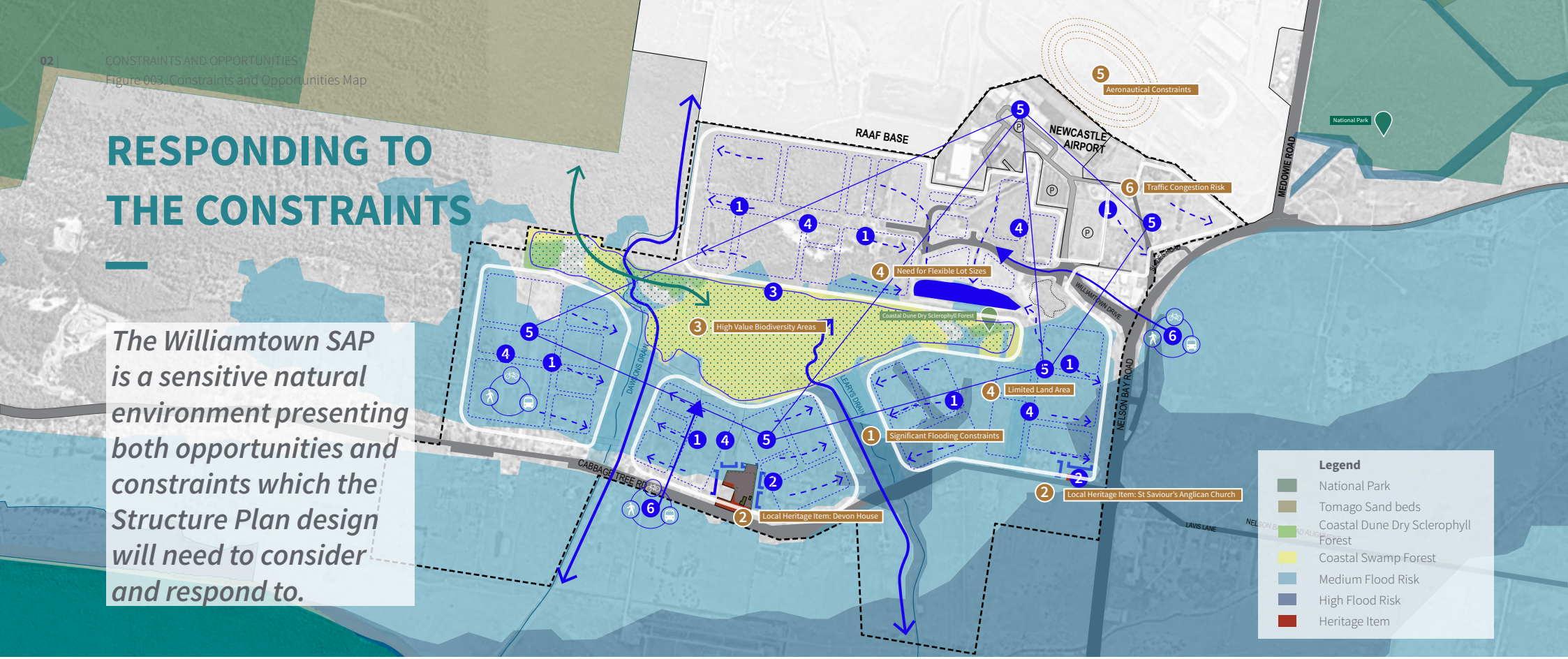
# 02

# CONSTRAINTS AND OPPORTUNITIES

Figure 003. Constraints and Opportunities Map

# RESPONDING TO THE CONSTRAINTS

*The Williamtown SAP is a sensitive natural environment presenting both opportunities and constraints which the Structure Plan design will need to consider and respond to.*



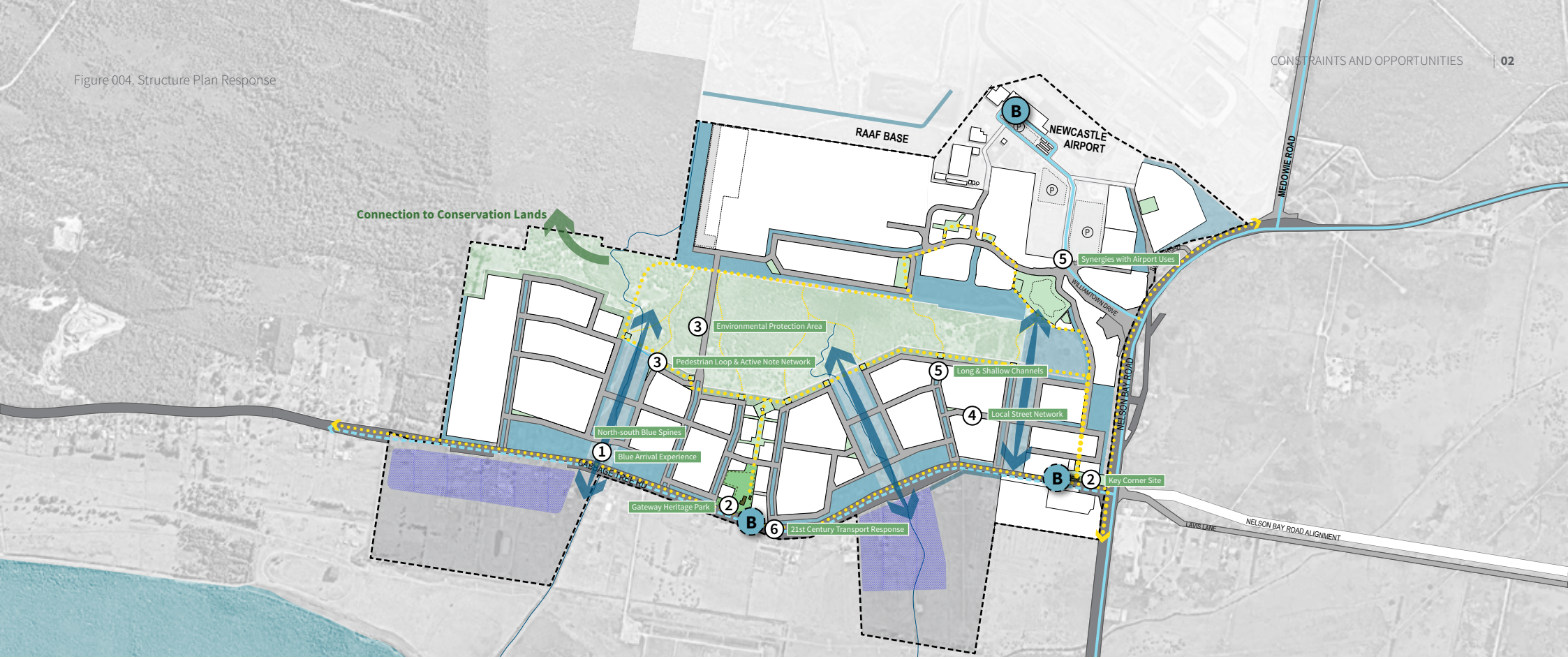

## Constraints

1. Significant flooding constraints influenced by local flooding, regional flooding and tidal inundation.
   - Ageing existing drainage network that in some instances is limited in capacity, efficiency and requires ongoing maintenance.
2. Risk of losing the local rural character and having it replaced with an alien industrial landscape.
3. Vegetated areas that comprise of high-value biodiversity areas including the Critically Endangered Swift Parrot and Vulnerable Koala, Squirrel Glider, Wallum Froglet and Earp's Gum.
4. Limited land area caused by flooding, environmental, drinking water catchment and aviation-related constraints and the desire to reimagine parking requirements.
   - Requirement to provide flexible lot sizes due to an uncertain future demand.
5. Specific aeronautical constraints related to the operation of Newcastle Airport and RAAF Base Williamtown. The constraints include aircraft noise, bird strike risk, extraneous lighting, obstacle or height limitations, wind shear and public safety considerations.
6. Risk of traffic congestion and requirement to separate freight and other vehicle movements.

## Opportunities

1. Optimise developable area by utilising existing drainage areas and implementing drainage infrastructure system that sits outside of developable land parcels.
   - Optimise developable area in proximity to the airport and RAAF base and utilise land south of Cabbage Tree Road for flood mitigation.
2. Retain and celebrate local heritage items and existing rural character.
3. Preserve and enhance high-value biodiversity areas and connect to ecological corridors.
   - Leverage surrounding bushland to provide recreational opportunities for future workers.
4. Facilitate best practice built form typologies.
   - Economic opportunity to allow for a range of users, tenants and formats, and to remain flexible as future stages of the SAP are realised.
5. Provide synergies with airport uses and, existing and approved development.
6. Promote modal shift and provision of public/active transport routes.

Figure 004. Structure Plan Response




## *Structure Plan Response*

① 
- **North-south Blue Spines** - The Structure Plan optimises future tenants' physical and visual access to water by celebrating and retaining existing channel locations.
- **Blue Arrival Experience** - The Structure Plan integrates required wetlands into the arrival experience along Cabbage Tree Road in order to both celebrate the SAP's blue network and avoid a bulk filling wall at important entry points to the SAP that would otherwise be necessary for water management purposes.

② 
- **Gateway Heritage Park** - The Gateway Park provides an engaging arrival experience particulary from the west. It provides open space, and retains and celebrates the local heritage item of Devon House.
- **Key Corner Site** - Similarly, the retained heritage St Saviour's Anglican Church at the corner of Cabbage Tree and Nelson Bay Roads, celebrates this key site and preserves the historical local character.

③ 
- **Environmental Protection Area** - This central, green heart of the SAP assists in future-proofing the area and ensuring biodiversity continues to be valued. It also enables the majority of the SAP development to have an interface with the natural environment.
- **Pedestrian Loop and Active Node Network** - An active transport network featuring a central Pedestrian Loop and connected Active Nodes provides access to open space and funnels people towards the central Environmental Protection Area.

④ 
- **Local Street Network** - The design of the Structure Plan street network responds to place rather than the need for an engineering outcome and facilitates a range of lot sizes from large to finer grain.

⑤ 
- **Synergies with Airport Uses** - The Structure Plan integrates existing and approved future developments and successfully co-locates defence and aerospace -related uses with direct airport frontage.
- **Long and Shallow Channels** - The Structure Plan's drainage infrastructure incorporates long and shallow channels and wetlands to raise awareness of the role of water in the SAP and especially to limit the bird strike risk.

⑥ 
- **21st century Transport Response** - The Structure Plan provides walking and cycling routes and access to outdoor space. Freight, airport and other SAP traffic is separated where required and the opportunity for bus stops along Cabbage Tree Road is considered.

# 03

# THE STRUCTURE PLAN

# WILLIAMTOWN SAP VISION

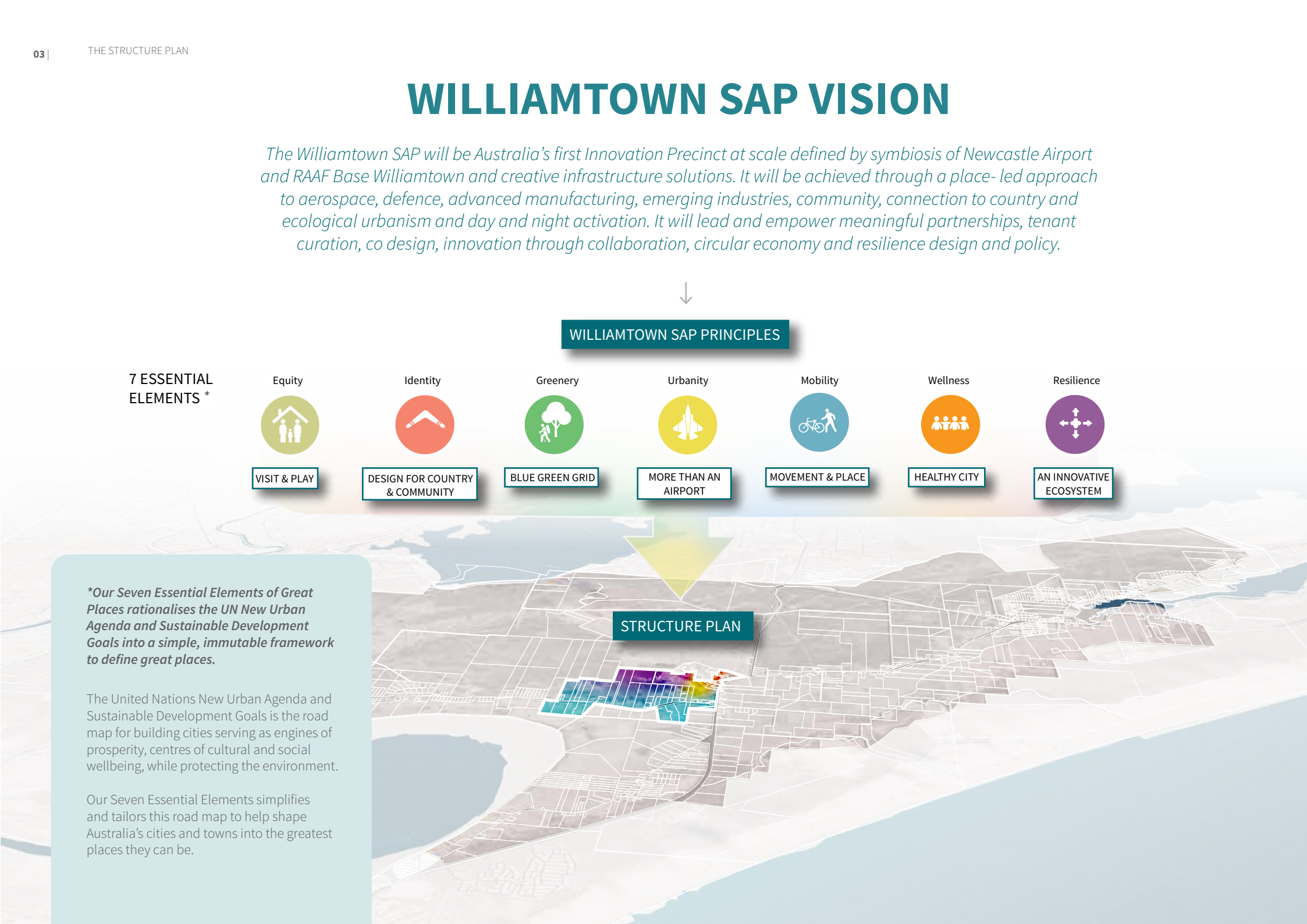
*The Williamtown SAP will be Australia's first Innovation Precinct at scale defined by symbiosis of Newcastle Airport and RAAF Base Williamtown and creative infrastructure solutions. It will be achieved through a place- led approach to aerospace, defence, advanced manufacturing, emerging industries, community, connection to country and ecological urbanism and day and night activation. It will lead and empower meaningful partnerships, tenant curation, co design, innovation through collaboration, circular economy and resilience design and policy.*

## WILLIAMTOWN SAP PRINCIPLES

7 ESSENTIAL ELEMENTS *

| Equity | Identity | Greenery | Urbanity | Mobility | Wellness | Resilience |
|---|---|---|---|---|---|---|
| VISIT & PLAY | DESIGN FOR COUNTRY & COMMUNITY | BLUE GREEN GRID | MORE THAN AN AIRPORT | MOVEMENT & PLACE | HEALTHY CITY | AN INNOVATIVE ECOSYSTEM |

## STRUCTURE PLAN



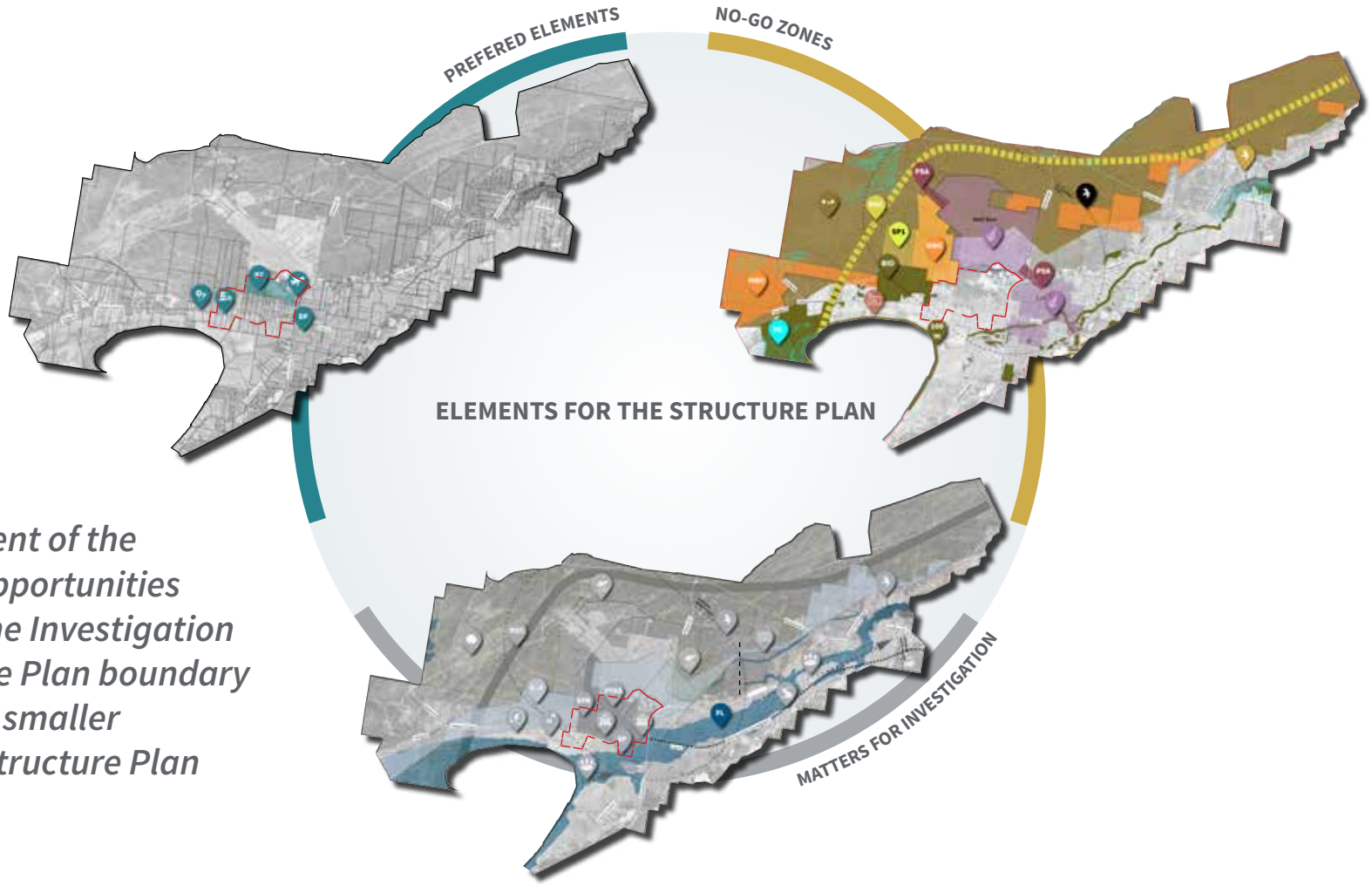
***Our Seven Essential Elements of Great Places rationalises the UN New Urban Agenda and Sustainable Development Goals into a simple, immutable framework to define great places.***

The United Nations New Urban Agenda and Sustainable Development Goals is the road map for building cities serving as engines of prosperity, centres of cultural and social wellbeing, while protecting the environment.

Our Seven Essential Elements simplifies and tailors this road map to help shape Australia's cities and towns into the greatest places they can be.

Figure 005: Illustrative Structure Plan

# REFINING THE STRUCTURE PLAN BOUNDARY




*Through assessment of the constraints and opportunities associated with the Investigation Area, the Structure Plan boundary was refined and a smaller footprint for the Structure Plan was determined.*

Figure 006. Elements for the Structure Plan

As illustrated in the previous diagram, the elements for the Structure Plan - preferred, no-go zones and matters for investigation - were presented to the technical team and stakeholders at the Enquiry by Design Workshop 2.

Over the course of the workshop the attendees discussed and agreed on the no-go areas including Hunter Water land, drinking water catchment areas, public safety areas and significant ecological zones, and matters for further investigation to inform a refined Structure Plan boundary.

As a result of these considerations, land south of Newcastle Airport, the RAAF Base and Astra Aerolab and north of Cabbage Tree Rd was identified as the most appropriate for development.

The refined boundary had a footprint of approximately 330ha and comprised land located between Newcastle Airport and Cabbage Tree Road. Additional land south of Cabbage Tree Rd was also included on the basis that it may be required for flooding and drainage mitigation.

At the conclusion of the EbD 2 it was agreed that additional modelling and analysis was required to resolve the following matters:

- Flooding and drainage
- Areas of biodiversity value and potential presence of endangered fauna
- Proximity and interface with Tomago Sandbeds
- PFAS contamination and soil constraints

Following the EbD workshop, the Structure Plan was further refined to incorporate advice from the technical consultants. The Structure Plan was then finalised with a developable area of 137 ha.

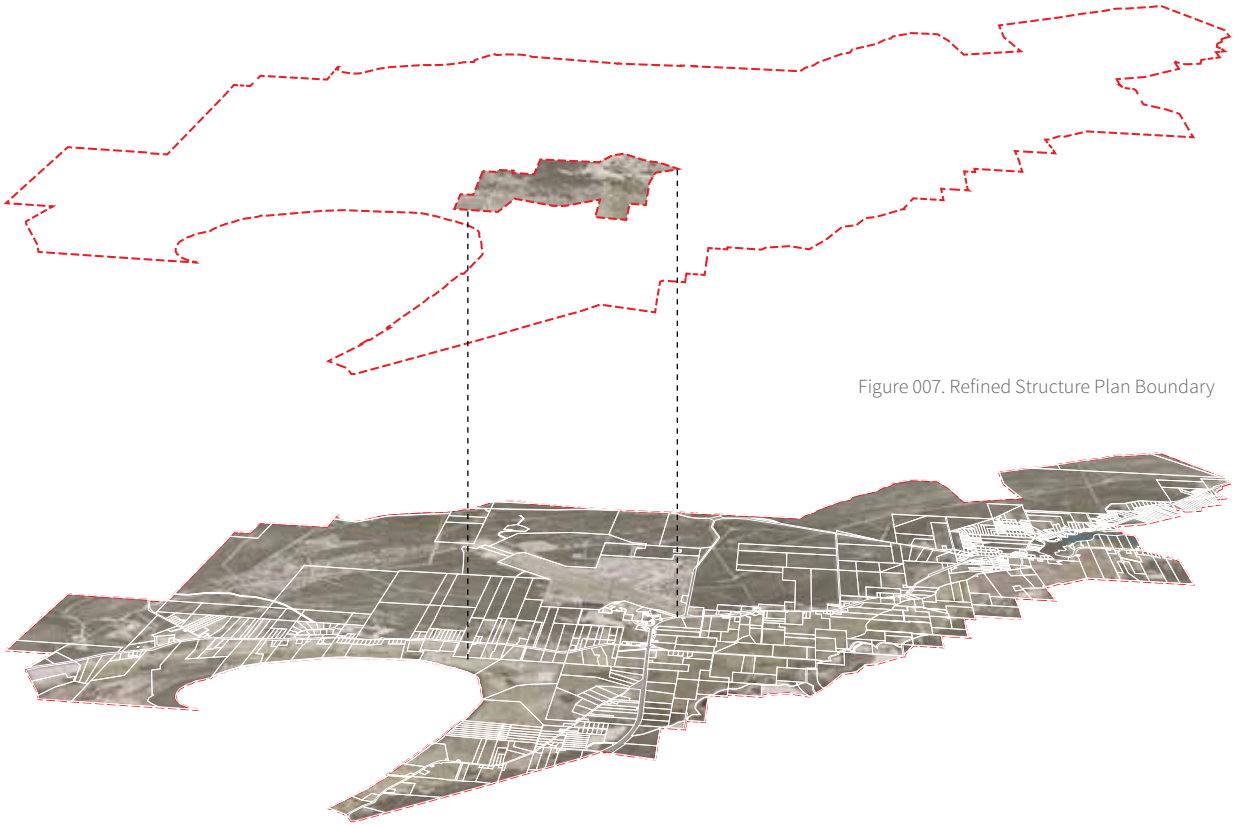
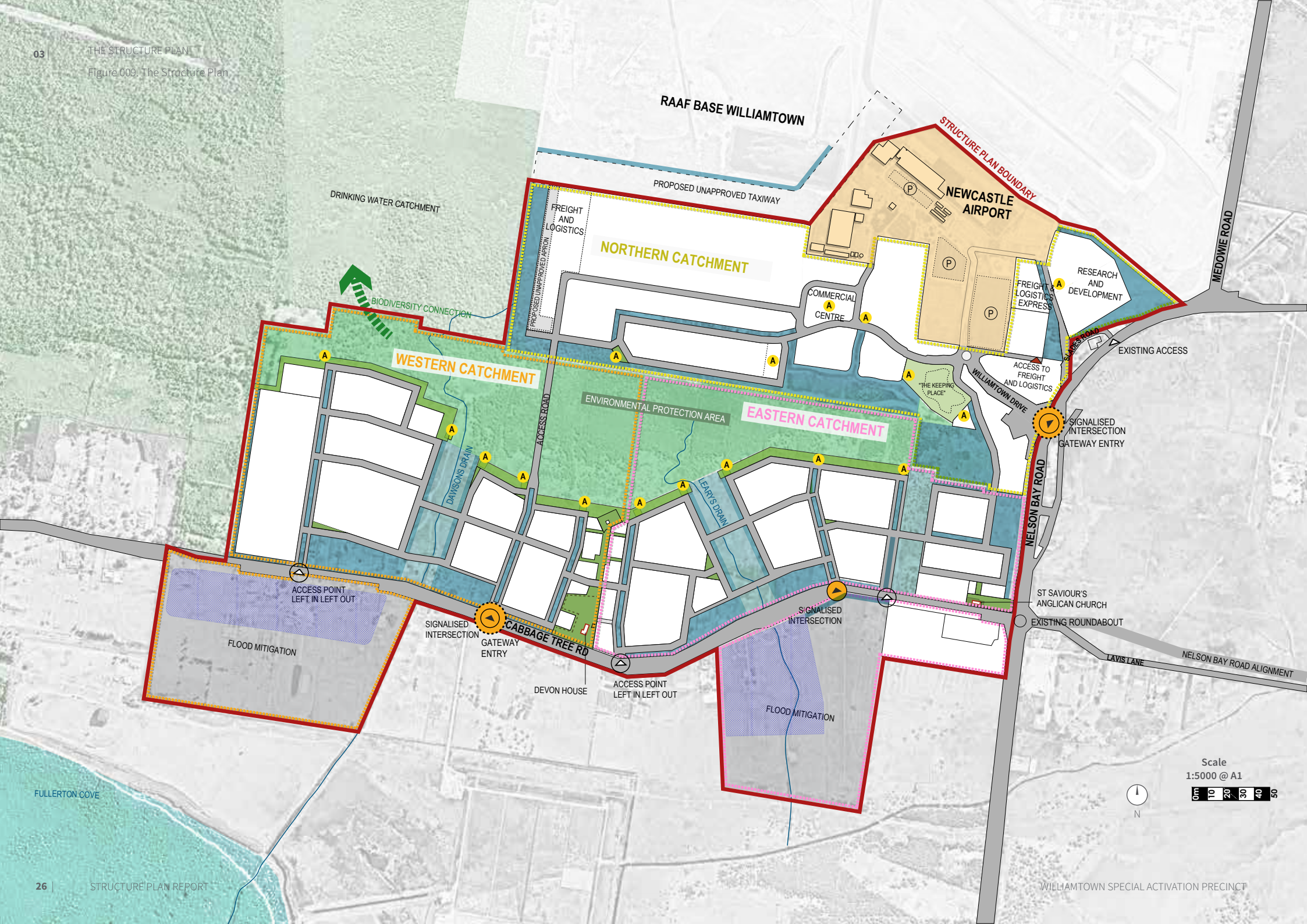


Figure 007. Refined Structure Plan Boundary

Figure 008. Williamtown SAP Investigation Area

Figure 009. The Structure Plan



# STRUCTURE PLAN AT A GLANCE

## *Legend*

- Williamtowwn Structure Plan Boundary
- The Northern Catchment
- The Western Catchment
- The Eastern Catchment
- Developable Area
- Public Open Space
- Drain
- Drainage Channels and Wetlands
- Gateway to SAP
- Access Point - Signalised Intersection
- Access Point - Left In / Left Out
- Existing Access
- Active Node
- Local Heritage Item
- Biodiversity Connection
- Flood Mitigation - Shallow Flood Storage

For details on intersection design, please refer to the traffic and transport technical report.

The table opposite (Table 001. Structure Plan Developable Area) outlines the Structure Plan's spatial outcomes and compares these outcomes to the Deloitte's Economic report.

Table 001. Structure Plan Developable Area

| Structure Plan Developable Area | Horizon 1 2026 (ha) | Horizon 2 2036 (ha) | Horizon 3 2056 (ha) | Final Structure Plan Area (ha) |
|---|---|---|---|---|
| **NORTHERN CATCHMENT** | | | | |
| Defence and Aerospace | 24 | 30 | 34 | 20 |
| Defence and Aerospace (Direct Airside Access) | 13 | 15 | 15 | 30 |
| Commercial Centre | 5 | 6 | 8 | 5 |
| Freight and Logistics | 3 | 5 | 5 | 7 |
| Research & Development | 2 | 2 | 4 | 7 |
| **Southern Catchments** | | | | |
| **WESTERN CATCHMENT** / **EASTERN CATCHMENT** | | | | |
| Commercial Centre | 5 | 6 | 7 | 68 |
| Advanced Manufacturing | 4 | 5 | 6 | |
| Light Industrial | 6 | 15 | 22 | |
| Research & Development | 4 | 5 | 5 | |
| **Total** | 66 | 89 | 106 | **137** |
| Infrastructure - Drainage (south of Cabbage Tree Rd) | | | | 64 |

Refer to Deloitte report for details on Horizons 1-3.

EQUITY

# VISIT & PLAY

## PRINCIPLE

*Optimise economic growth by delivering a mix of unique civic, cultural and recreation opportunities that are tailored to Defence families and highly skilled professionals; providing a mix of flexible, multi purpose facilities that promote collaboration, innovation and research partnerships.*

## STRUCTURE PLAN RESPONSE

- Incorporation of a mix of daytime and nighttime uses from employment-related uses to leisure and recreation activities, which are envisaged to also attract visitors:
  - Adaptive reuse of heritage buildings for cultural/social uses
  - A wide variety of accessible public open spaces scattered throughout the precinct
  - A new Science Museum
  - Pedestrian/cycle links connecting cultural and social activities and public open spaces including a central pedestrian loop
- Leverage tourism opportunities associated with upgrade of airport to create the SAP as a destination
- Campus style development

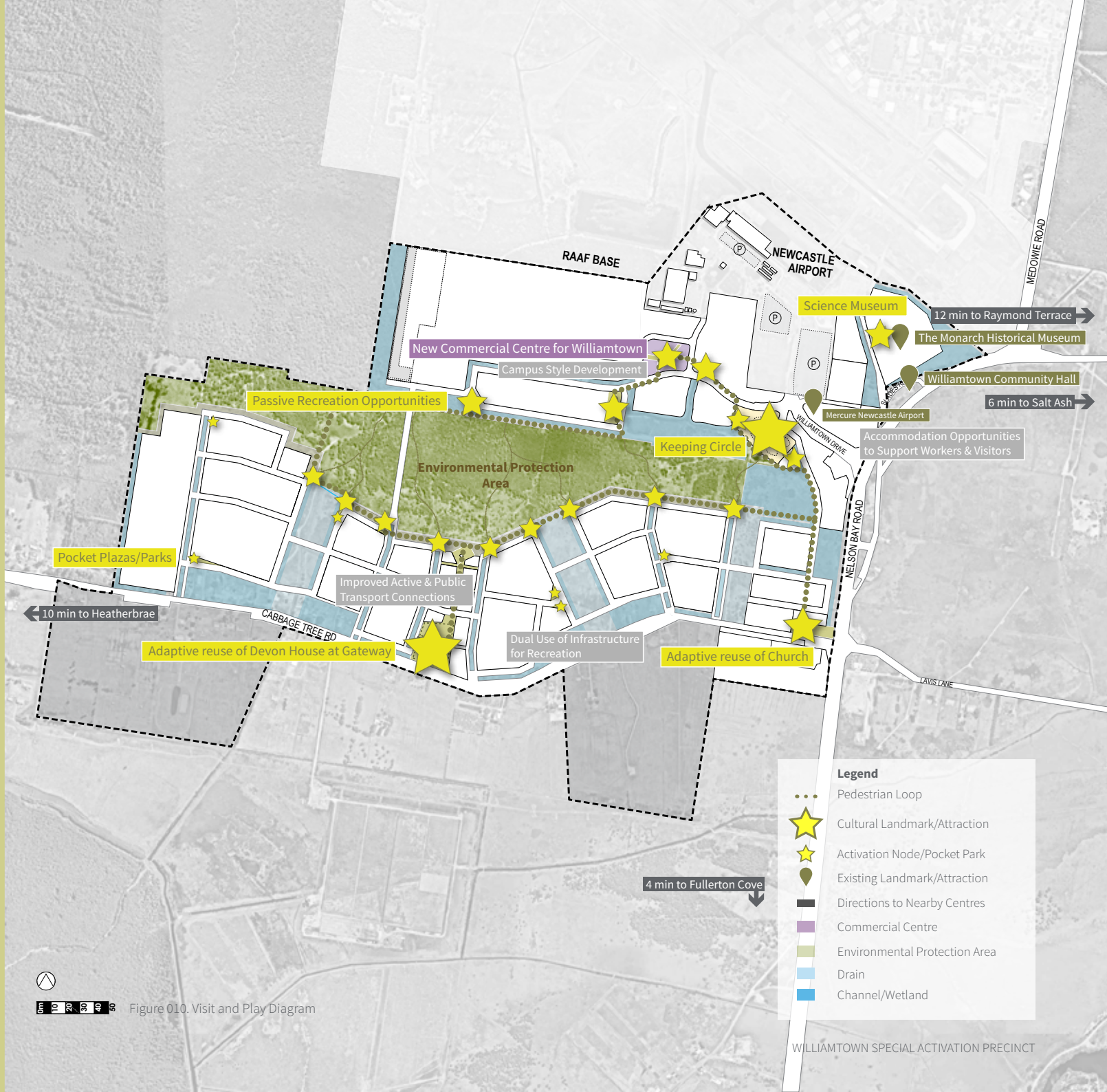



Figure 010. Visit and Play Diagram

IDENTITY

# DESIGNING FOR COUNTRY

## PRINCIPLE

***Prioritise designing with and for Country, celebrating and promoting diversity through cultural infrastructure that reflects our diverse identities, harnessing water, responding to climate, amplifying greenery and telling human stories within a pattern of walkable, human scale places.***

## STRUCTURE PLAN RESPONSE

- The Structure Plan weaves together high value cultural and ecological sites within a walkable, natural setting
- Pedestrian Loop connects gathering spaces, including Keeping Circle used by the local indigenous community
- Celebration of the area's existing natural and heritage features by:
  - Incorporating key vistas of the Stockton Dunes and terminating views to nature
  - Retainment and conservation of the central Environmental Protection Area
  - Avoiding development of significant ecological areas
  - Harnessing water for an innovative wetland and channel system
  - Adaptive reuse of Devon House and Church.



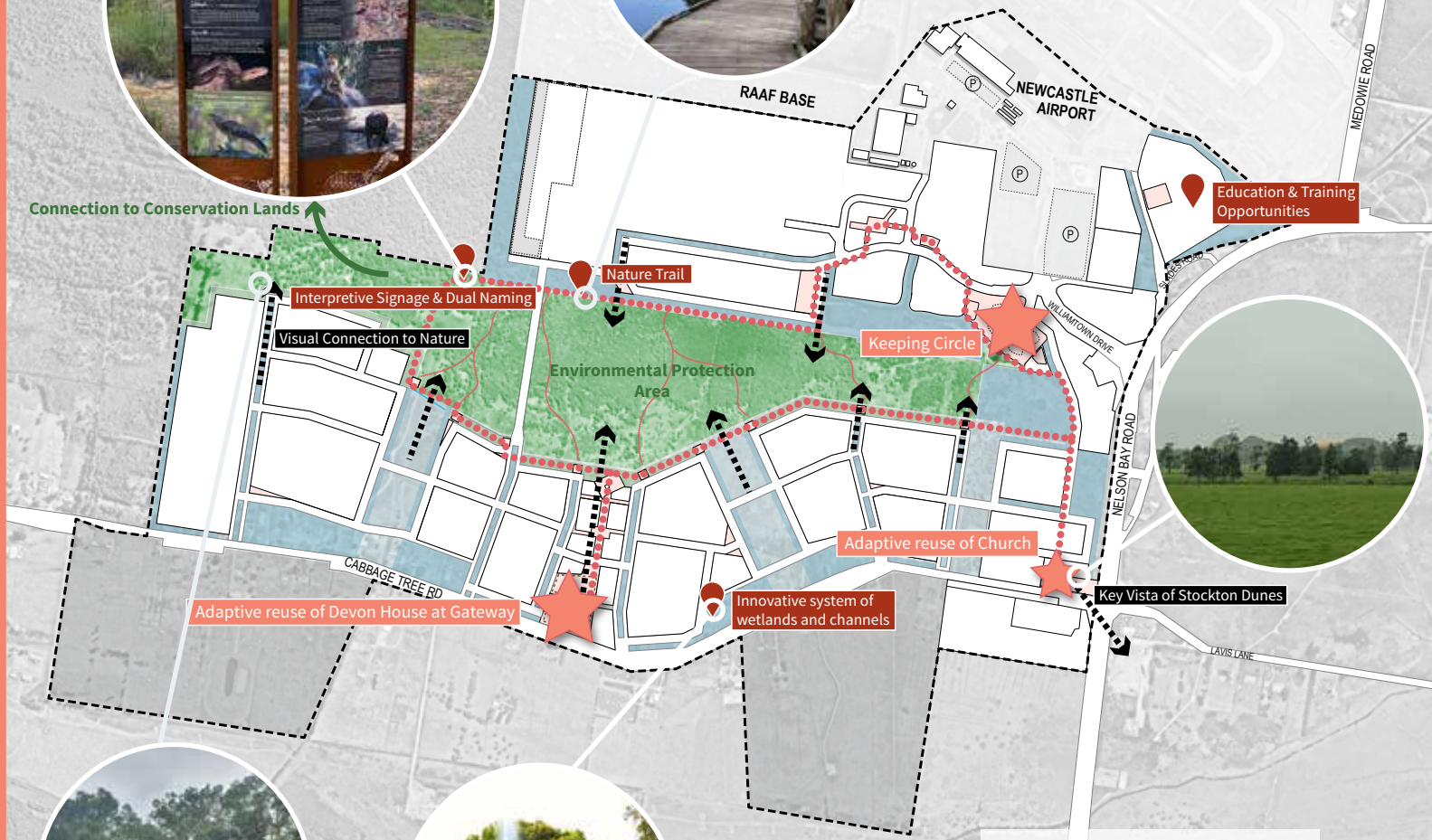



Figure 011. Designing for Country Diagram

GREENERY

# BLUE GREEN GRID

## PRINCIPLE

*Ensure a successful blue-green network and help establish the SAP as a national and international benchmark for blue green grid practices.*

## STRUCTURE PLAN RESPONSE

- Formalised protection and enhancement of the central Environmental Protection Area
- Responding to significant ecological areas distinguished through Biodiversity assessment
- Including protection of Coastal Dune Dry Sclerophyll Forest, Coastal Swamp Forest, Forested Wetland and Freshwater Wetland
- With 4 major ecological corridors traversing the precinct, the development is structured to face and integrate nature and provide associated amenity benefits including dual use of drainage infrastructure for recreation.
- Lush, green, wetland areas permeate the precinct, providing a connection to nature at every turn
- Public spaces are located along the Environmental Protection Area edge with bushwalking trails feeding off from them
- Integration of an innovative system of wetlands and channels and water quality design measures
- Safe evacuation from flood events

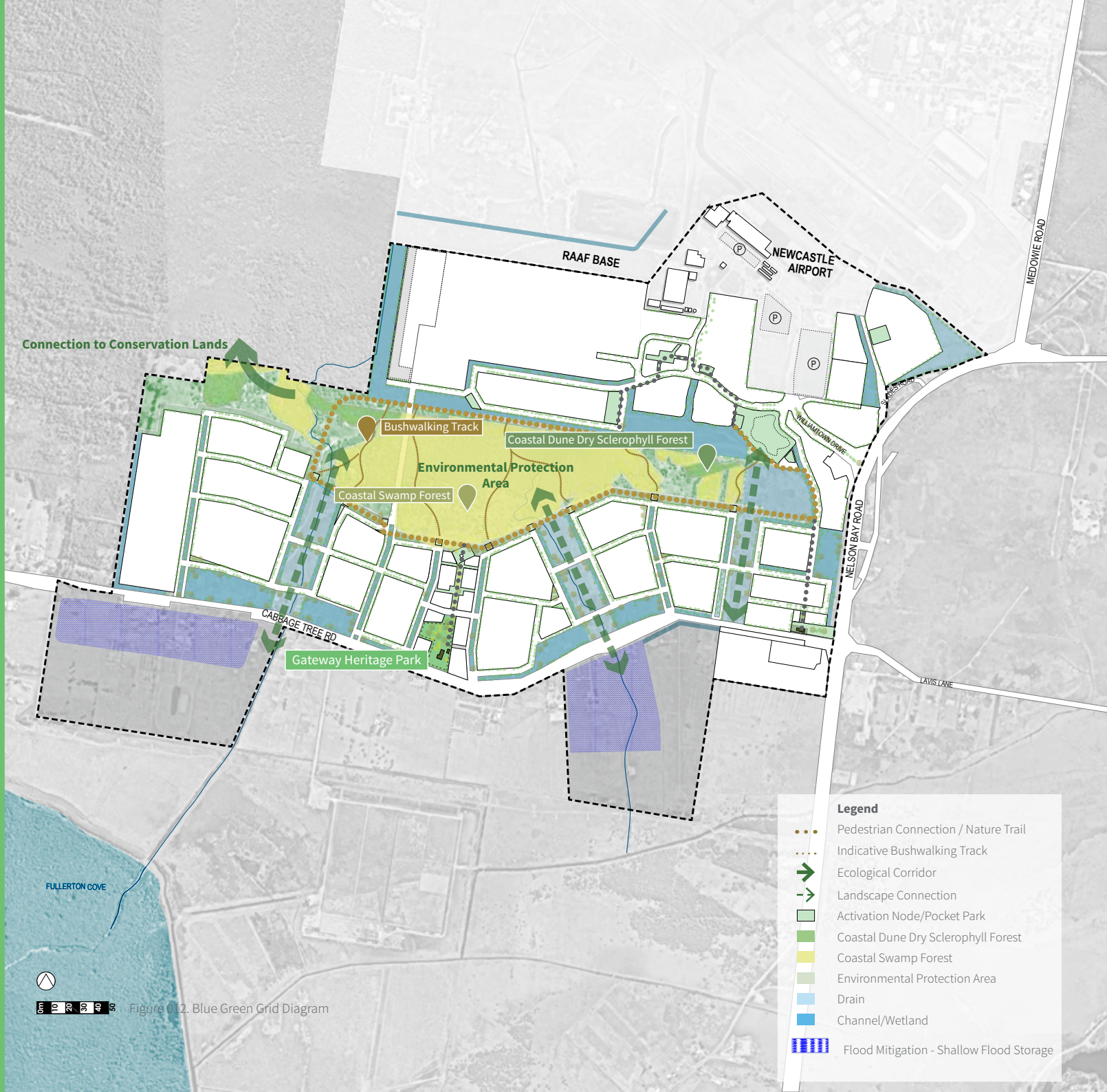



Figure 012. Blue Green Grid Diagram

URBANITY

# MORE THAN AN AIRPORT

## PRINCIPLE

***Leverage the required advanced training structures and innovation relationships to implement a circular economy structure whereby sustainability drives the design brief, curates the tenancies and enables responsible development to occur where Business-as-usual would have otherwise prohibited.***

## STRUCTURE PLAN RESPONSE

- Leveraging off the proximity of the airport and adjacent catalytic uses of defence and aerospace
- Integration of a range of innovative industries and activities
- Seamless integration with existing and planned Astra Aerolab development
- Gateway to the Hunter Region for tourism and business
- Design assists with the cross-fertilisation of ideas:
  - Provision of efficient movement network including pedestrian connections
  - Compact human-scaled centres with a campus style
  - Land parcels devoted to research and development
  - Integration of cultural nodes such as the Keeping Circle, Church and Devon House.

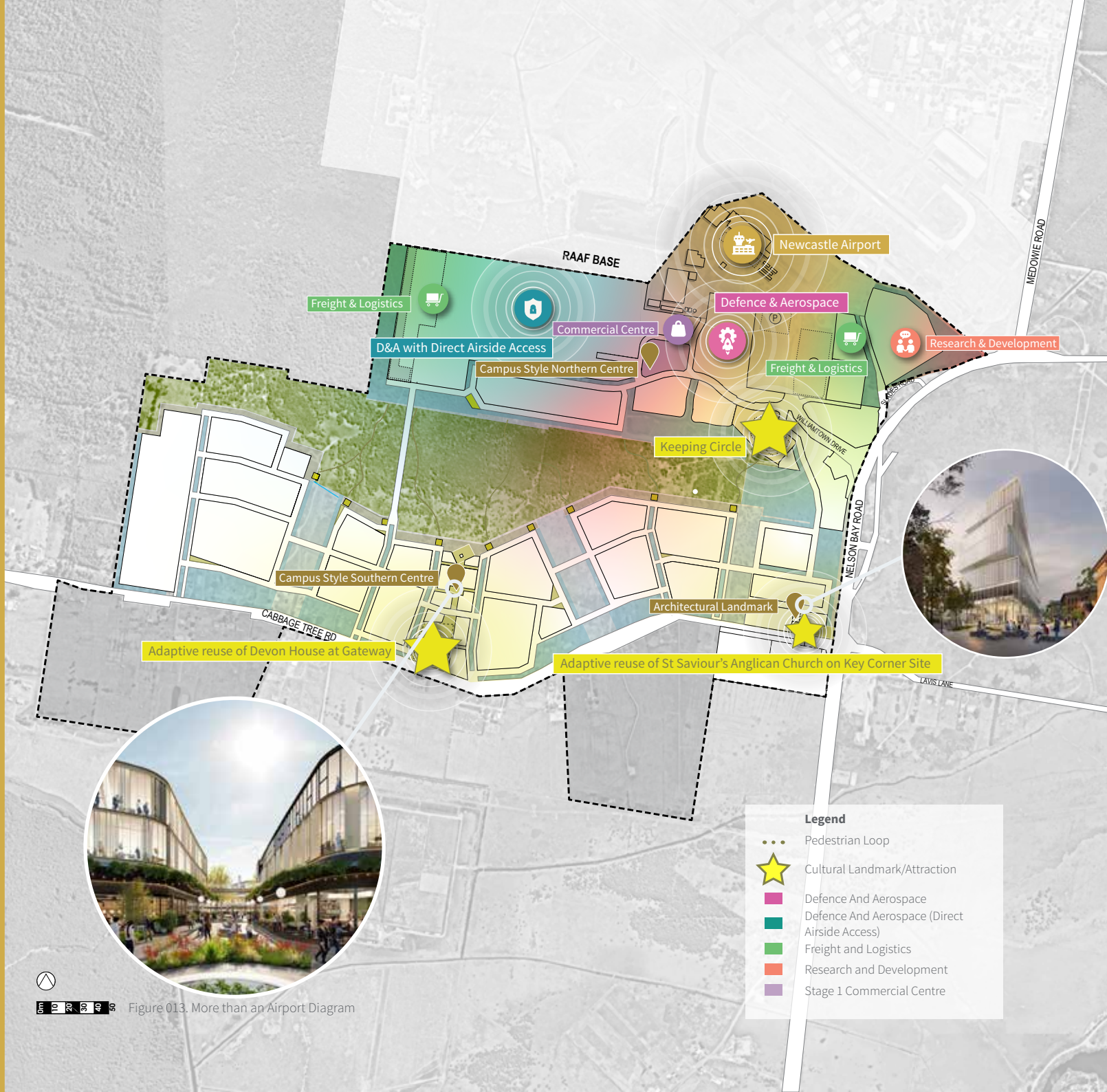



Figure 013. More than an Airport Diagram

MOBILITY

# MOVEMENT & PLACE

## PRINCIPLE

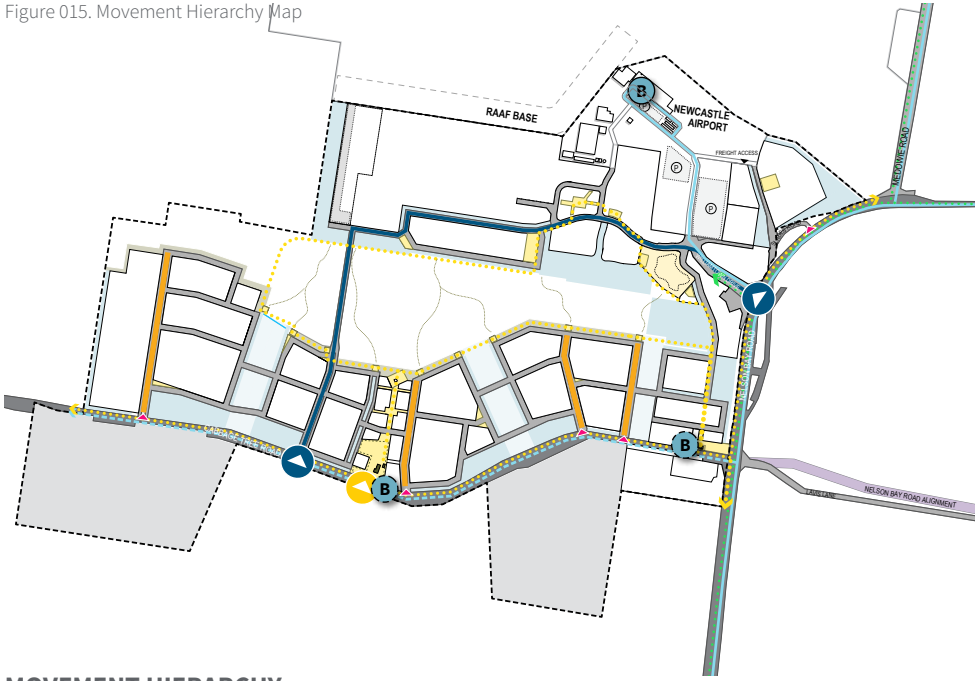
*Provide a truly integrated national model for Movement & Place whereby the movement network is designed to attract intended business clusters and corridors whilst the 'people-focused' character drives the design & location.*

## STRUCTURE PLAN RESPONSE

- Incorporation of a compact and efficient movement network
- Destinations such as the Commercial Centre and the Keeping Circle can be reached within a 5-10 min walk of each other
- Pedestrian Loop encircles Environmental Protection Area , connecting the precinct
- Road network connects to existing and planned road layouts
- With frequent intersections, the road layout minimises the potential for rat-running
- Provides multiple access points from Nelson Bay and Cabbage Tree Roads
- With a minimum number of 4-way intersections (3), the road layout reduces the need for round-abouts as they are expensive to construct and are not pedestrian-friendly
- Integration with new Nelson Bay Road alignment


Figure 014. Movement and Place Diagram

Figure 015. Movement Hierarchy Map



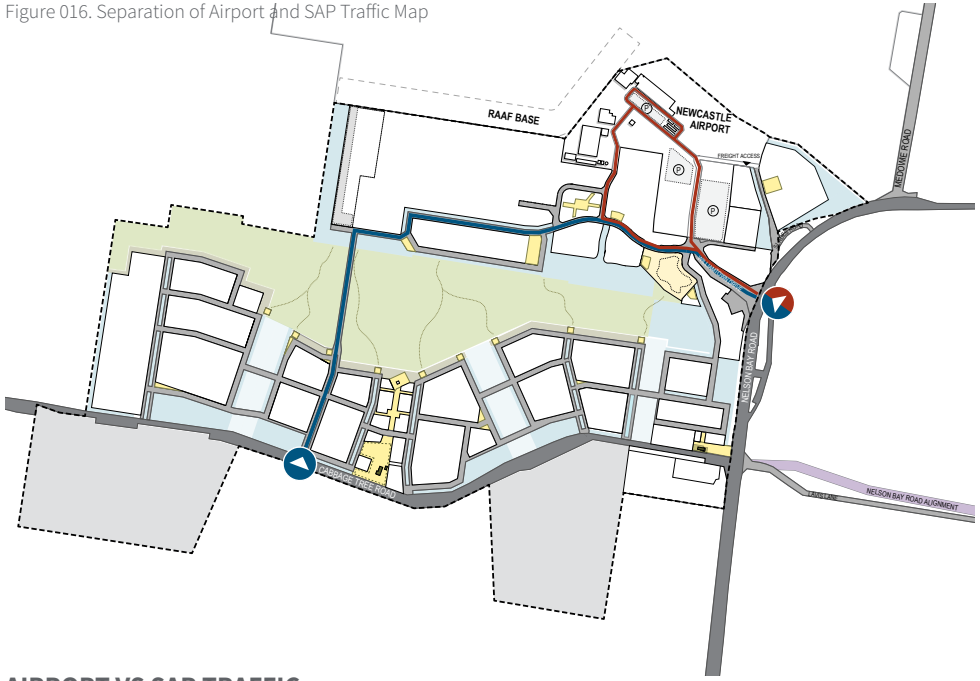

## MOVEMENT HIERARCHY

- Lack of E-W routes in the southern section is designed to keep internal SAP movements as local access only.
- Eliminates vehicles using the SAP roads as a rat-run instead of Cabbage Tree Road.
- Key N-S movement would be along the Local Distributor A or Nelson Bay Road.

**Legend**

- Pedestrian Connection
- Proposed Regional Cycleway
- Existing Bus Route
- Potential New Bus Route to be Considered
- Indicative Bus Stop to be Considered
- Existing Bus Stop
- Local Access Road
- Local Distributor B
- Local Distributor A
- Main Road
- Nelson Bay Road Alignment (Offline Option)
- Main Vehicular Access Point (incl. freight)
- Main Pedestrian Access Point
- Access point

Figure 016. Separation of Airport and SAP Traffic Map




## AIRPORT VS SAP TRAFFIC

- Key access point for Newcastle Airport would be via Williamtown Drive.
- Key access points for the Williamtown SAP would be via Cabbage Tree Road Main Access Point and Williamtown Drive.

**Legend**

- Main SAP Traffic Route
- Main Airport Traffic Route
- SAP Access Point
- Airport Access Point

WELLNESS

# A HEALTHY CITY

## PRINCIPLE

***Elevate the critical nature of health and recreation, creating a Williamtown Pedestrian Loop connecting to key cultural and recreation destinations at the same points as bus routes; promoting physical, cultural, environmental and mental wellbeing.***

## STRUCTURE PLAN RESPONSE

- Incorporation of a Pedestrian Loop featuring connected public open spaces and recreational opportunities .
- Bushwalking trails feed off from the main Pedestrian Loop, providing an escape to nature.
- Walkable, commercial centre provides human-scaled setting and promotes physical and mental well-being.
- Provision of walkable access to key public spaces and pocket parks.
- Integration of tree-lined boulevards and local streets with system of channels provides needed shade and enhances terminating vista on Environmental Protection Area beyond.


Figure 017. A Healthy City Diagram

RESILIENCE

# INNOVATIVE ECOSYSTEM

## PRINCIPLE

***Becoming a global leader in resilience, achieving United Nations Industrial Development Organisation certification to achieve an adaptable, cool, carbon neutral & water cycle Precinct; supported by science, technology, research, advanced manufacturing & aerospace & geared towards attracting global & local business, industry, research and endeavour.***

## STRUCTURE PLAN RESPONSE

- Incorporation of a flooding and water quality management solution that:
  - Optimises developable land
  - Integrates sub-precincts and minimises land fragmentation
  - Retains ecological and cultural features
  - Is designed to incorporate landscape features
  - Celebrates water as gateway to the precinct
  - Connects to existing/planned Astra Aerolab system
- Integration of renewable energy solutions such as rooftop solar and battery energy storage systems (see section on Renewable Energy for more information).

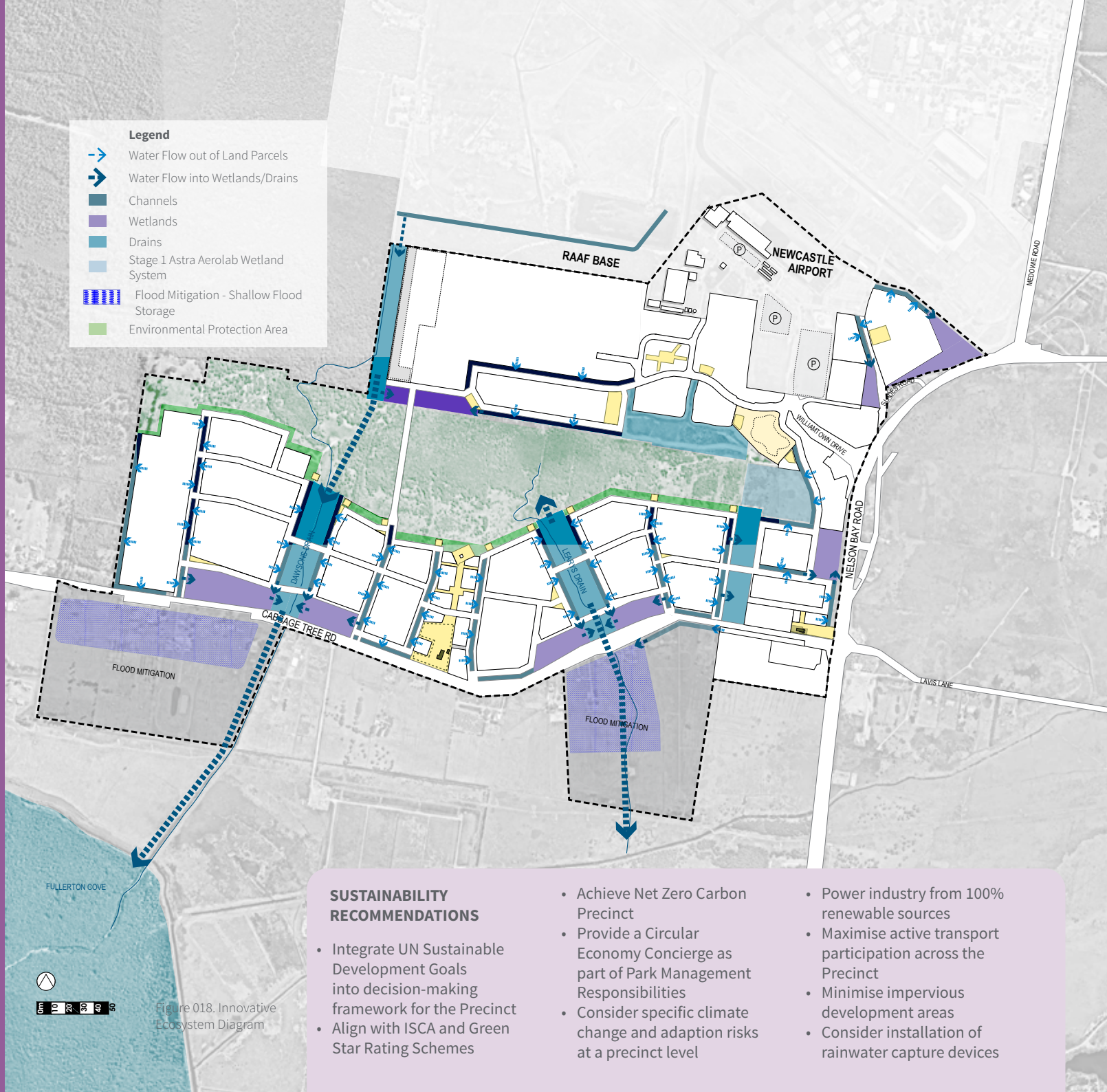



Figure 018. Innovative Ecosystem Diagram

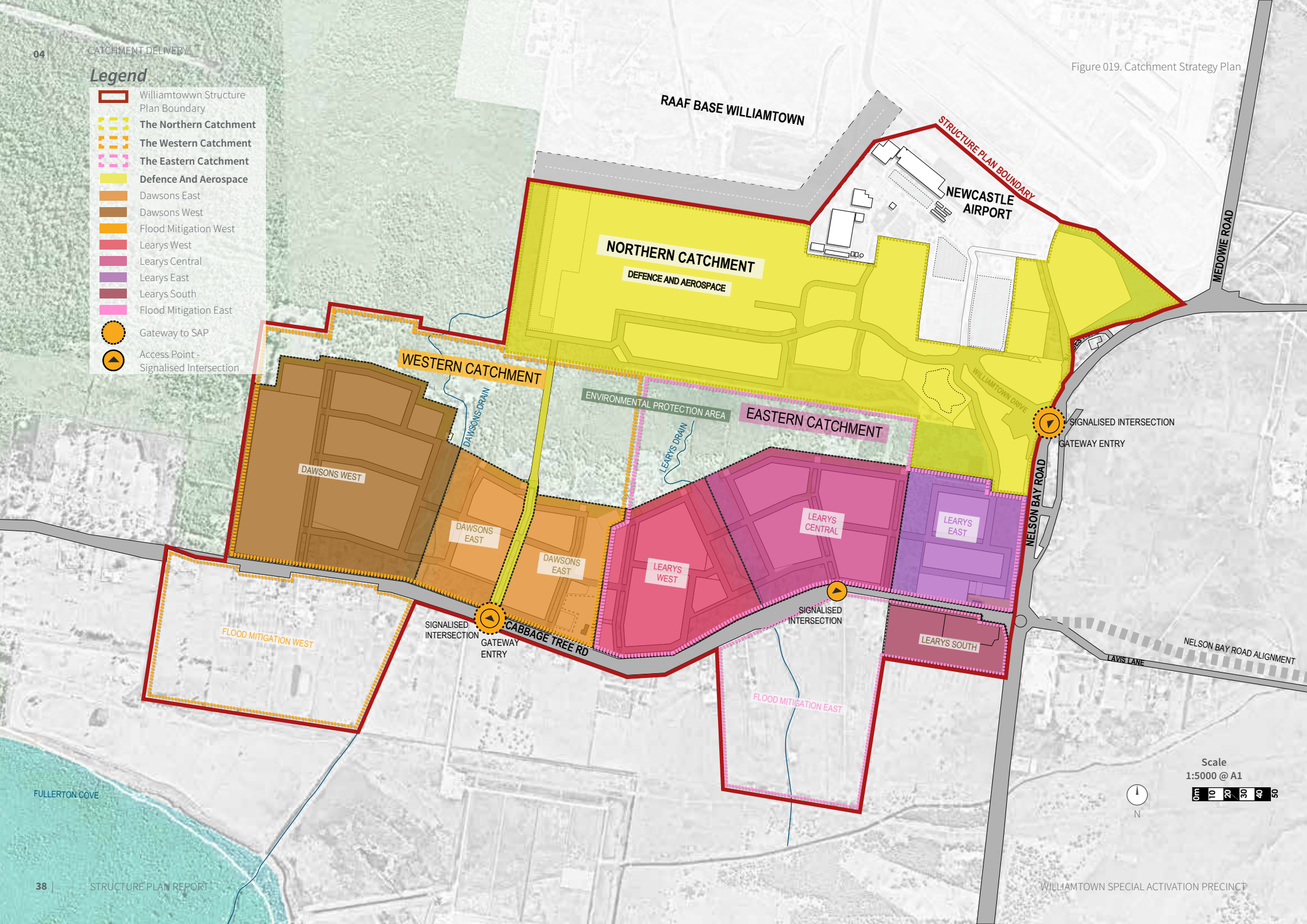
### SUSTAINABILITY RECOMMENDATIONS

- Integrate UN Sustainable Development Goals into decision-making framework for the Precinct
- Align with ISCA and Green Star Rating Schemes
- Achieve Net Zero Carbon Precinct
- Provide a Circular Economy Concierge as part of Park Management Responsibilities
- Consider specific climate change and adaption risks at a precinct level
- Power industry from 100% renewable sources
- Maximise active transport participation across the Precinct
- Minimise impervious development areas
- Consider installation of rainwater capture devices

# 04

# CATCHMENT DELIVERY

Figure 019. Catchment Strategy Plan



# CATCHMENT STRATEGY

***The Structure Plan is envisioned to be delivered with a catchment-based approach to staging in order to facilitate flexible and considered development over the next 40 years. The Structure Plan consists of three catchments: Northern and, Eastern and Western to the south.***

**Northern Catchment**

The Northern Catchment provides an extension to the existing Council approved development which is currently under construction. This Catchment provides a logical Stage 1 of the Williamtown SAP, by providing early airside access sites leveraging off the proposed taxiway extension and prioritisation for freight and logistics given the upgrade of the runway.

Market demand analysis has shown that there is a strong demand in the short term for uses associated with defence and aerospace and particularly those uses requiring direct airside access. This Catchment also looks to encourage research, development, innovation and training opportunities associated with the defence and aerospace uses.

This Catchment also provides the commercial core for the Williamtown SAP and a number of nodes, which are smaller gathering places.

This Catchment will require two access points, the key access point being the existing access road to Newcastle Airport, Williamtown Drive, and a secondary access point via Cabbage Tree Road. The second access point is critical for the freight and logistics uses.

Drainage for the Northern Catchment will enable development of the eastern portion of the Astra Aerolab site under approved drainage approach, with stormwater being directed to the eastern portion of the catchment. The undeveloped western portion of the Northern Catchment will largely drain to the west and south with longitudinal wetlands and trunk drainage infrastructure providing a catchment based approach to water quality and quantity.

**Southern Catchments (Eastern & Western Catchments)**

The Southern Catchments are largely influenced by regional drainage impacts. As one of many mitigation measures, each catchment will involve a series of drainage channels, wetlands and bulk filling to provide a safe working platform on which development can occur. In order to achieve flooding requirements and minimise the impact of interim or ad-hoc drainage solutions as a result of uncoordinated development, the southern portion of the Structure Plan has been split into two key regional drainage catchments being the Eastern Catchment and the Western Catchment. Each catchment provides the necessary infrastructure solutions to mitigate flooding impacts, achieve water quality objectives, provide PFAS separation and ensure regional transport connectivity. Each of the catchments identify an area of land required outside of the development footprint to mitigate flood impacts and have been identified within the SAP boundary.

**Southern Catchments - Sub-catchments**

Both the Eastern and Western Catchments are made up of smaller sub-catchments. Each of these sub-catchments are required to be filled above flood levels through bulk earthworks, as such each sub-catchment is required to be developed holistically in order to achieve integration with the overarching water sensitive urban design strategy and provide safe road connectivity with Cabbage Tree Road. It is recommended that landowners develop concurrently within these sub-catchments to ensure road/drainage connectivity and to minimise interim or ad-hoc drainage solutions.

05

# DESIRED FUTURE CHARACTER

# BUILT FORM CHARACTER

## OVERVIEW

The Williamtown SAP provides a unique opportunity to build on the strong foundations of place, community, built and landscape character of the area whilst leveraging the strategic profile to further enhance the physical amenity into the future. Our initial place, urban and landscape analysis documented the existing character. The character of a place can be lost or diminished through intense or accelerated redevelopment. The table opposite demonstrates how a Business as Usual approach to employment – focused development might be realized and the contrast to our proposed retention and celebration of the unique Williamtown Character.

This spread provides a summary of the Character intent across the elements of:

- Landscape- Context and Setting
- Landscape- Natural Environment
- Landscape- Public Realm
- Built Form- Industrial
- Built Form- Business Park

The following pages illustrate best practice, locally calibrated urban typologies consistent with the character intent.

This character is to be developed further within the Architectural and Public Domain Guidelines during the delivery phase of the Williamtown SAP.

## THE CHARACTER

Williamtown's strategic location set between Newcastle and Port Stephens establishes its identity as a rural hub that is at the brink of economic growth, technological advancement and a tourism hub. Its existing character is defined by the prevalent aviation activities that take place at the RAAF base and Newcastle Airport which are situated at the heart of the investigation area. The commercial and defense aviation aspect begin to set the tone and pace of this rural area and its surrounding character. The investigation area is defined by pockets of industrial activity in areas located closer to Tomago and Salt Ash; and tourism interests that are generated by commercial entities such as Fighter World, Quadbike tours and the Stockton Bight Sand Dunes.

The investigation area's surrounding context also has a large impact on its identity which is transitioning from a rural agricultural hub to a center for economic growth and innovation. Tomago's strong industrial character spills into areas at the western edge of the investigation area whereas the eastern edge is characterised by low to medium density rural housing in Salt Ash, along Lemon Tree Passage Road and around Tilligerry Creek.

The overall topographical character of the site varies gradually with gentle undulations followed by the dunes which create a topographical barrier and present a dramatic change in the landscape's visual character. Together, these elements are experienced at various scales which range from human to bird's eye levels. Their quintessential natural character allows them to be recognised as distinctive landscape character typologies that have associated scenic values and sensitivity to change.

Figure 020. Built Form Character Table

| | EXISTING CHARACTER | |
|---|---|---|
| **LANDSCAPE - NATURAL ENVIRONMENT (ENVIRONMENTAL PROTECTION AREAS, CORRIDORS, INTERFACES AND WETLANDS)** | • Fullerton Cove as a celebrated asset<br>• Flood waters as a naturally occurring system |  |
| **LANDSCAPE - PUBLIC REALM/ RECREATION (STREETS, PEDESTRIAN PATHS AND PARKS/ PLAZAS, WETLANDS)** | • Acceptance of flood events<br>• Adventure recreation<br>• Limited wayfinding and identity<br>• Healthy community and industry respect for the protection of Country<br>• Vehicle dominated |  |
| **BUILT FORM - LARGE FORMAT INDUSTRIAL** | • Sheds within a carpark<br>• Highly visible/ exposed (flat land with minimal landscaping) |  |
| **BUILT FORM - BUSINESS PARK** | • Vehicle dominant (entry experience and carpark priority) |  |

| | BUSINESS AS USUAL RESPONSE | | 21 CENTURY WILLIAMTOWN CHARACTER | |
|---|---|---|---|---|
|  | • Separation and isolation of Fullerton Cove from the SAP Character<br>• Disconnect from surrounding natural assets |  | • Swales ensure that urban stormwater is captured and filtered before reaching natural waterbodies, such as nearby Fullerton Cove.<br>• By showcasing the importance of the natural systems that are interwoven throughout the precinct, the SAP can convey a unique sense of place and identity. |  |
|  | • Concrete drainage channels and earthworks- only solutions<br>• Peripheral corporate signage<br>• Interpretive signage within natural environment<br>• Optimise vehicular network/ supplement active travel |  | • Prioritise sunken corridor streets as vegetated swales planted with species that tolerate temporary inundation as well as drought, additionally offering habitat and beautifying streetscapes<br>• Use the topography and waterways to enhance the community/ recreation offering within the site<br>• Linear wetlands support the overall stormwater and flood management of the SAP and contribute to an iconic arrival sequence for users of the precinct and emphasise its unique landscape setting.<br>• Use innovation and technology to tell Williamtown's story of sustainability and respect for Country within the natural and urban environments.<br>• Create an attractive pedestrian environment tailored to the micro climate and lifestyle. |  |
|  | • Up to 3 storeys high, with parking located outside of the building on impermeable surfaces.<br>• Minimal landscaping and canopy cover<br>• Poor access to blue or green spaces/ supporting uses and/ or activities |  | • Consideration as an Urban Typology rather than a Building Typology<br>• Landscape as a method to support and enhance the attractiveness of the land use<br>• Reduce the primary building footprint by optimising the building (ie, mezzazine etc) a<br>• Increased amount of pervious and green spaces directly adjacent buildings through means including utilising shared roads/ driveways<br>• Centralised/ shared parking structures that can be adapted to new uses over time (maximum distance of 500m from a workplace).<br>• Encourage the integration of water bodies and small retail precincts or spaces to create natural gathering spaces that are well connected to the green and blue grid. |  |
|  | • Building footprints occupy a third of the lot coverage, with a mixture of private open space and impervious surface car parks covering the balance.<br>• Unbuilt space is comprised of ornamental landscape, parking and private driveways. |  | • Address the street<br>• Promote active travel access through visible and legible end- of- trip facilities and infrastructure<br>• Encourage mixed use sleeving of buildings that are located adjacent to or near water bodies and green spaces.<br>• Centralised/ shared parking structures that can be adapted to new uses over time (maximum distance of 400m from a workplace).<br>• Roof areas are visually attractive and should be optimised for cooling, amenity and energy conservation.<br>• Allow room for permanent water features to become a central landscape feature and to ensure workers are connected to the blue and green grids. |  |

# LANDSCAPE CHARACTER

*Using innovative design solutions, the Williamtown SAP integrates, supports, and showcases the sites unique landscape setting throughout all aspects of the precinct, helping to strengthen the overall objectives and vision of the SAP.*

## OVERVIEW

The Structure Plan prioritises the delivery of development outcomes, paralleled with its goal of ecological conservation and resilience. The Structure Plan seeks to leverage off the site's unique landscape character, and proximity to surrounding ecological assets, to deliver a site-wide landscape design that encourages interaction with the natural environment, provides opportunities for recreation, delivers green infrastructure assets that strengthen the ongoing operations of the SAP and the creation and protection of habitat for endemic species.

Figure 021. Landscape Character Diagram

*Environmental Protection Area Trails*

*Landscaped Steps Towards the Environmental Protection Area*

*Green Streets With Swales*


*Landscaped Wetlands*

*Squares and Public Spaces*

Figure 022. 3D Illustration of the Environmental Protection Area Trails

# ENVIRONMENTAL PROTECTION AREA TRAILS

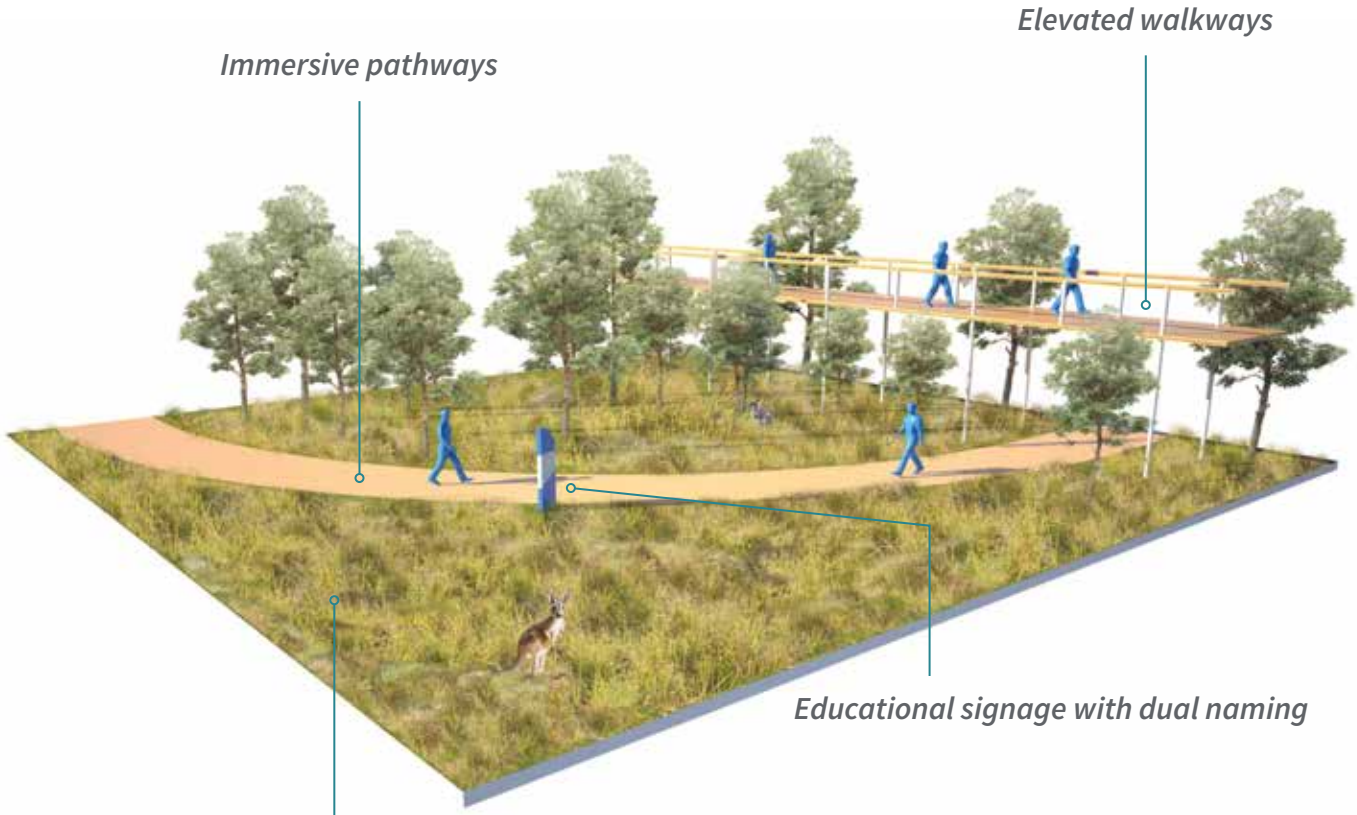
*A variety of pathways can be woven into the Environmental Protection Area offering users diverse recreational experiences immersed in natural settings.*

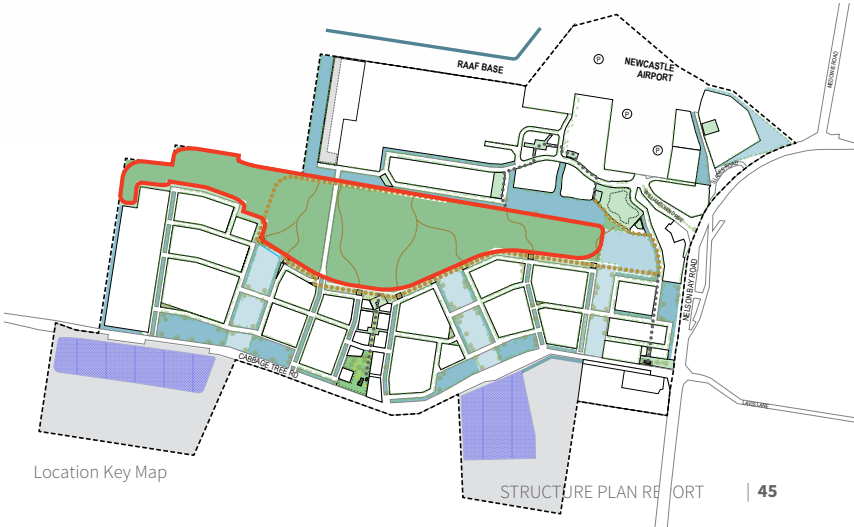
## OVERVIEW

At the centre of the Structure Plan is the Environmental Protection Area - a significant area devoted to precinct water management and vegetation. By incorporating a series of trails through the Environmental Protection Area, people can use these networks for a variety of purposes including exercise, play, connecting with nature and rest.

Differing in materiality, width and character, trails can also incorporate viewing platforms, seating, picnic-settings and wayfinding elements, letting users know exactly where they are in the precinct.

Memorable or unique installations can help to highlight certain areas, whilst signage can act as a powerful education tool. Trails can act as a framework for guided tours, supporting local tourism ventures, and if interwoven with destinations and appropriate amenity, can ensure the comfort and enjoyment of all users.




Location Key Map

# ENVIRONMENTAL PROTECTION AREA INTERFACE

***The transition between higher elevated development parcels and lower water catchment drainage corridors can be achieved through landscaped steps, ramps and planted embankments.***

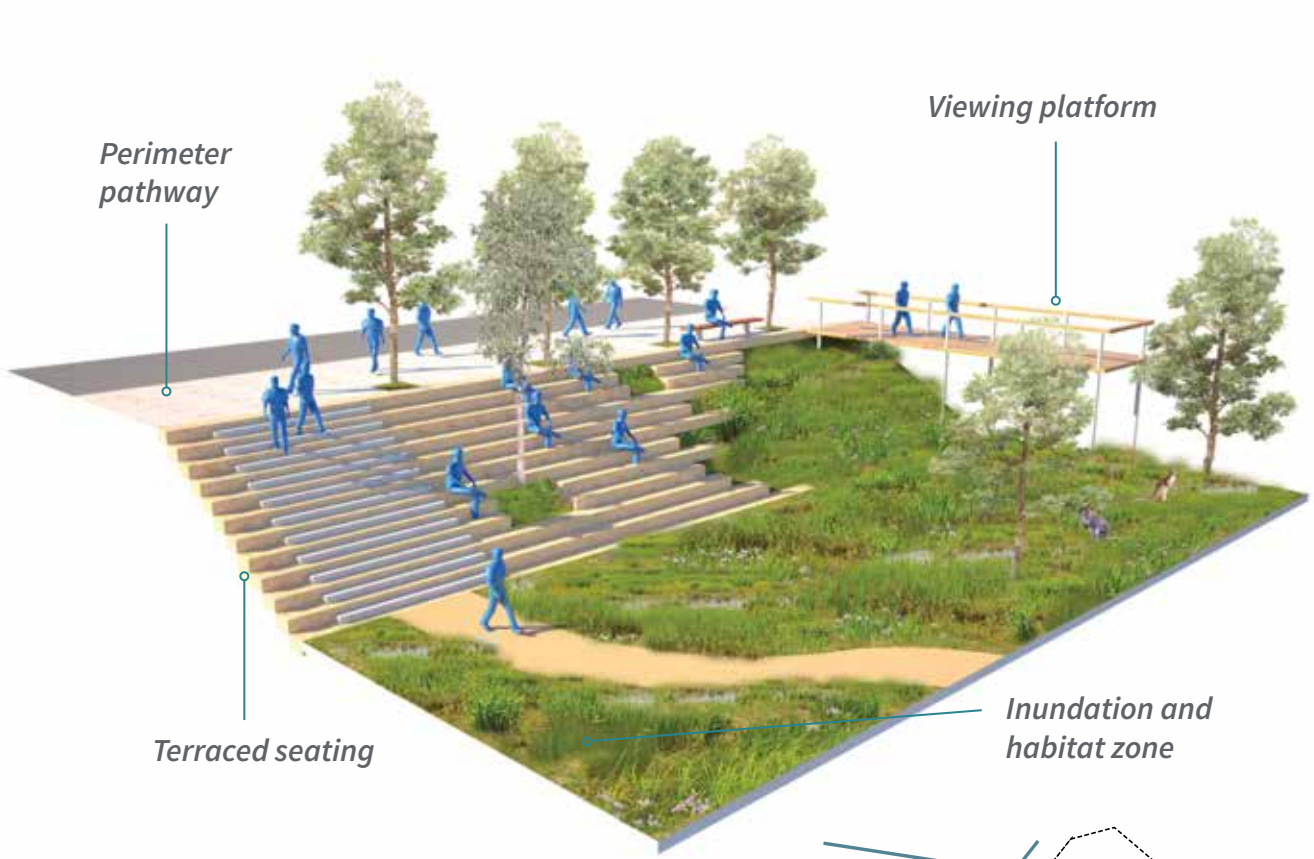
**OVERVIEW**

Flooding and rainfall events have the potential to negatively impact on people and places without appropriate design responses. It is proposed to elevate developed areas above water catchment areas and provide appropriate transition between the areas. Stepping down into the waterways of the Environmental Protection Area can be done via sandstone blocks, tiered concrete steps, retaining walls and terracing.

In addition to terracing, providing ramps for equitable access is imperative, allowing all users to traverse lower elevations when water flows are minimal. Longer pathways have the added value of offering an alternative passage that has its own unique landscape signature winding down the slope and gradually transitioning from the street to a natural setting.

This change in level also creates environments that lend themselves to active recreation elements such as slippery dips, climbing routes, outdoor gym equipment, bmx and skate ramps, performance and tourism-based activities, as well as passive seating spaces. Furthermore, development should be designed to face these spaces and the Environmental Protection Area to provide passive surveillance and leverage the surrounding amenity.

Figure 023. 3D Illustration of the Environmental Protection Area Interface





Location Key Map

Figure 024. 3D Illustration of Green Streets with Swales

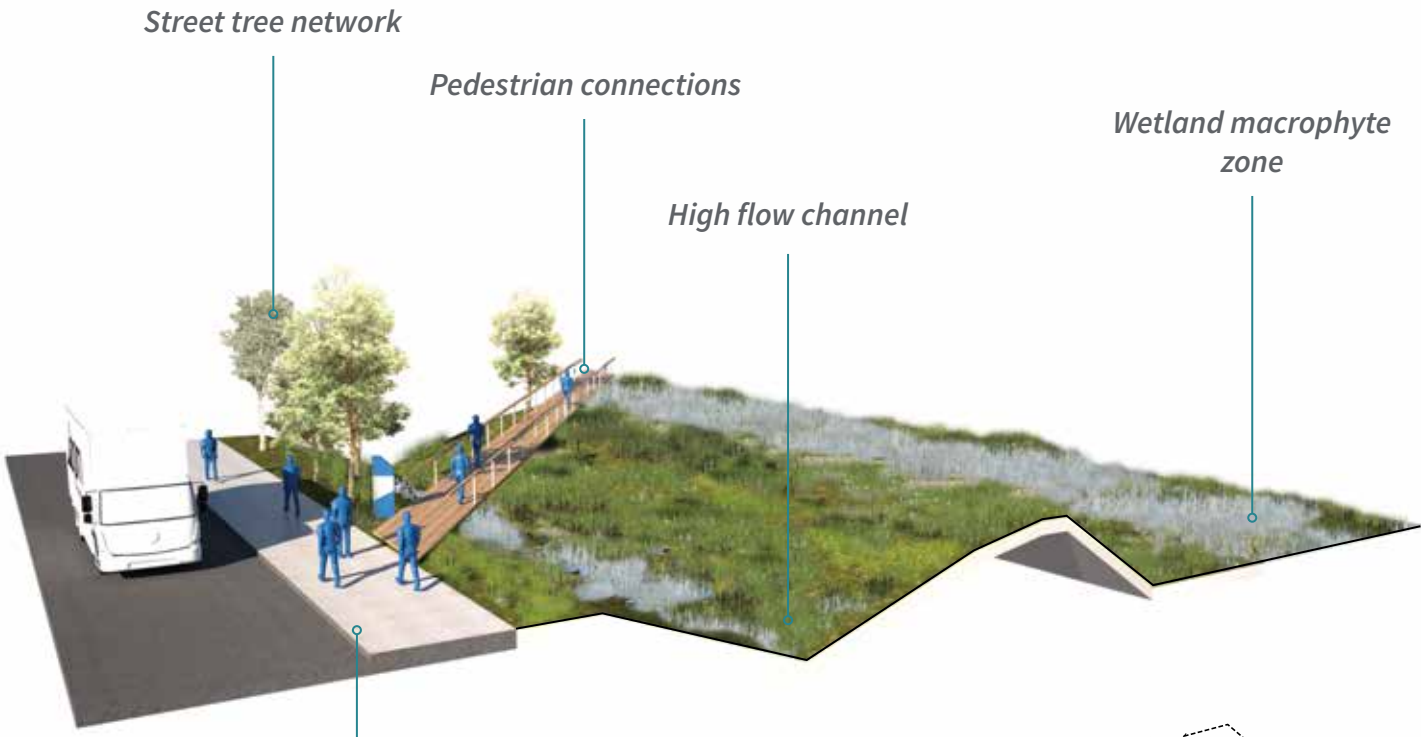
# GREEN STREETS WITH SWALES

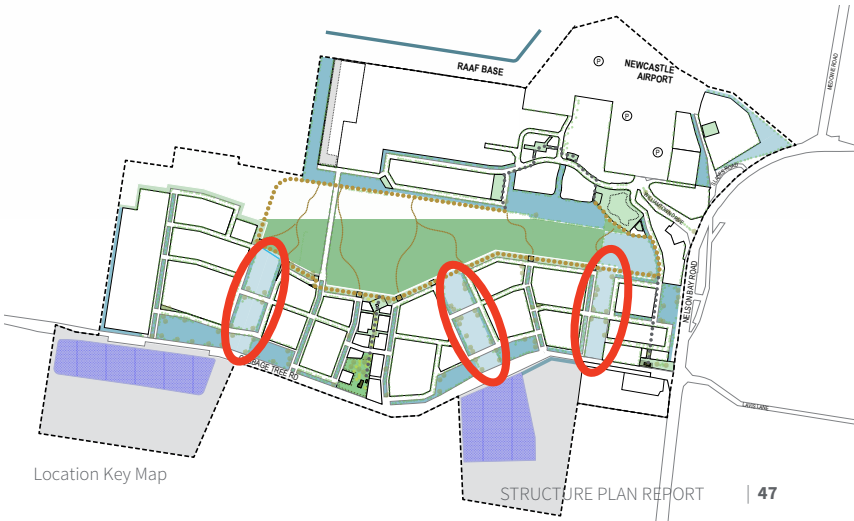
*Shaded streets and vegetated swales will encourage active transport and treat stormwater.*

## OVERVIEW

In any season it is important that public streets are both inviting and comfortable to inhabit. The key components of a successful blue green grid is a connected canopy, where street trees are appropriately spaced to create a shaded footpath route an the ground plane incorporates a network of swales that capture and treat stormwater as it is shed from footpaths and roads.

These sunken corridors can be  planted with species that tolerate temporary inundation as well as drought, additionally offering insect habitat and beautifying streetscapes. Swales ensure that urban stormwater is captured and filtered before reaching natural waterbodies, such as nearby Fullerton Cove. Vegetated swales can prevent erosion, absorb nutrient run-off and create habitat for local insect life.




Location Key Map

# SQUARES AND PUBLIC SPACES

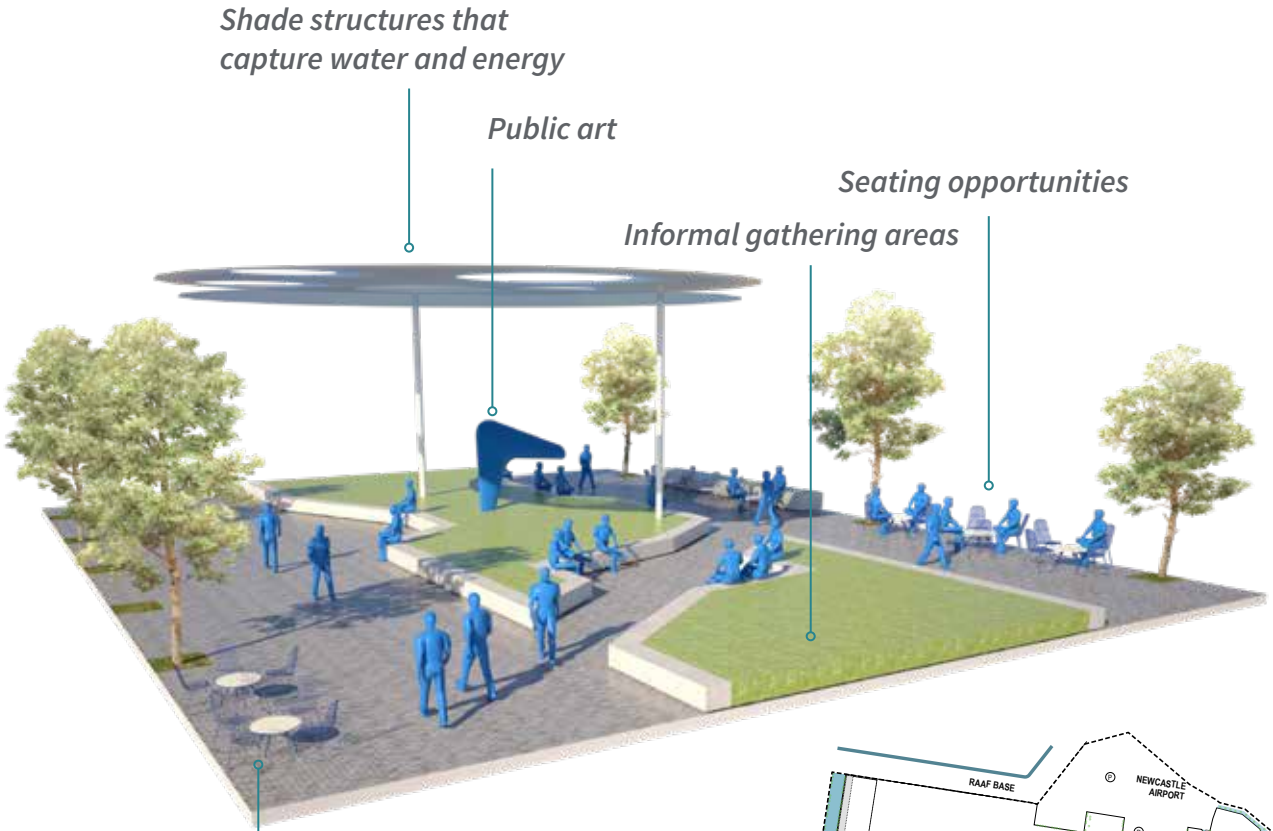
*Vital to any successful urban fabric are places where people can pause and socialise, supporting local economies and increasing social capital.*

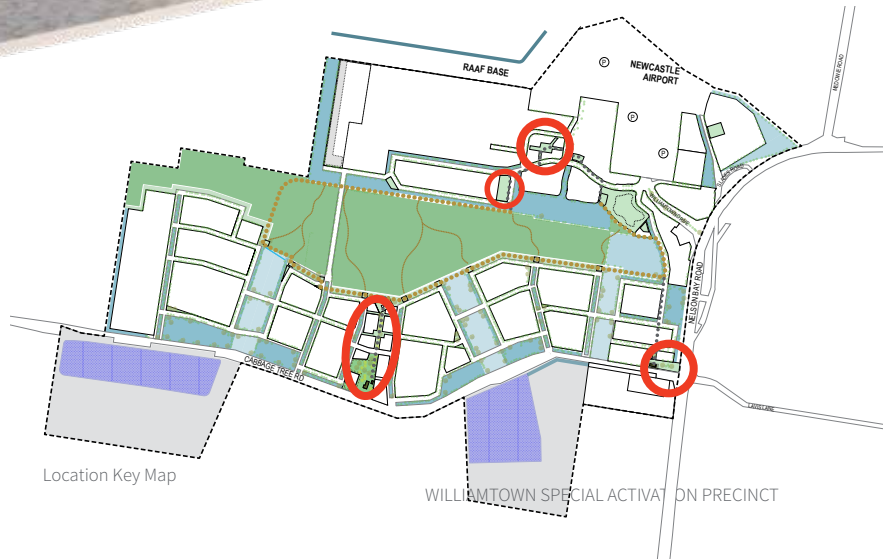
## OVERVIEW

Public spaces such as squares and plazas, laneways, pocket parks and small seating spaces facilitate the activation of precincts, inviting people to inhabit areas for longer. With extended visitation, surrounding businesses benefit economically and the vibrant character of the precinct is cemented.

Providing amenity for different types of user profiles forms part of the attraction of public spaces, creating a one-stop shop for user needs. Supporting these spaces through the incorporation of green shaded areas in the summer, sunny seating areas in the winter, comfortable and unique meeting points encourage people to pinpoint and return to locations.

Figure 025. 3D Illustration of Squares and Public Spaces




Location Key Map

Figure 026. 3D Illustration of a Wetland

# DRAINAGE NETWORK

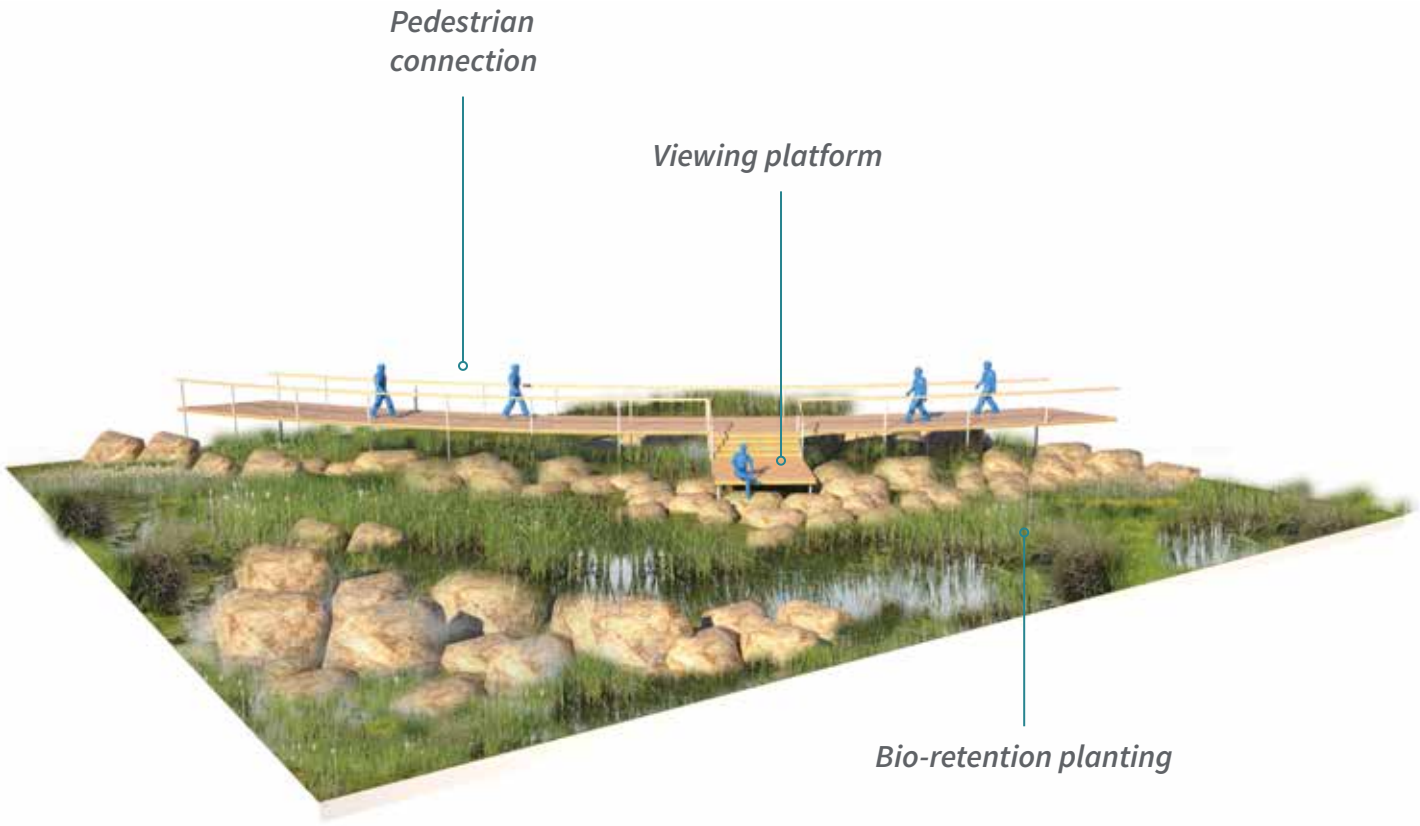
*An innovative drainage network comprised of wetlands and channels will fulfill a vital role in the water cycle of the Structure Plan.*

## OVERVIEW

Linear wetlands running adjacent to Cabbage Tree Road support the overall stormwater and flood management of the Structure Plan. They also contribute to creating an iconic arrival sequence for users of the precinct and emphasise its unique landscape setting. By showcasing the importance of the natural systems that are interwoven throughout the precinct, the Structure Plan can convey a unique sense of place and identity.

To ensure activation, the proposed drainage network must tie into the overall pedestrian network. Through elevated boardwalks people can easily pass over lower-lying areas, taking in localised views as they journey through the precinct.

Additionally, by incorporating platforms, steppers/boulders and balancing routes through ephemeral zones, users can enjoy these areas in wet and dry periods. Incorporating a sense of play and delight into these water treatment corridors ensures they are multifunctional assets of the precinct.





Location Key Map

Figure 027. 3D Illustrations of Pedestrian Connections

# PEDESTRIAN CONNECTIONS

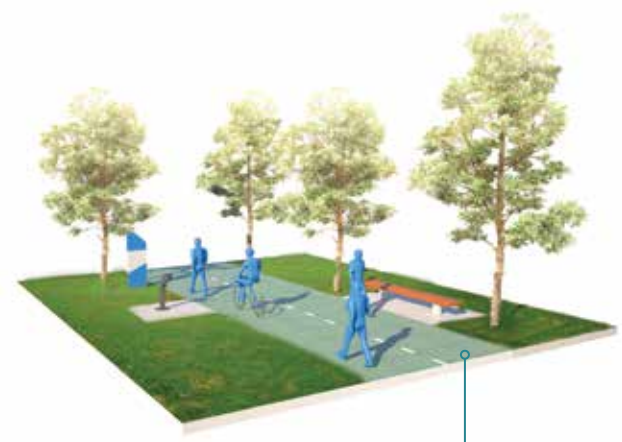
*Creating logical, efficient and diverse pedestrian connections throughout the Structure Plan will promote healthy, active lifestyles that benefit all precinct users.*

## OVERVIEW

Considered routes that connect people with key destinations such as employment areas, transport hubs, the airport, and the Environmental Protection Area, are an important foundation for promoting wellness and mobility within the Structure Plan. The quality of these connections is also essential in terms of their greenery and overall beauty. Connections can act in a seamless fashion and be integrated with existing infrastructure networks for maximum gain.

Beneficial connections ensure that individuals and employment areas are not isolated and don't experience the negative outcomes of such remoteness. Large and small networks that link people to public transport, employment, open space, commercial centres, essential services and tourism destinations can ensure connectivity underpins the Structure Plan.

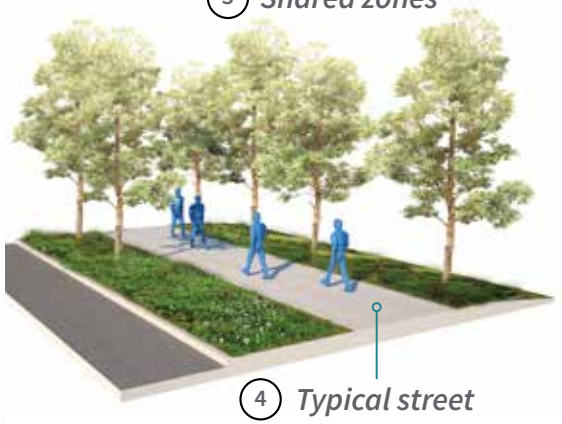
In parallel with human movement, the connectivity of wildlife areas should be considered. Wildlife corridors connecting to the Environmental Protection Area can enhance and support pedestrian connections, serving local species simultaneously. Types of corridors include stepping stone vegetation patches across the landscape such as paddock trees, wetlands and roadside vegetation, continuous lineal areas of vegetation such as riparian strips or ridge lines, or a mix of larger habitat areas and small isolated patches.



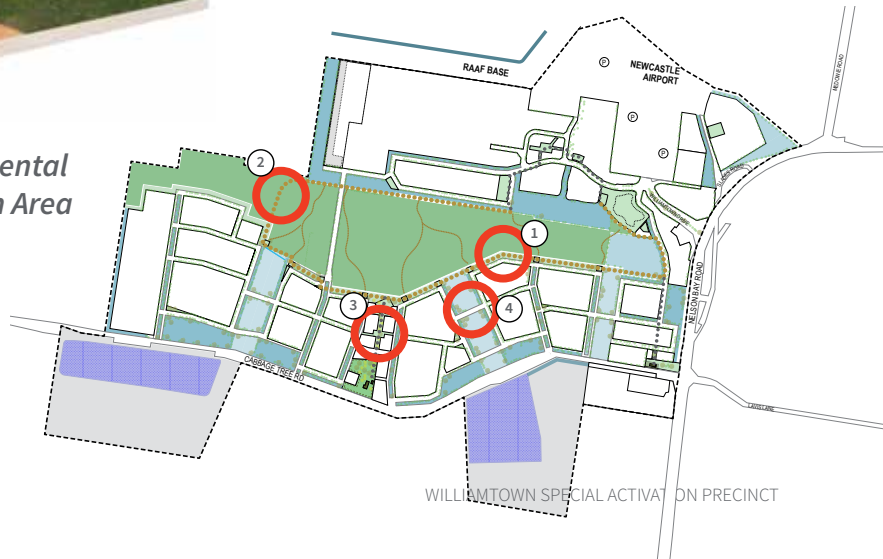
1 *Shared pathways*

3 *Shared zones*

2 *Environmental Protection Area*



4 *Typical street*



# BULK FILL VISUAL IMPACT

Figure 028. Bird's Eye View of the SAP

*The bulk fill strategy aims to respond to the flooding constraints present within the area and consider the visual amenity of the SAP. The following images illustrate the minimal visual impact of the bulk fill response.*

Figure 029. Interface with the Environmental Protection Area at Eye Level

Figure 030. Birds Eye View of the Interface with the Environmental Protection Area

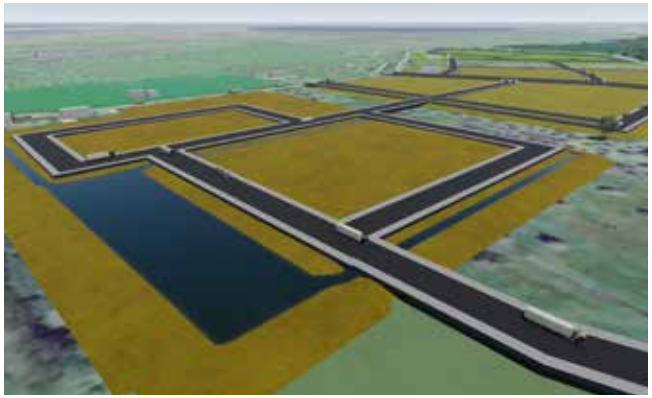


Figure 031. Bird's Eye View of a Wetland and Connected Channels

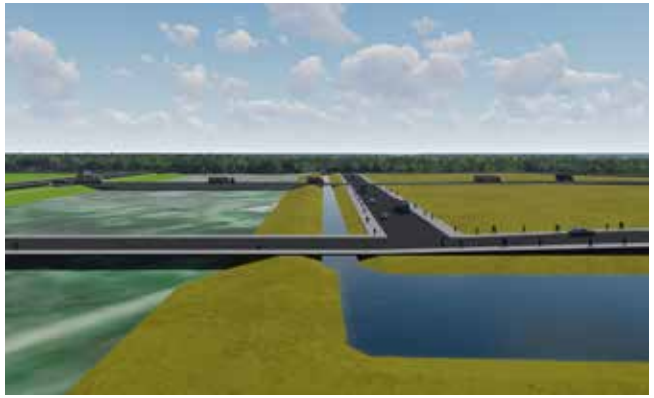


Figure 032. Lower Bird's Eye View Looking Towards the Environmental Protection Area via Dawsons Drain

# APPENDIX 01

# STRUCTURE PLAN EVOLUTION

# EVOLUTION OF THE STRUCTURE PLAN

*The evolution of the Structure Plan was a collaborative process between government agencies, a multidisciplinary team of design and technical experts, and key community stakeholders.*

## 1

## INVESTIGATION AREA - ANALYSIS PHASE

Williamtown Special Activation Precinct commenced with an investigation area of 11,000 ha. The investigation area spread from Tomago to Salt Ash and from the Worimi Conservation Lands and Stockton Dunes to the Grahamstown Dam in the north. This area was intended to be reduced in size as part of the EbD process.

## 2

## ENQUIRY BY DESIGN WORKSHOP 1 OPTIONS

The first Enquiry By Design workshop gave the working group the opportunity to understand constraints, shape and test big ideas and develop innovative solutions at scale, through an iterative cross-disciplinary design process. Three scenario options were developed during the Enquiry by Design Workshop held in Williamtown on the 10th and 11th February, 2021, and subsequently refined for testing by the technical consultants.

**1** PROTECT, REGENERATE, STIMULATE

**2** A GLOBAL GATEWAY

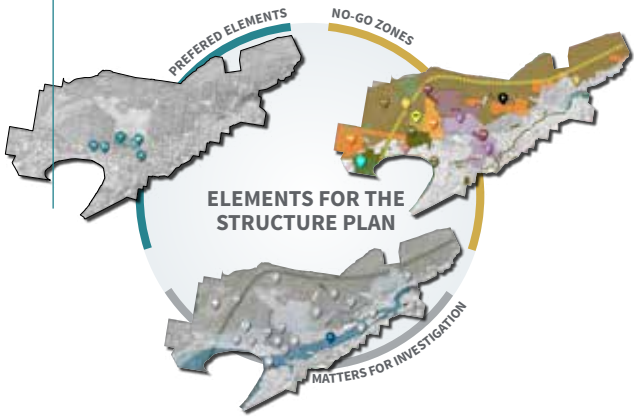
**3** 21 CENTURY WILLIAMTOWN

# 3

## ENQUIRY BY DESIGN 2 WORKSHOP REFINING THE STRUCTURE PLAN BOUNDARY

27 April 2021 – Friday 30 April 2021

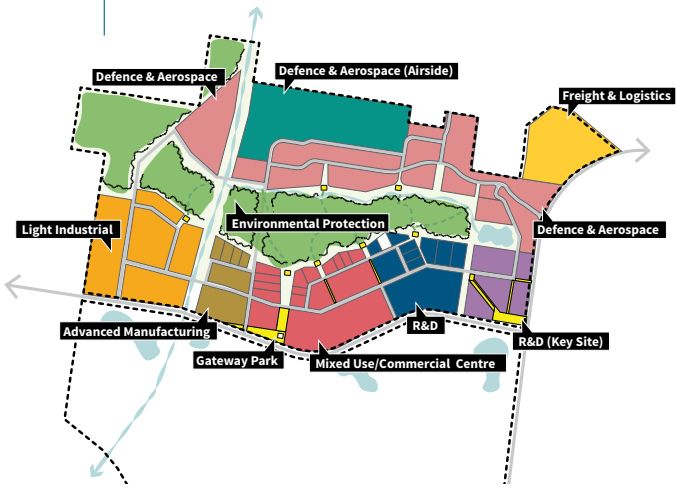
The second Enquiry By Design workshop focused on refining the Structure Plan boundary based on detailed evaluation of existing constraints, the suite of technical studies and assessment by the technical consultants, and advice from relevant agencies.




# 4

## ENQUIRY BY DESIGN 2 WORKSHOP 2 DRAFT STRUCTURE PLAN

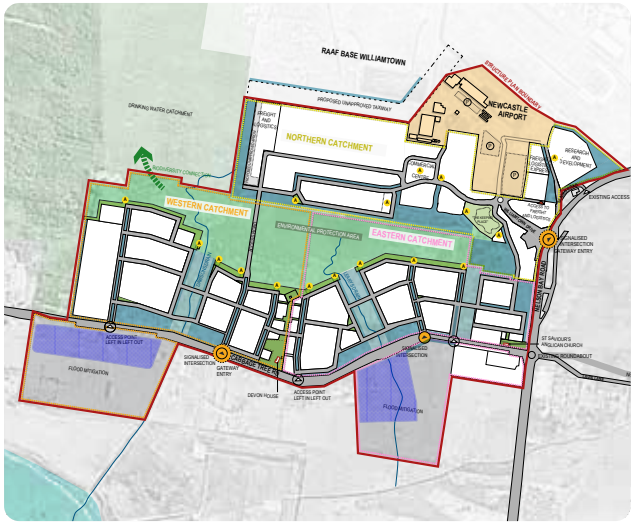
During this 4-day workshop, the working group focused on resolving the constraints and eventually agreed on a refined Structure Plan boundary and prepared a Draft Structure Plan option encompassing an area of approximately 330 ha of land located between the Newcastle Airport and Cabbage Tree Rd. It was acknowledged that further work would have to be undertaken to address constraints present within the defined Structure Plan boundary.




# 5

## REVISED STRUCTURE PLAN

Following the Enquiry By Design Workshop 2, the design team worked together to refine the Draft Structure Plan to incorporate the flooding and drainage solution and to address the environmental constraints whilst assuring alignment with the Williamtown SAP vision. The resultant Structure Plan comprises over 140 ha of developable land and incorporates a holistic flooding and drainage solution comprising a system of wetlands and linear channels that is integrated into the streetscape.



# APPENDIX

# 02

# ANALYSIS REPORTS SUMMARIES

# PLANNING ANALYSIS

*Consistent with the Statutory Planning Analysis report and referencing documents there within, the following analysis delineates key planning controls and features of the SAP.*

## STATUTORY ENVIRONMENT - LAND USE CONSIDERATIONS

### EXISTING LAND USE ZONES

The primary land use planning instrument applying to the Williamtown SAP investigation area and outlining permissible land uses is the Port Stephens Local Environmental Plan 2013 (PSLEP 2013). The various land use zones within the Structure Plan boundary include:

- RU2 Rural Landscape
- B7 Business Park
- SP2 Infrastructure Defence

The RU2 Rural Landscape land use zone permits a wide range of agricultural and mining land uses including agricultural production industries, extractive industries, intensive livestock agriculture, poultry farms and rural industries. The land use zone also enables a limited number of commercial, industrial and infrastructure uses including plant nurseries, home industries, airstrips and roads. Some residential and other uses are also permitted within the zone, however these are limited to low density development types including dual occupancies, dwelling houses, eco tourist facilities and tourist and visitor accommodation.

The B7 Business Park land use zones enable a range of commercial uses including office and business premises, neighbourhood shops, information and education facilities, and some industrial and infrastructure uses including light industries and general industries. Hotel and motel accommodation is also permitted within the land use zone.
SP2 Infrastructure – Defence/Air Transport Facility permit limited land use development outcomes which generally relate only to defence/airport purposes or are ancillary to that purpose.

### PROPOSED LAND USE ZONES

Consistent with the SAP frameworks for Parkes, Wagga Wagga, and Moree, the Activation Precincts State Environmental Planning Policy (SEPP) will become the primary Environmental Planning Instrument for the Williamtown SAP and largely replace the Port Stephens Local Environmental Plan (PSLEP) 2013. The recommended land uses for the Williamtown SAP include:

- REZ Regional Enterprise Zone
- E2 Environmental Conservation
- SP2 Infrastructure

This REZ zone is recommended to cover the core developable areas of the Williamtown SAP.  Its intended purpose is to facilitate the development of industrial and employment activity identified for the Williamtown SAP such as defence and aerospace industries, whilst also allowing for ancillary development to occur within all sub-catchmentss of the SAP.

As the zoning framework for the REZ within Williamtown is relatively flexible, more distinct guidance at the sub-catchment level will be provided within the Master Plan itself to ensure the intended outcomes of each catchment are established.

## *Current Land Use Zone Under PSLEP2013*

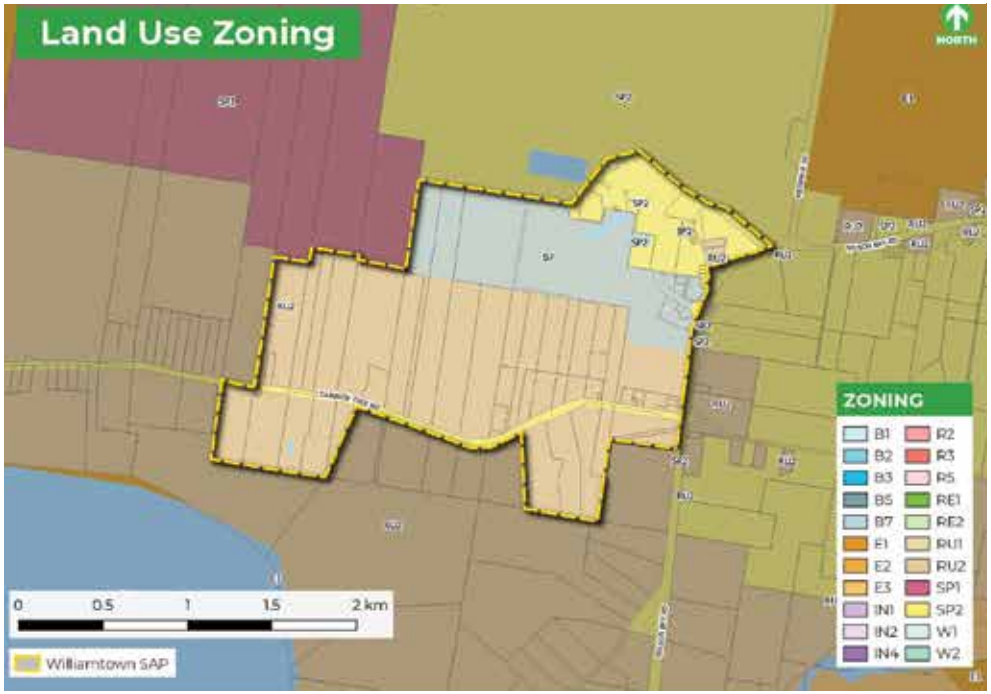



Figure 034. Current Land Use Zone Under PSLEP2013

## *Proposed Land Use Zone*

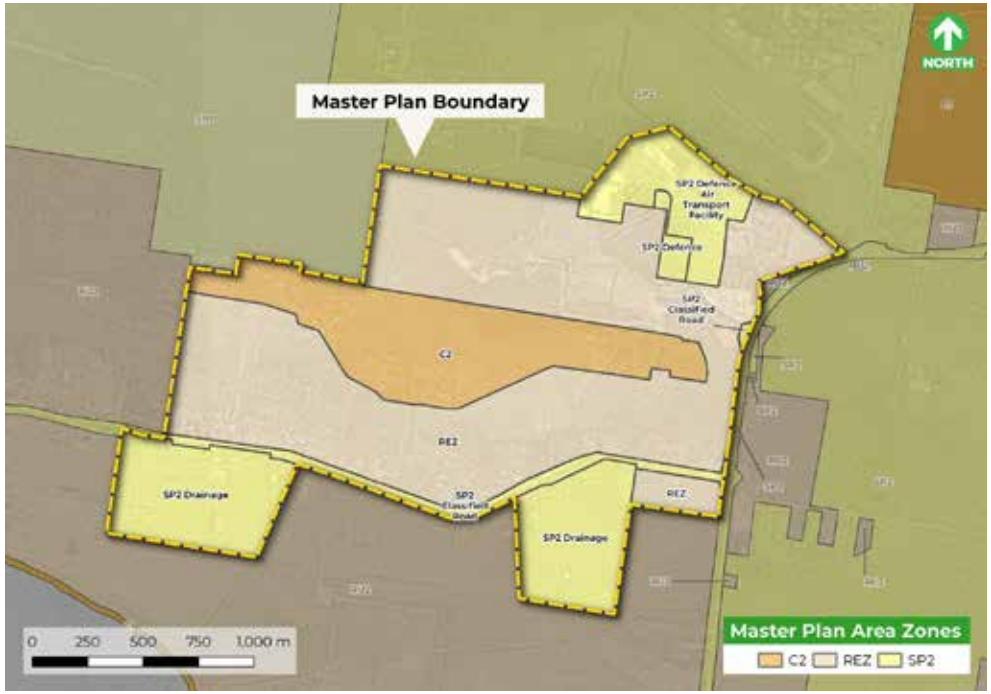



Figure 035. Proposed Land Use Zone

# PLANNING ANALYSIS

The E2 zone is recommended to cover areas within the Williamtown SAP that are considered to be of high ecological, scientific, cultural or aesthetic value. It provides for the highest level of protection, management and restoration of such land and for Williamtown is proposed across the central heavily vegetated area.

The SP2 zone is also recommended to be retained over parts of the site which are needed for specific infrastructure purposes, such as the RAAF Base/Newcastle Airport (which is already zoned SP2 – Infrastructure – Airport under the PSLEP 2013) and land to the south of Cabbage Tree Road which is needed to manage flooding and stormwater from the precinct.

## CONSIDERATIONS FOR PLANNING FRAMEWORK

The planning framework established for SAPs means that many statutory planning controls which are designed to protect and promote appropriate land uses are effectively 'switched off'. As such, the Williamtown SAP will need to include a range of specifically drafted controls to manage environmental constraints and promote appropriate planning controls. Detailed considerations for the planning framework are provided in the Statutory Planning Report prepared by Mecone with a summary of the key considerations provided below:

**Environmentally Sensitive Areas** - Typically, complying development is not permitted on environmentally sensitive areas such as areas containing high biodiversity value, Indigenous heritage, or wetlands. It is important to ensure development on any such area is subject to a more stringent and site-specific assessment through the development application process. As such, it is recommended that an environmentally sensitive areas map be created within the Activation Precincts SEPP Williamtown which clearly maps areas where complying development is not to be carried out.

**Vegetation/Tree Removal** – A change in the land use zone proposed to apply within the Williamtown SAP will mean provisions under SEPP (Vegetation in Non-Rural Areas) 2017 and the Local Land Services Act 2013 will not apply to the Williamtown SAP. As such, it is recommended that additional provisions are made within the Activations Precinct SEPP which manage the clearing or removal of vegetation and trees within the SAP.

**Hunter Water drinking catchment** – Given the critical importance of the Tomago Sandbeds and aquifers in proximity to the Williamtown SAP, a referral process needs to be established for the Williamtown SAP similar to the current provisions of section 51 of the Hunter Water Act 1991.

**Aircraft operations** - Development controls and safeguards for development in proximity to the RAAF Base Williamtown and Newcastle Airport are necessary to ensure that land use and development do not hinder or impact the ongoing, safe and efficient operations of the RAAF Base and airport, and likewise, to minimise the impacts to land uses and development against aeronautical operations (e.g. noise). Applicable development controls and safeguards are to be incorporated within the Activation Precincts SEPP and Master Plan.

**Flooding** - The low lying and flood prone nature of the area is identified as a significant constraint for the Williamtown SAP which has required a number of flood management measures to achieve a level of flood protection for development. It is recommended that flood planning controls be adopted within the Activation Precincts SEPP which are reflective of the current controls identified under the PSLEP 2013.

**Indigenous and Non-Indigenous Heritage** – The National Parks and Wildlife Act 1974 will continue to apply to the Williamtown SAP which will continue to protect and preserve items and places of Indigenous Heritage.

Non-Indigenous Heritage – Two locally listed heritage items are identified within the Williamtown SAP. It is recommended that similar provisions to those identified for other SAPs are adopted which applies clause 5.10 of the PSLEP 2013 to the Williamtown SAP in the same way it applies to heritage items under that Plan.

Bushfire – The majority of the Williamtown SAP is identified as bushfire prone land (although this is expected to be lessened as land develops and vegetation is removed). Appropriate development controls and standards similar to those identified in clause 5A.29 of the Codes SEPP should be included within the Activations Precincts SEPP for Williamtown.

**Contamination and remediation of land** – Contamination, both, PFAS and non-PFAS, are identified within the SAP boundary and existing management and remediation requirements will continue to apply. The Williamtown SAP will result in no changes

to how remediation work is characterised by SEPP No 55—Remediation of Land. As such, development and remediation works will need to consider the planning controls of SEPP 55.

**Other considerations**

- State Environmental Planning Policy (Exempt and Complying Development Codes) 2008 contains specific provisions for subdivision. Replication of many of these controls in the Williamtown SAP should be considered.
- The PSLEP 2013 contains some provisions that provide high level development considerations and allowances. Many of these will continue to apply within the Williamtown SAP including:
  - 2.7 Demolition requires development consent
  - 2.8 Temporary use of land
  - 5.1 Relevant acquisition authority
  - 5.8 Conversion of fire alarms
  - 5.11 Bush fire hazard reduction
  - Wetlands

## PLANNING PATHWAY CONSIDERATIONS

**Complying Development** - A key objective for all SAPs is to create a streamlined planning pathway where most uses are permissible as complying development. Given that many industrial and commercial uses would ordinarily require a development application, it is recommended that general measures and standards are identified to minimise potential impacts of complying development.

**Development without consent** - The introduction of the Williamtown SAP will not impede the ability for works and activities to be undertaken as development without consent under the ISEPP in most cases. However, some works under the ISEPP are restricted to 'prescribed zones', which will not be present within the Williamtown SAP. As such, inclusion of infrastructure works such as electricity generating works, roads and road infrastructure facilities, etc, should be identified for inclusion within the Williamtown SAP.

**Exempt Development** – Exempt development identified within the codes SEPP will not apply to the Williamtown SAP, unless specifically 'switched on' under the Activations Precincts SEPP. It is recommended that the inclusion of certain exempt development provisions under the Codes SEPP and bespoke exempt development provisions be identified for the Williamtown SAP, similar to other SAP's including Parkes and Wagga Wagga.

# ECONOMIC SCENARIO

***The Williamtown SAP is a significant investment not only in the local economy, but in the defence and aerospace sectors. While the precinct has potential to accommodate a range of industry sectors in the long term, the growth is likely to be organic and driven over time by demonstration of co-location benefits.***

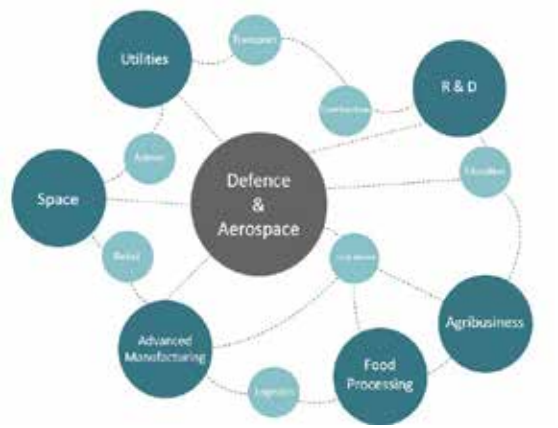
The operation identity of the Williamtown SAP remains defence and aerospace oriented. Success will be dependent on connectivity, amenity and education of the workforce, with growth occurring organically through synergies created by location, sector symbiosis and accessibility to markets.

## CATCHMENT STRATEGY

The total land use demand estimated for the Williamtown SAP is based on market sounding where participants expressed interest in investing in Williamtown SAP on conditional factors such as sufficient amenity and utilities being provided and, in some instances, necessary security provisions in place. The general consensus is that most businesses looking to locate in Williamtown are small to medium sized businesses who will be looking for convenient 'plug and play' options in the precinct.

The ability to realise the projected demand for the SAP will be dependent on the ability to set out a clear value proposition to attract businesses, and also flexibility to meet their needs – this could mean the initial 5 to 10 years will see a more organic approach to the SAP whereby businesses are located outside of their designated area to catalyse development, with a longer term goal to establish potential sub precincts.

Analysis has been undertaken on likely sequencing of uptake of land under the Structure Plan. This analysis is shown in the table below, and is represented as a total land use requirement, and includes the 7.9 hectares in use at 2020.




| Structure Plan Developable Area | Horizon 1 2026 (ha) | Horizon 2 2036 (ha) | Horizon 3 2056 (ha) | Final Structure Plan Area (ha) |
|---|---|---|---|---|
| **NORTHERN CATCHMENT** | | | | |
| Defence and Aerospace | 24 | 30 | 34 | 20 |
| Defence and Aerospace (Direct Airside Access) | 13 | 15 | 15 | 30 |
| Commercial Centre | 5 | 6 | 8 | 5 |
| Freight and Logistics | 3 | 5 | 5 | 7 |
| Research & Development | 2 | 2 | 4 | 7 |
| **Southern Catchments** | | | | |
| **WESTERN CATCHMENT** / **EASTERN CATCHMENT** | | | | |
| Commercial Centre | 5 | 6 | 7 | 68 |
| Advanced Manufacturing | 4 | 5 | 6 | |
| Light Industrial | 6 | 15 | 22 | |
| Research & Development | 4 | 5 | 5 | |
| **Total** | 66 | 89 | 106 | **137** |
| Infrastructure - Drainage (south of Cabbage Tree Rd) | | | | 64 |

Table 002. Structure Plan Developable Area Compared to Deloitte's Economic Horizons

# SOCIAL INFRASTRUCTURE

*The aim of social infrastructure throughout the SAP is to provide high quality amenities to support workers, provide community benefit to the surrounding residential areas and create opportunities and reasons for international, domestic and local visitors to visit and play.*

## FUTURE SOCIAL INFRASTRUCTURE PROVISION

Innovation precincts take time to develop and need a variety of social spaces and infrastructure supported by curated programs to facilitate a strong a well-functioning innovation ecosystem and social fabric.

Currently, there is an inadequate provision of social infrastructure in Williamtown and no town centre or point of focus.

The Structure Plan seeks to provide the blueprint for a successful social infrastructure offering for the future community. Outlined opposite are a range of opportunities and recommendations for the future social infrastructure provision in the Williamtown SAP.

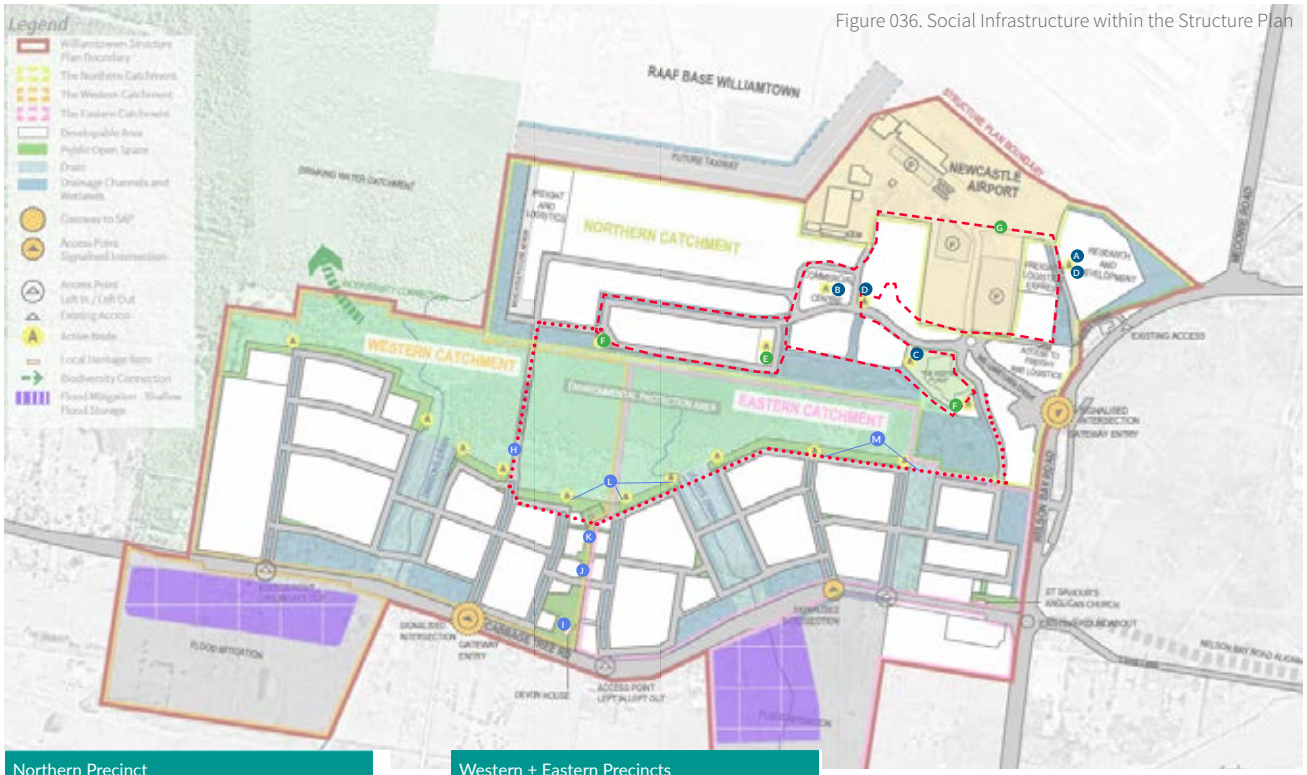



Figure 036. Social Infrastructure within the Structure Plan

**Northern Precinct**

**Community and cultural spaces**

- A Transport/Aerospace/Science museum + event space
- B Central community hub + community meetings spaces
- C Small community/cultural space (relationship to Keeping Place)
- D Indoor/outdoor meeting, 'collision' and gathering spaces

**Western + Eastern Precincts**

- H Walking + cycling 'health loop' (Stage 2)
- I New 'Gateway' Park (+ Devon House setting)
- J Future start up and community spaces
- K Indoor recreation centre/indoor courts
- M Outdoor fitness stations along the 'health loop'
- L Outdoor learning 'pods' along the 'health loop'

**Open space and recreation**

- E Active recreation spaces - outdoor courts + sport/recreation field
- F Outdoor learning spaces connected to the environmental + cultural place story
- G Walking + cycling 'health loop' (Stage 1) connecting the active nodes

Refer to Social Infrastructure report for more information.

# WORIMI LALC AND ABORIGINAL COMMUNITY FEEDBACK

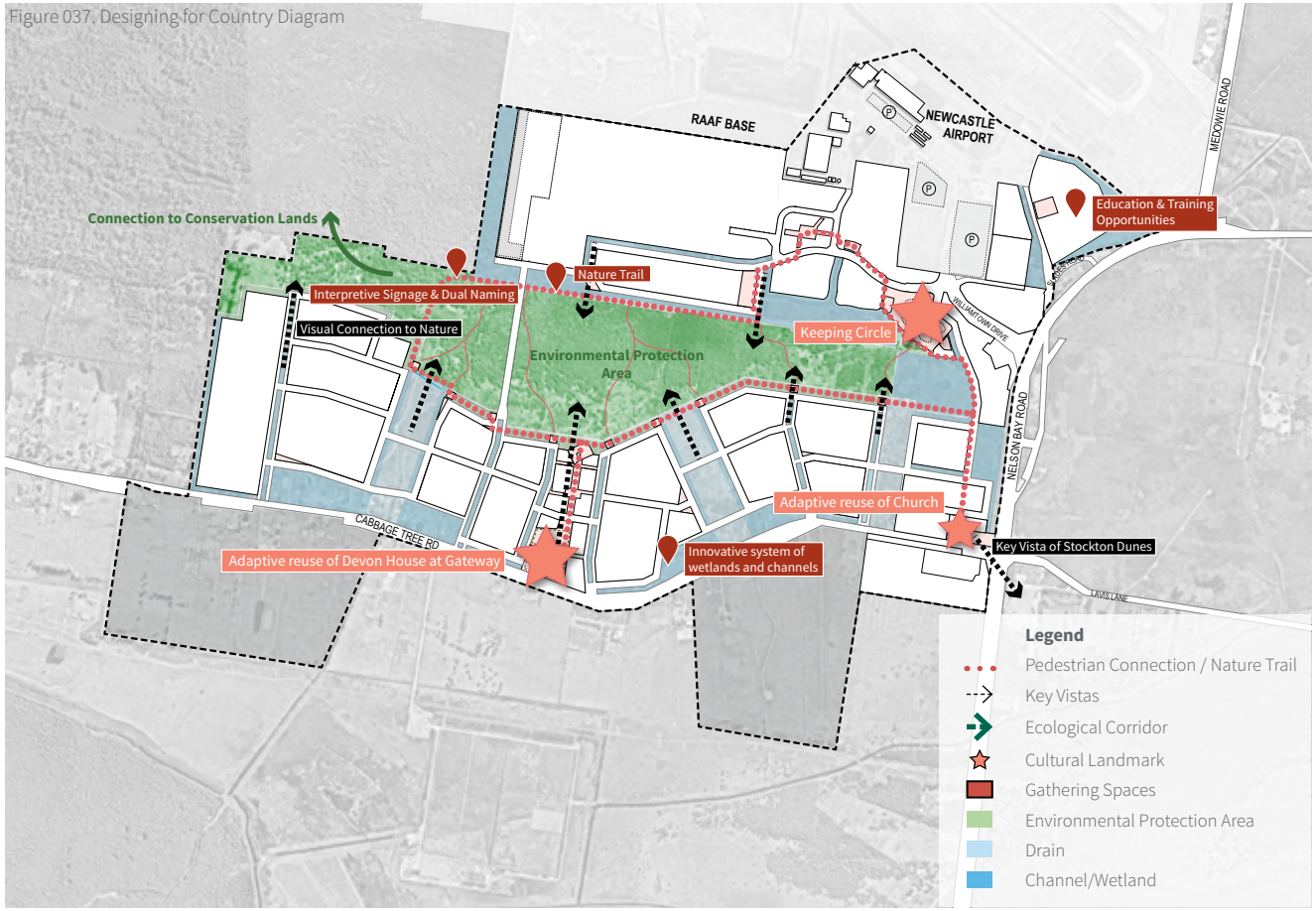
***The Worimi people are the traditional owners of the Port Stephens region. The Williamtown SAP will celebrate and protect its history and landscape values, maintaining a 'sense of place' throughout the future of the broader Williamtown area.***

Indigenous Cultural Heritage sites will be managed in consultation with local Aboriginal representatives, based on the principles of protection, avoidance and mitigation to preserve the significance of Worimi sites, culturally significant vegetation and artefacts. Further assessment across the SAP will be required.

Aligning with the Williamtown SAP overall vision and key principles, the delivery plan is to demonstrate incorporation of a range of corresponding objectives.

Workshops were held at the Worimi Local Aboriginal Land Council's Murrook Culture Centre at Williamtown, to seek input on the design and master planning process of the SAP proposed for Williamtown from the Aboriginal community with ties to the area. Attendees were asked to think about the SAP principles and relevant objectives developed from discussions at the Enquiry by Design Workshops, and what opportunities there were for cultural engagement. A summary of their responses is contained below.

Figure 037. Designing for Country Diagram



## VISIT AND PLAY OBJECTIVES

- Support for local tourism on country with a focus on investing in local people to deliver cultural tourism experiences.
- Working with the Worimi Local Aboriginal Land Council to develop tourism and cultural experiences to increase the connection to country and address issues relating to the lack of education of local cultural heritage.
  - Tourists could be involved at dusk in painting paper lanterns at certain times on Stockton dunes and letting the lanterns go, so they could be seen in the distance.
  - Ideas similar to The Field of Lights installation at Uluru.
  - Experiences that increase the connection to country and address issues relating to a lack of education.
  - Celebrate the local Worimi people and their stories, branding parts of the precinct with the Worimi identity through the design of buildings and landscapes, and producing an official SAP logo that reflects the whole of Worimi country.

## DESIGN FOR COUNTRY AND COMMUNTY OBJECTIVES

- Develop cultural sites and meaningful local art opportunities to celebrate Worimi cultural heritage while working with the community and local artists to celebrate local culture and environment.
- Have an inclusive, consultative arrangement whereby the community could select who the artists and story tellers are.
- Consistent approach to interpretive signage was identified, as was the display of Worimi art on roofs of buildings and development structures, and art lighting projections.

## BLUE- GREEN GRID OBJECTIVES

- Identify opportunities to strengthen and create a wetland to dunes connection, sensitive to climate change, water conservation and cultural fire management.
- Develop community groups to manage, protect and preserve areas of significance and connections to these areas.

## MORE THAN AN AIRPORT OBJECTIVES

- Create and provide employment opportunities for Worimi people across energy, defence, research, commercial, tourism, culture and eco-tourism sectors with a preference for placements to be managed through 1:1 mentoring.
- Create roles where place of work is active, interesting and affordable.
- Provide a prominent role for Worimi people in eco-conservation.
- Technology education was seen to be important for those in the early years of employment however there should also be support throughout the process for existing leadership.
- Creating roles where the place of work was active, interesting, and affordable.
- PFAS remediation is important to the Worimi people as a way of healing Country. Work with the Worimi community to identify ways of healing Country.

## MOVEMENT AND PLACE OBJECTIVES

- Provide a prominent role for the Worimi in wetland development and cultural land rehabilitation.
- Protect connections between wetlands and women's sites.
- Create opportunities for improved public transport to significant areas and sites in and around Williamtown SAP.
- Emphasis on water as an important part of culture and life.
- Identified issues such as damming water to protect the community from flooding, and improving roads for greater flood safety and drainage.

## HEALTHY CITY

- Develop opportunities to improve public healthcare and wellness amenities for the Worimi people.
- Opportunities such as pop-up health checks, family healthcare, and access to wellness activities or the provision of a community fitness centre would be of benefit to the community.
- Wellness was also linked to the health of the wider environment and people's connection and access to country.
- Supporting cultural identity and connections to cultural knowledge and the creation of resources to capture family and cultural stories.
- A whole of community approach was advocated – the provision of these sorts of services would prevent the creation of a dead industrial/commercial zone.

## AN INNOVATIVE ECO-SYSTEM

- Develop innovative remediation solutions throughout Williamtown SAP providing cultural healing opportunities.
- Introduce cultural practices back into country.
- Smoking ceremonies could be conducted before works are undertaken and further support could be given to connect Worimi children with their elders to ensure traditions and knowledge is maintained.
- Provide further support to ensure Worimi traditions and knowledge is maintained.
- Develop an eco-buffer around the SAP to develop innovative remediation solutions, and to develop deep canals to manage flood waters.

DRAFT

# INDIGENOUS CULTURAL HERITAGE

*The Williamtown SAP is located within the lands of the Worimi people. Within the SAP boundary, Aboriginal Heritage Information Management System (AHIMS) sites have been identified within the Inner Barrier Dune system, all in close proximity to the interbarrier depression, or swamp lands.*

**AHIMS SITE ACRONYMS**

- AFT: Artefact (stone, bone, shell, glass, ceramic and metal)
- AFT/BUR: Artefact/Burial
- AFT/BOM: Artefact/Non-human bone and organic material

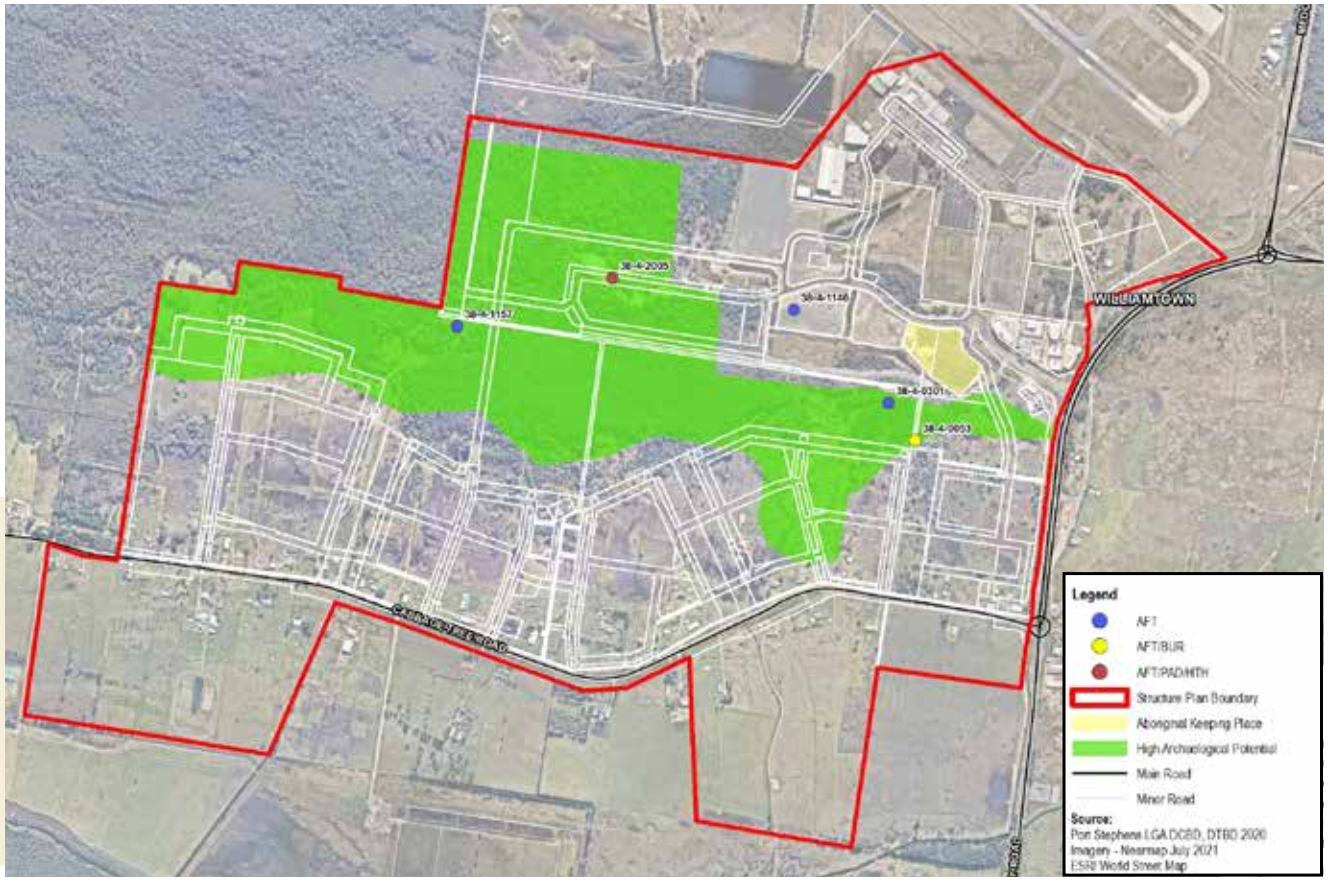



Figure 038. Archaeological Potential Area Map

## Matters for Consideration

Locations of high cultural and archaeological potential are located within the northern portion of the SAP boundary that overlooks the swamp lands (inter barrier depression) and includes the interfaces of the swamp lands and dune.

A number of site types are likely to occur including shell middens, artefact scatters, isolated finds, scat trees, camp sites (with middens, artefacts, evidence of cooking and food preparation, knapping, etc) and burials.

Previous assessments and traditional knowledge have also identified that burials are located throughout the dunal system, and as one previously identified in the SAP boundary, there is very high potential for additional burials to be located in the dunes in the precincts.

## Structure Plan Response

In light of the contextual information, further investigations of the SAP will be undertaken, including field surveys to ground truth known AHIMS sites within the SAP boundary and identify are new sites and Potential archaeological Deposits (PADs).

There will also be on-going involvement of registered Aboriginal stakeholders in the design process.

## Recommendations for Master Plan & Delivery

### PERFORMANCE CRITERIA

1. Incorporate Designing with Country and Indigenous heritage values into the Structure Plan
2. Protect Indigenous heritage sites throughout the project and avoid adverse impacts to Indigenous heritage values wherever possible
3. Develop an Aboriginal Cultural Heritage Management Plan (ACHMP) in consultation with the Registered Aboriginal Parties (RAPs).
4. Where adverse impacts to Indigenous heritage values are unavoidable, undertake a salvage program with a qualified archaeologist and representatives of the RAPs in accordance with the ACHMP
5. Conduct ongoing consultation with the RAPS to keep the community informed about the progress of SAP development and obtain feedback on mitigation of impacts to Indigenous heritage values and opportunities for meaningful engagement
6. Protect and mitigate incidental harm to unrecorded Indigenous heritage values through the implementation of a sound chance finds procedure
7. Interpret Indigenous heritage values in collaboration with community with the aim of enhancing significant values and creating a sense of place.

# NON-INDIGENOUS HERITAGE

*There are two recognised sites of local historic heritage significance within the Project Area: "Devon House", including former Moxey's slab cottage, dairy, hay shed and slab barn, and St Saviour's Anglican Church, including WWI memorial plaque. Directly adjacent to the SAP is also the Commonwealth Heritage Listed RAAF Base Williamtown. Predictive modelling has also identified areas to contain sites which have low heritage potential.*

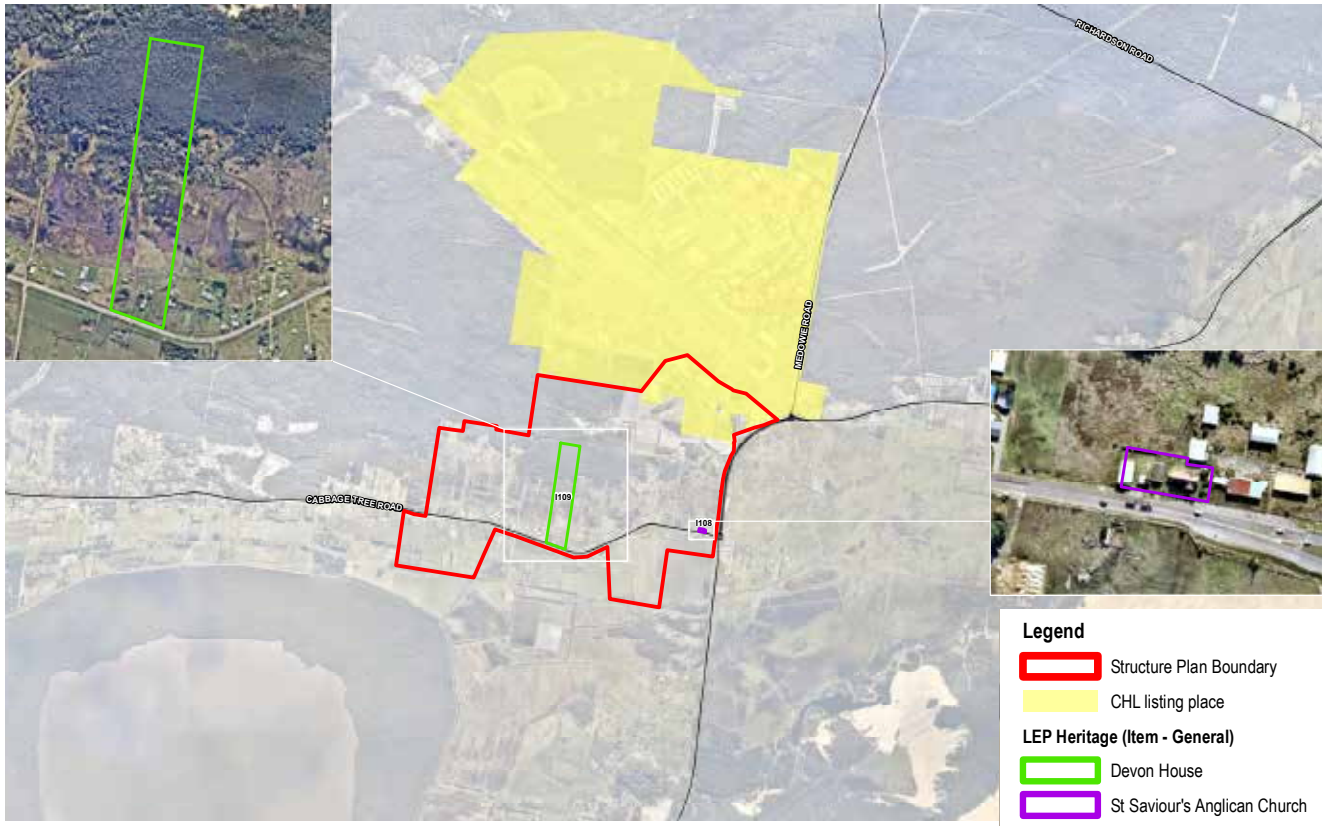



Figure 039. Historic Heritage Sites within Structure Plan Area

## Matters for Consideration

### KNOWN HERITAGE VALUES

**Devon House**
The significance of the site is associated with the property boundary and the main house itself, the associated shed and dairy towards the rear of the property and the overall rural setting of the site.

**St Saviour's Anglican Church**
St Saviour's Anglican Church was established in 1912 and has been in continued use by the Williamtown community for nearly 110 years. The Church is a modest gothic-revival style brick building located near the corner of Cabbage Tree Road and can be seen from Nelson Bay Road. It is in good condition with a high degree of integrity, largely unchanged since its original establishment.

**RAAF Base Williamtown**
RAAF Base is located to the north of the SAP, with the boundary adjacent to the airside boundary of the base. There are no structures of contributory importance to the Commonwealth Heritage List values of RAAF Base Williamtown in proximity to this northern Project Area boundary. There are also no significant views or sight lines that will be impacted by the proposed Structure Plan.

**Williamtown Public School**
This site is likely to hold an intrinsic connection to the Williamtown community who fought to protect it prior to and following its closure. This site is currently abandoned and in poor condition. As such it is anticipated that these buildings will be considered for removal. As this assessment has found Nil heritage values, no impact is anticipated to this site.

## Structure Plan Response

### OVERALL VISION

Overall, the Structure Plan for the Williamtown SAP has both prioritised and highlighted key existing elements within the landscape to encourage a sense of place, and this includes the careful incorporation of both Devon House and St Saviour's Church. Together these two sites provide a unique opportunity for the Williamtown SAP to highlight and celebrate Williamtown's rich agricultural and close community history through continued use, sympathetic adaptive reuse, and interpretation, in order to ensure a high level management approach to the protection of these sites.

### OPPORTUNITIES FOR A PLACE-LED APPROACH

#### DEVON HOUSE

The Structure Plan has included Devon House as 'Public Open Space' , safeguarding the ongoing conservation of Devon House into the future and providing opportunities for adaptive reuse and interpretation – ideally through the transformation of the site into a heritage park. Overall, this approach is a good heritage outcome for Devon House.

#### ST SAVIOUR'S ANGLICAN CHURCH

The Structure Plan has included the location of St Saviour's Church as 'public open space' with the intention of retaining the Church in-situ and ensuring its continued use.

## Recommendations for Master Plan & Delivery

### PERFORMANCE CRITERIA

In order to ensure heritage values are conserved and protected, it is recommended that the SAP adhere to the proposed performance criteria below:

1. Protect Non-Indigenous heritage sites throughout project design and execution.
2. Any changes to Non-Indigenous heritage sites should be guided by Burra Charter Principles.
3. Incorporate the place, history, heritage and landscape in the Masterplan.
4. Avoid adverse impacts to Non-Indigenous heritage values.
5. Where adverse impacts are unavoidable, project design and execution should involve appropriate mitigation strategies.
6. Protect and Interpret Non-Indigenous heritage sites in collaboration with community with the aim of enhancing significant values and creating a sense of place.
7. Consider the importance of setting, views, access and the visual and landscape context of Non-Indigenous places during project design and execution.
8. Where project design and execution involve changes to Non-Indigenous heritage places, involve suitably qualified heritage professionals.
9. Protect and mitigate incidental harm to unknown sites of potential historic heritage significance through the implementation of a sound chance finds procedure.

# BIODIVERSITY

*The Environment Protection Area and the land in the north-west corner of the SAP boundary are of high biodiversity value.*

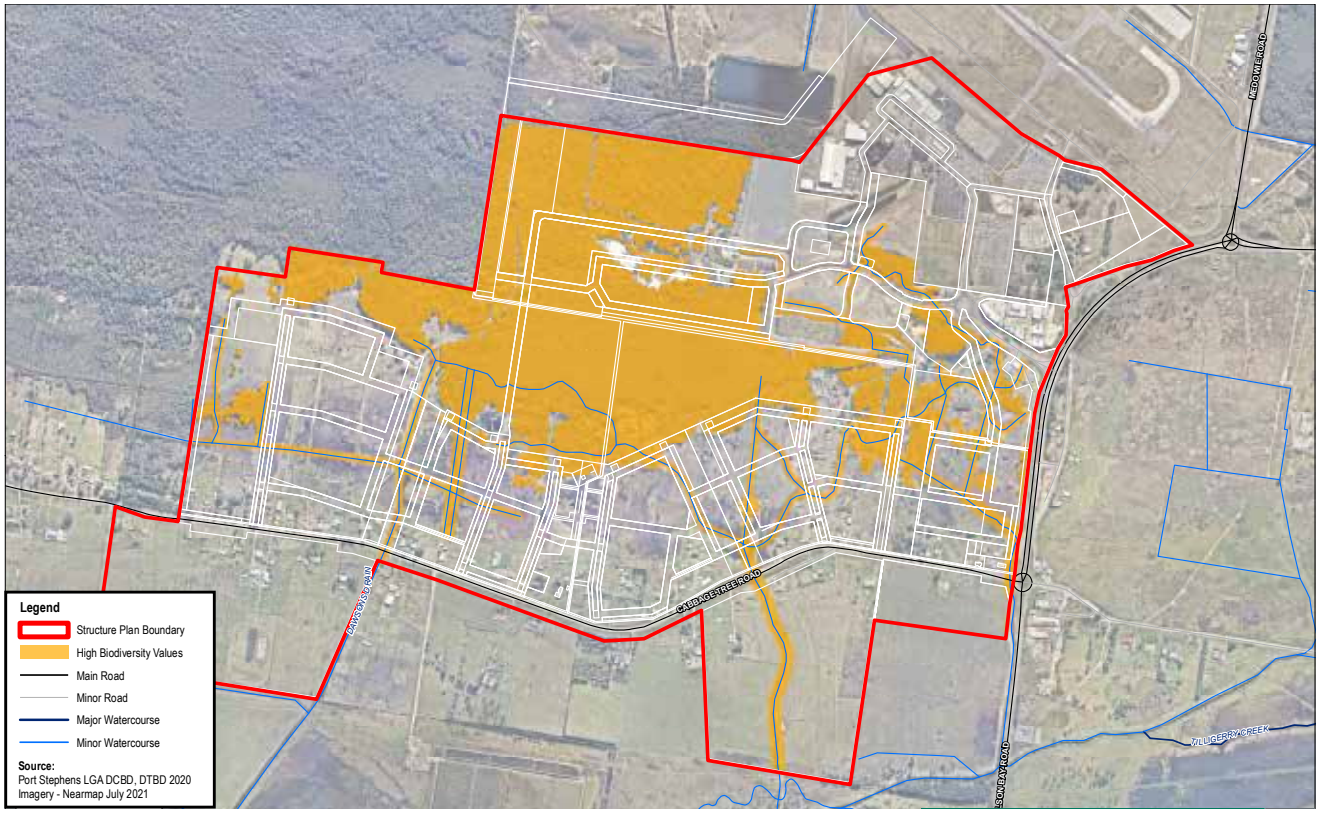



Figure 040. High Biodiversity Values within the Williamtown SAP

### AREAS OF HIGH BIODIVERSITY VALUE

The majority of the vegetated areas within the SAP boundary comprise areas of high biodiversity value including:

- Extensive Important Mapped Area for the Swift Parrot. Impacts to these areas are a potential Serious and Irreversible Impact (SAII);
- Two (2) Threatened Ecological Communities (TEC) (Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions and Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions);
- Extensive occurrence of Earps Gum, a listed threatened species under the EPBC Act;
- Extensive known habitat for Koala, Squirrel Glider and Wallum Froglet; and
- Potential habitat for additional species.

## Matters for Consideration

### INUNDATION IMPACTS

- The Structure Plan will result in areas of Broad-leaved Paperbark - Swamp Oak - Saw Sedge swamp forest subject to increased inundation within the Environmental Protection Area.
- In some areas (subject to detailed design), up to 4.5m batters will effectively create a basin to contain higher inundation levels, and this will likely accelerate tree death. This is due to water levels extending higher up tree trunks and the trees will be in standing water for longer periods.
- Regrowth will be restricted due to drowning of the seeds. This has to potential to lead a new ecosystem in 10 or 20 years (dependent on regularity and length of inundation periods, which will be driven by prevailing rainfall conditions year-to-year).

## Structure Plan Response

### ENVIRONMENTAL PROTECTION AREA

The Structure Plan includes a large central corridor through the precinct that provides an important habitat linkage area leading to the adjacent Hunter Water land and Tilligerry State Conservation Area to the west. This Environmental Protection Area has been developed through a series of workshops and avoids large areas of important habitat values.

### CREDITS

Based on the retention of this important central corridor, and assuming full clearing within the development precincts, the Williamtown SAP would require a total of:

- 871 ecosystem credits (indicative only); and
- 2,852 species credits (indicative only).

*It is noted that an existing development consent is applicable to the Astra Aerolab land and the preliminary results do not incorporate any existing offsetting mechanisms associated with that project. It is likely the credit obligations associated with the WIlliamtown SAP will be reduced when the existing offset obligations are considered.*

## Recommendations for Master Plan & Delivery

- Assess the impact of increased freshwater runoff and total nitrogen load on wetlands at Fullerton Cove.
- Meet the BAM survey requirements for species with the potential to occur that have not been adequately surveyed.

# BUSHFIRE

*The Williamtown SAP is located within a bushfire prone landscape with a history of major fire events. The entire precinct (excluding the existing Newcastle Airport) is mapped as containing Category 1, 2 or 3 vegetation or their associated buffer zones.*

## AREAS OF INFLUENCE

The vegetation that will have the greatest influence on bushfire behaviour within the precinct is the areas of retained Coastal Swamp Forest within the central protection area and the large areas of Forested Wetlands within the Hunter Water owned lands (and Tilligerry State Conservation Area) to the north and west (outside of the SAP).

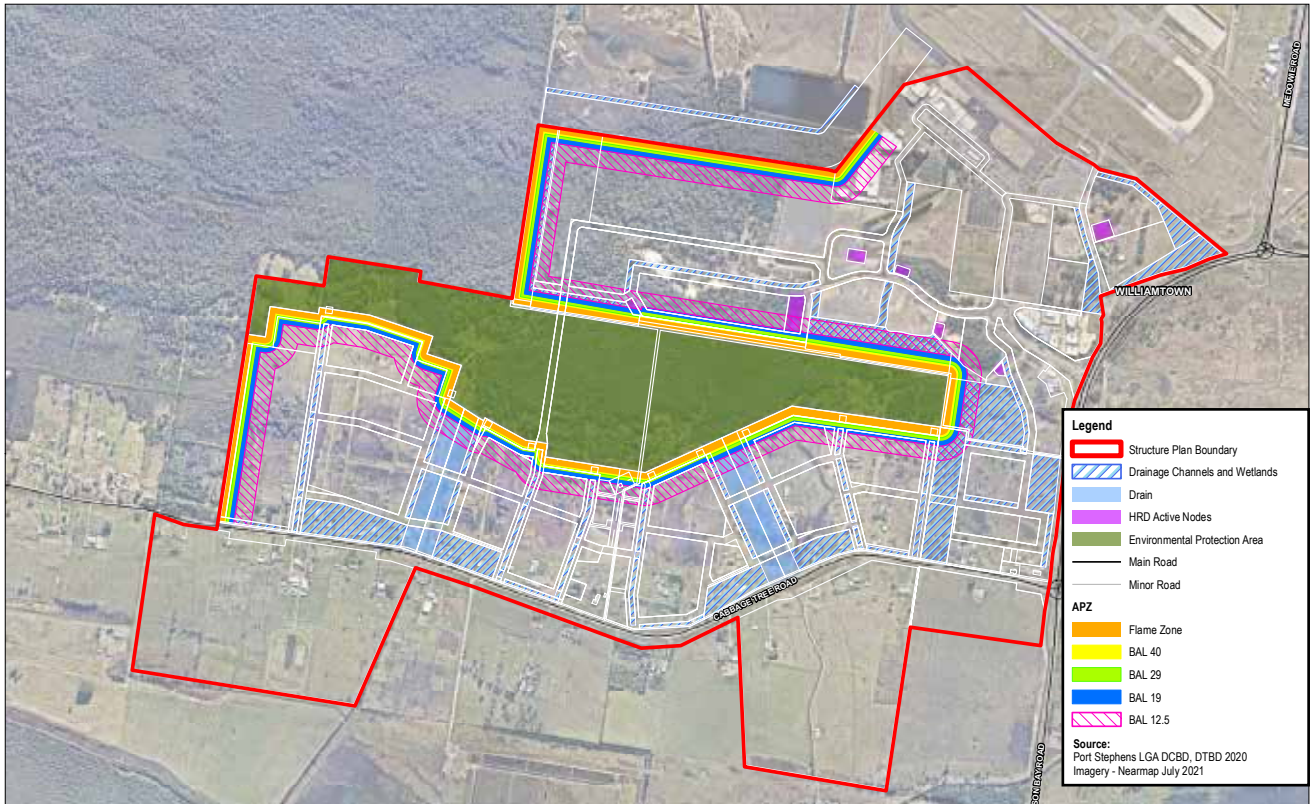



Figure 041. Indicative BAL for the Structure Plan

## Matters for Consideration

### CENTRAL ENVIRONMENTAL PROTECTION AREA

The central Environmental Protection Area, and the forested wetland outside of the SAP have continuous fuels that are available to burn during average seasons. They are highly combustible and the regional climatic conditions may support crown fires.

To mitigate this identified bushfire risk and support other environmental objectives the majority of this high bushfire risk area within the SAP has been allocated for environmental protection with limited to no development occurring in these areas.

## Structure Plan Response

### APZ AND BUSHFIRE ATTACK LEVEL

Provide suitable Asset Protection Zones across the precinct to result in a Bushfire Attack Level of:

- BAL 29 or lower to all the future building envelopes;
- BAL 12.5 or lower to all SFPP; and
- BAL 12.5 or lower to all hazardous industry.

The SAP may also require the creation of APZs that need to be maintained sequentially until the final phase of development is completed to afford each stage of the development the appropriate level of bush fire protection.

## Recommendations for Master Plan & Delivery

### SUMMARY OF PROPOSED PERFORMANCE CRITERIA

1. Asset Protection Zones are managed and maintained to result in a Bush fire Attack Level of BAL 29 or lower (not BAL 40 or BAL FZ) to all future building envelopes that are being assessed as complying development.
2. Where referral to NSW RFS is required, APZs should be managed and maintained to result in a Bush fire Attack Level of BAL 12.5 or lower (not BAL 29, BAL 40 or BAL FZ). These developments will not be assessed as complying development.
3. All landscaping is to comply with Appendix 4 of Planning for Bush fire Protection 2019 and relevant environmental approvals required under the NSW Biodiversity Conservation Act 2016 and/or Commonwealth Environment Protection and Biodiversity Conservation Act 1999. Where environmentally sensitive vegetation are to be cleared, the proposals will need to be carefully considered and may no longer be consistent with complying development.
4. Access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating as well as providing a safe operational environment for emergency service personnel during firefighting and emergency management on the interface.
5. Adequate water supplies are provided for firefighting purposes.
6. The location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings, and must be installed and maintained.
7. The location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings.

# FLOODING & WATER CYCLE MANAGEMENT

***The SAP is flood prone and has therefore presented the challenge of achieving a level of flood protection, balancing flood impacts from local and regional flooding and considering the inter-related contamination, hydrogeology and geotechnical related constraints.***

Water cycle management was a critical factor influencing the overall design and approach of the Structure Plan. A number of water cycle management strategies were tested as part of refining the Structure Plan.

Drainage infrastructure areas were initially reviewed immediately south of Cabbage Tree road to maximise high value developable land north of Cabbage Tree Road. However, preliminary bulk filling assessments, required to pipe and treat water to the south of Cabbage Tree Road, suggest that the required scale and cost of importing fill would likely be excessive due to minimum grades. Locating the drainage infrastructure for flood mitigation and water quality within the development would provide a more efficient bulk filling outcome as it would provide for shorter drainage lengths.

The general intent of the strategy is to maximise onsite water quantity and quality measures to reduce bulk filling requirements, although there is a minor reduction in developable land within the SAP boundary.

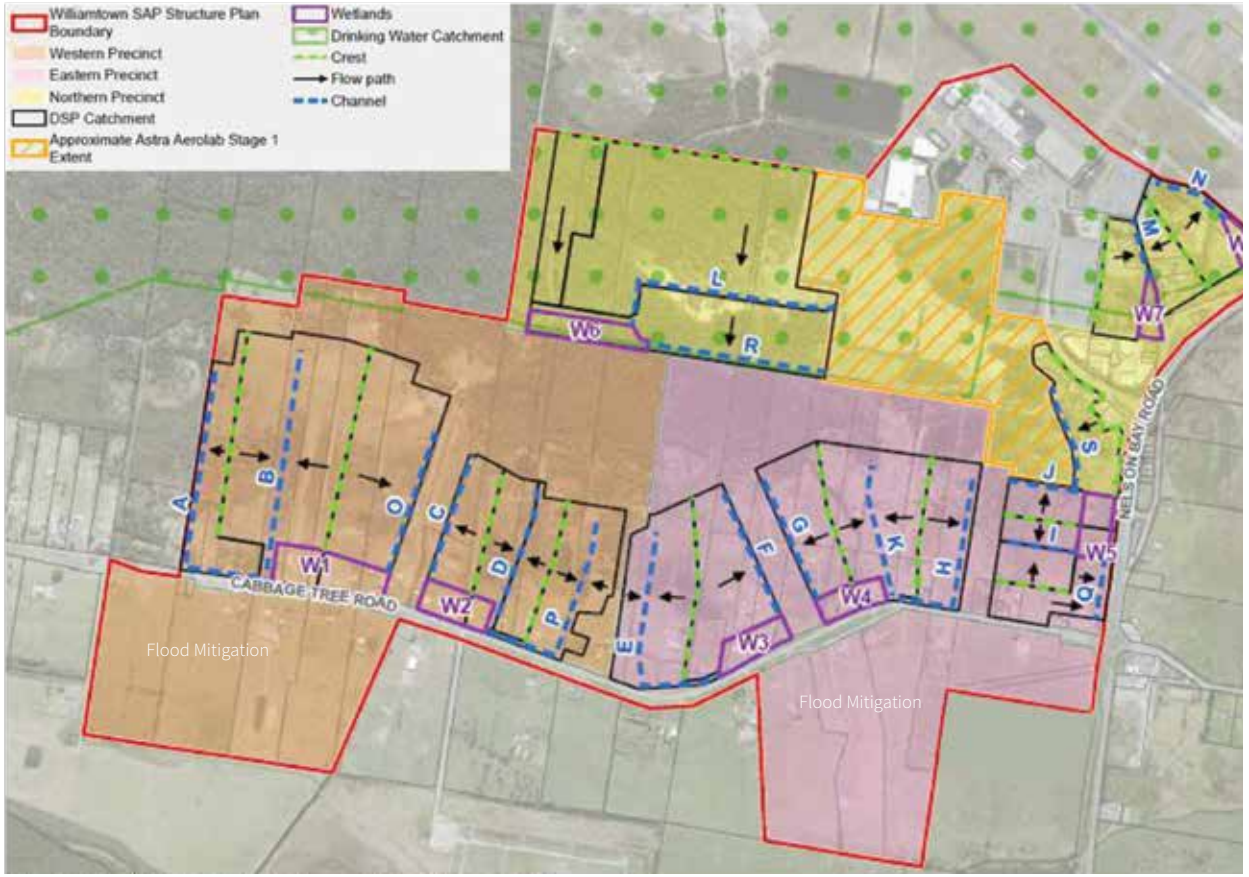



Figure 042. Proposed Wetlands and Drainage Channel Arrangement

## Matters for Consideration

- The SAP is located within a flood storage area therefore displaces floodwater to adjacent areas. This requires flood mitigation to offset this impact that reduces developable land.
- Due to existing flat grades in the area, extensive bulk filling is required to facilitate stormwater drainage and flood protection.
- A catchment based approach is the only feasible way the SAP can be developed.
- Whilst the location of the northern sub-precincts within the drinking water catchment is not ideal, the impact can be managed.
- The effectiveness of the flood management measures may change subject to design development and incorporation of more detail into the analysis.
- Limited demand for stormwater reuse within precinct means runoff volumes increase to Fullerton Cove which may prove sensitive to changes in freshwater inflows.
- Sea level rise may prevent the water quality treatment facilities from operating as intended in the future.

## Structure Plan Response

- The configuration of the precinct is able to accommodate the predominant overland flow directions.
- The Structure Plan has identified dedicated areas for flood impact offsets South of Cabbage Tree Road.
- The southern sub-precincts are located south of the drinking water catchment and although the majority of the northern sub-precincts are located within the drinking water catchment, their southern boundaries are outside it which provides a point of discharge for treated stormwater.
- Reduce the bulk fill requirement by adopting a lower flood protection level for the development in general, or sections of. Individual lots may still be required to achieve the full flood protection to the 1% AEP plus year 2100 climate change, which would be the developer's responsibility.
- Reduce the level of resilience to climate change with respect to tailwater levels for water quality. Currently the water quality strategy is to discharge above the estimated sea level rise prediction. This is based on the year 2100 predictions which is informing the development levels and bulk fill volumes.
- Limit the need for full flood detention (ie. smaller basins) to manage development flows and allow flood impacts within the flood impact offset areas. This would however require more land acquisition across the floodplain (south of Cabbage Tree Road).
- Centralised roofwater harvesting system could supply water to Grahams Town Dam, nearby market or as dual reticulation for each precinct. This would reduce freshwater runoff volumes to enhance protection of Fullerton Cove.
- Opportunity to reduce the footprint of the sub-catchment water sensitive urban design (WSUD) infrastructure by considering underground detention and treatment.

## Recommendations for Master Plan & Delivery

The development facing Cabbage Tree Road acts as a blockage to local flood flow from the north. This results in increased flood levels across the bio-conservation area, which acts as a flood detention basin and location of the displaced water resulting from the development bulk filling. The road crossings connecting the sub-precincts either side of Dawsons drain and Learys drain are designed to restrict flow discharging south of Cabbage Tree Road. This helps to limit flood impacts to within acceptable levels downstream. Where this is not able to achieve a 'no flood impact' result, it is proposed to acquire land south of Cabbage Tree Road to reclaim some of the lost flood storage from the development and assist with managing adverse impacts in more frequent flood events.

# HYDROGEOLOGY

*The assessment has found that the Williamtown SAP Structure Plan poses an overall 'medium-low' risk to groundwater and hydrogeology.*

### 'MEDIUM-LOW' RISK

In summary, the development incorporates the following risks:

- 'Low' risk for groundwater supply groundwater levels, and groundwater flooding.
- 'Medium' risk for groundwater recharge, groundwater quality and pollution, and GDEs.

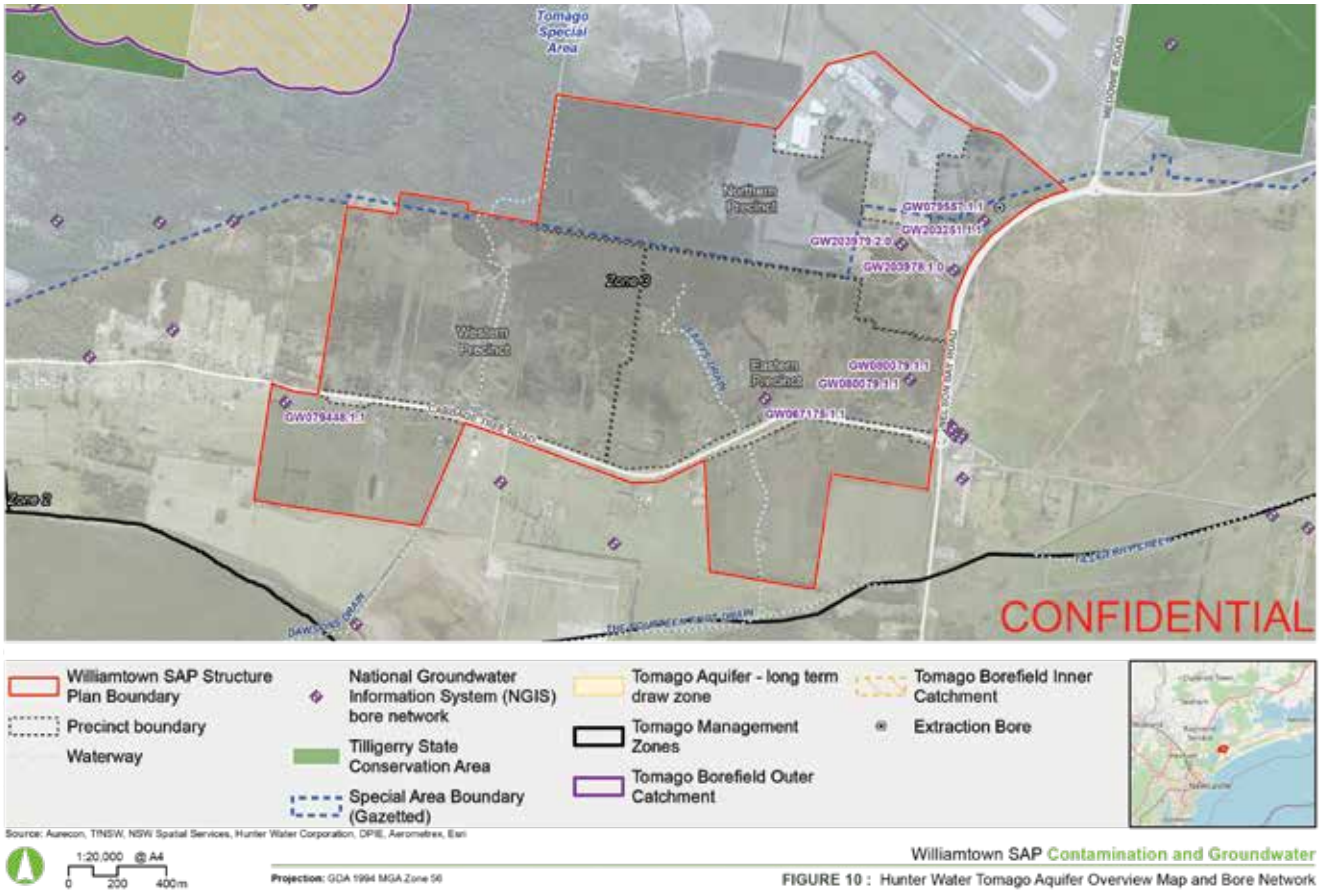



Figure 043. Hunter Water Tomago Aquifer Overview Map and Bore Network

## Matters for Consideration

- Due to the presence of PFAS contamination in groundwater, groundwater abstraction licences within the SAP development area should be restricted to avoid potential impacts to human health and the environment.
- Development will result in disturbance / destruction of habitat classed as high potential Groundwater Dependent Ecosystems (GDEs). This may contravene provisions under the Groundwater Quality Protection Policy and Groundwater Dependent Ecosystem Policy on protection of vulnerable and valuable ecosystems.
- Any dewatering activities required for SAP development will require special measures to ensure that dewatering does not result in significant drawdown impacts within the Tomago aquifer.
- Any dewatering activities required for SAP development will require special measures to ensure that dewatering activities do not result in migration of PFAS / non-PFAS contamination into unaffected portions of the Tomago aquifer or receiving waterways.
- Any dewatering activities required for SAP development will require special measures to ensure that dewatering does not result in compaction and land subsidence.

## Structure Plan Response

- There are no high priority GDEs within the area of disturbance for the Structure Plan development area.
- The Structure Plan protects large areas of land classified as high potential groundwater dependent ecosystems.
- No development in high ecological value (HEV) areas.
- Development is unlikely to result in significant reductions in groundwater levels with the potential to affect high priority GDEs as a result of reduced recharge.
- Annual potable water demand (1,361 ML / year) does not increase average demand (69,400 ML/a) above available supply (75,000 ML/a) for Hunter Water's available water supply resources.
- SAP sub-precincts do not impact on Hunter Water reference bores for Water Sharing Plan.
- SAP sub-precincts do not impact on Hunter Water monitoring or water supply bores.
- No disturbance of National Parks.
- With appropriate management SAP development is unlikely to affect the beneficial use category of groundwater within the immediate area of the SAP when accounting for existing impacts from PFAS and non-PFAS contamination.
- SAP development is unlikely to significantly impact groundwater levels at existing water supply works.
- Natural patterns of groundwater recharge and flow are unlikely to be significantly affected by SAP development.
- Structure Plan likely to result in Level 1 impact outcome under the Aquifer Interference Policy.
- Structure Plan reduces potential for waterlogging within SAP through emplacement of bulk fill materials.

## Recommendations for Master Plan & Delivery

It is recommended that further investigations are carried out to assess and identify appropriate management measures and resolve the potential weaknesses and threats that have been identified through the groundwater SWOT analysis, including:

- Further assessment of potential impacts from development on groundwater levels resulting from reduced recharge by increase in impermeable surfaces, relative to provisions under the Aquifer Interference Policy. This would include development of a groundwater model to simulate potential impacts of development on groundwater levels and flow paths.
- Design of appropriate drainage systems within and around the SAP as part of water cycle management and flooding control to control groundwater levels. These also consider risks from sea-level rise, particularly in establishing Eastern and Western development areas within the low-lying regions
- Further assessment of habitats classed as high potential GDEs to establish impacts from disturbance / destruction of ecosystems by SAP development relevant to provisions under the NSW Groundwater Quality Protection Policy and NSW Groundwater Dependent Ecosystem Policy.

These additional investigations may be conducted during the Concept Design stage, which should include the development of a groundwater model to simulate potential impacts of development on groundwater levels and flow paths.

# GEOTECHNICAL

*The various geological soil and rock formations associated with the SAP present numerous challenges for development.*

## OVERVIEW

The geological profile and soil landscape of the SAP are likely to present a moderate to high risk to development (see Constraints Map opposite). Acid Sulfate soils will likely present a high risk for development in the south-eastern portion of the Precinct, while the areas in the north present a lower risk.

It will be important to balance geological constraints with related environmental challenges – proposed filling approach, PFAS management, flood impacts, high groundwater levels, foundational depths, utility construction, pavements and roads and acid sulfate soils.

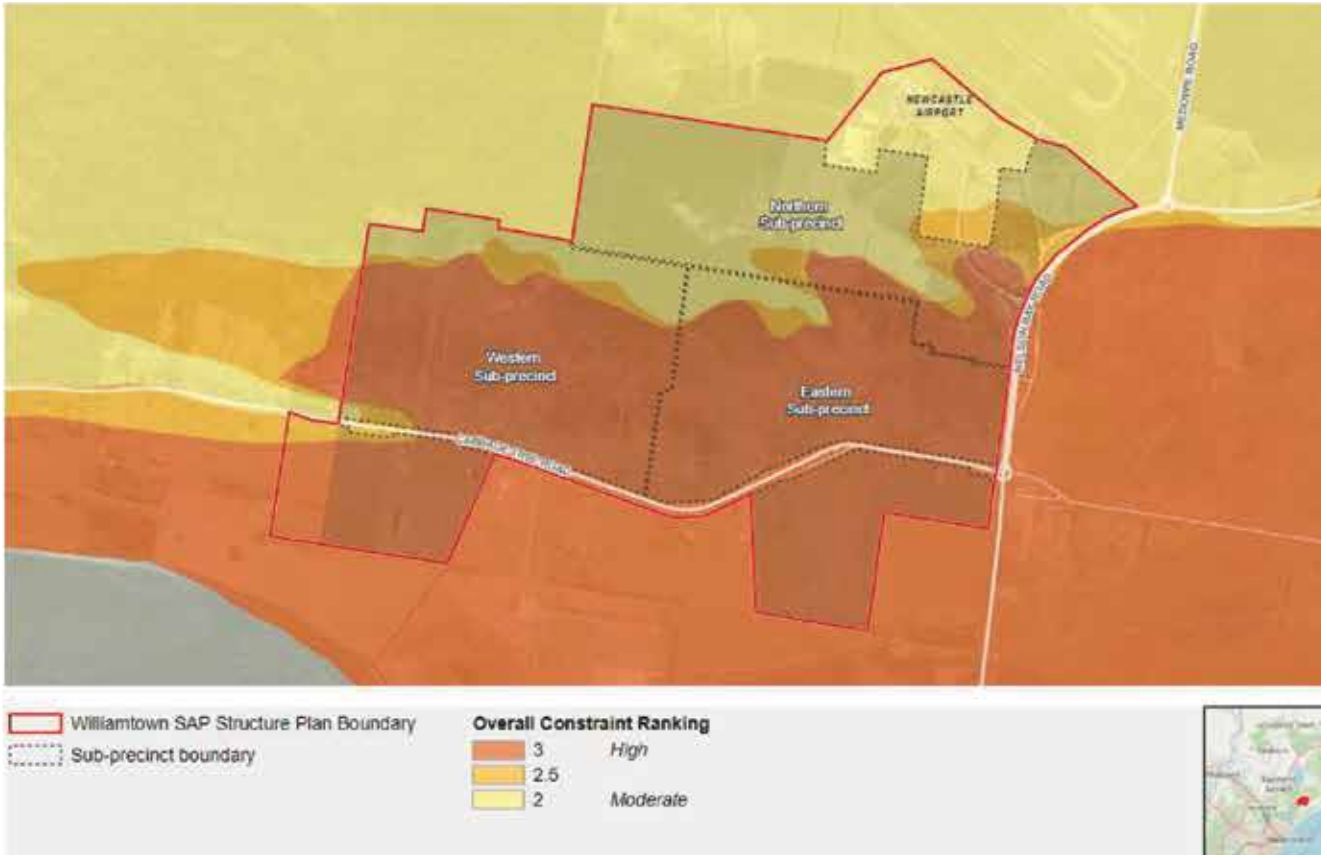



Figure 044. Overall Constraints Map for the Structure Plan

## Matters for Consideration

**PFAS CONTAMINATION**

- PFAS is non-volatile however it is known to migrate with groundwater fluctuations. Fill placement is therefore subject to protection from PFAS migration.
- A key consideration to note is that any PFAS or other contaminant mitigation measure may limit the potential development options for a given development area or lot.

**FLOODING**

- Filling to mitigate flooding may cause excessive total or differential settlements in the underlying soft clay soils.
- The risks associated with this are ongoing settlement, shallow foundations and program delays due to the preloading of the soft clay soils.

**SHALLOW FOUNDATIONS**

- Shallow foundations associated with the Northern Catchment may have to consider the following:
  - Given the shallow groundwater across the SAP, it is recommended that designs incorporate shallow foundations as far as possible.
  - Risk of differential and total settlements under new structures needs to be addressed during the design stage.
  - The surcharge time required to achieve adequate conditions to comply with standard serviceability requirements depends on the thickness of the soft/ compressible clay deposits and the amount of preloading.

**DEEP FOUNDATIONS**

- It is recommended that designs of heavy buildings that require deep foundations such as basement car parks use driven piles and Continuous Flight Auger (CFA) solutions as these methods minimise the amount of excavated soil and groundwater material treatment required compared to bored piles.

**UTILITIES**

- Underground utilities must be designed to respond to groundwater, PFAS and acid sulfate soils.

**PAVEMENTS AND ROADS**

- The majority of the road network in the SAP will be raised above the surrounding land to mitigate against impacts from flooding events.

**ACID SULPHATE SOILS**

- The higher risk of Acid Sulphate soils for the Western and Eastern Catchments will require ASS testing and management.

## Structure Plan Response

- Based on the findings from the scenario testing phase, the majority of the development is proposed north of Cabbage Tree Road to reduce the extent of the area that will lie on the soft soils of the Estuarine swamp soil type.

## Recommendations for Master Plan & Delivery

Geotechnical investigations may be required to or during concept design to confirm the extent and location of the soils present within the SAP.

The following measures to facilitate development are recommended:

- Early investment in fill placement and preloading to reduce construction stage settlement management. If fill material becomes available from local highway improvement projects in the Hunter region, then this fill may be acquired for more cost-effective rates and could be used in early pre-release flood management land improvement work.
- Monitoring of settlements associated with preloading by using remote sensing and interferometry, installation of survey targets on the fill surface for better accuracy. This could reduce the need for extensometers and other installations through PFAS barriers.
- Levee design – lining channels with suitable impermeable and non-dispersive fill over locally sourced fill may reduce the volumes required for import.
- Investment in collation and organisation of the various sources of geotechnical data currently held by third parties. If a central Williamtown SAP geotechnical database was developed then all subsequent stages of design and planning and any individual developments could benefit from this record of previous work and site geological conditions.

# AIR QUALITY

*The RAAF Base and Newcastle Airport are the main existing emission sources that will impact the SAP. There are also possible air emission sources located in the Western Catchment of the Williamtown SAP.*


Figure 045. Maximum 1-hour NO2 Concentrations for a 20m High Flow Rate Stack

## Matters for Consideration

### RAAF BASE & NEWCASTLE AIRPORT

The existing RAAF base/Newcastle Airport is considered within the SAP boundary and is the main existing emission source. This assessment takes into consideration the proposed expansion of the airport and related additional aircraft movements and larger aircraft for the year 2036.

### POTENTIAL LIGHT INDUSTRIAL USES

There are potential air emission sources in the western catchment of the Williamtown SAP. The potential land uses in this area may include: brewery/distillery, ceramics and glass industries, chemical industries and works, petroleum works, and contaminated soil treatment works. This assessment has considered a proposed stack source located in the western catchment. This stack source has been tested for different flow rates, temperatures, stack diameters and height.

## Structure Plan Response

### MODELLING RESULTS

Modelling results indicate that even with conservative assumptions regarding emissions there are unlikely to be air quality impacts within the Williamtown SAP area. Furthermore, it is considered that a single point source (stack) could be located within the western precinct based on the height, flow rate and other stack parameters modelled (see figure on opposite page).

### MANAGING STACK EMISSIONS

Nevertheless, it is necessary that best practice mitigation and management measures will be considered for any new industrial activity including such things as:

- Treatment of emissions prior to release into the atmosphere.
- Improving plume dispersion (subject to aviation safety constraints).
- Regular equipment maintenance to ensure proper and efficient operation.

## Recommendations for Master Plan & Delivery

- Given the proximity to the RAAF base, any proposed developments should be assessed to compliance with the relevant planning controls for the management of airspace in and surrounding the base;
- For possible odour/air emissions sources from a proposed brewery or contaminated soil treatment works, it is considered that these industries could be located within the Williamtown SAP with the appropriate controls considered at the design stage so that there is no offensive odour beyond the boundary of the facility;
- The industries proposed are considered suitable for the Williamtown SAP and it is recommended that these are located in the western catchment;
- A single point source (stack) for the industries assessed could be located within the western catchment based on the height, flow rate and other stack parameters modelled; and
- Further air quality modelling and plume rise modelling should be conducted when the exact size and nature of the proposed industry is confirmed. Further modelling is recommended if more than one stack sources is considered within the western catchment.
- The airport has been considered holistically as part of the Williamtown SAP but an upgrade to the airport is subject to a separate assessment and approval process to the Williamtown SAP.

# NOISE

*One of the major noise sources which will impact the land use compatibility is aircraft noise from the Royal Australian Air Force (RAAF) Base Williamtown and Newcastle Airport.*

## MAIN NOISE SOURCES

The Structure Plan, being directly west of the existing RAAF Base Williamtown and Newcastle Airport, will be impacted by existing and future aircraft noise.

Furthermore, land uses within the SAP may impact upon existing surrounding sensitive uses, typically residential premises.

Potential future sensitive receivers within the SAP include, education and training facilities, eco-tourism activities, restaurants and cafes, offices and accommodation facilities.

Potential medium to high noise generating sources may include freight and logistics uses, advanced manufacturing and entertainment activities.

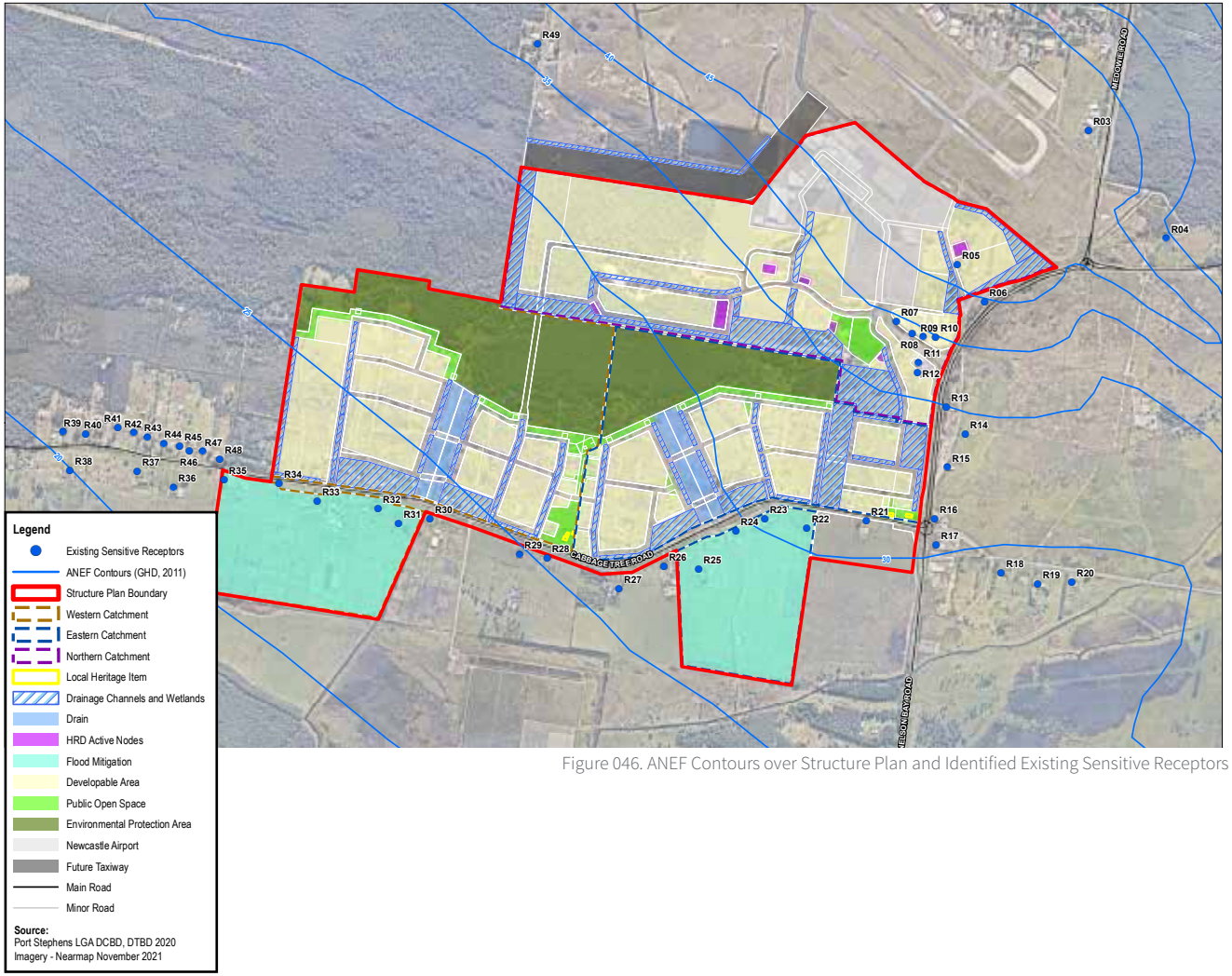



Figure 046. ANEF Contours over Structure Plan and Identified Existing Sensitive Receptors

## Matters for Consideration

### CURRENT AIRCRAFT NOISE

Aircraft noise impact was noted as being a limiting factor to determine compatibility of certain proposed industries, typically to land close to Newcastle Airport and the RAAF base.

### FUTURE AIRCRAFT NOISE

Land compatibility due to aircraft noise impact may slightly change beyond Year 2025. However, the Aircraft Noise Reduction (ANR) for building envelopes are not expected to change, as it is calculated based on the maximum aircraft noise. This will typically result in no additional upgrades to building envelopes to maintain an appropriate level of indoor acoustic amenity. The ANR is a design parameter used to determine appropriate building components. In general, specialist acoustic advice is recommended to be sought to ensure that the sound transmission loss of all individual building components is appropriate to achieve the required ANR values. This is the most cost effective method to ensure aircraft noise is adequately mitigated.

### NOISE CATCHMENT AREAS

Noise Catchment Areas (NCAs) comprising mainly of residential dwellings which may also be impacted by future development, were identified.

## Structure Plan Response

### POTENTIAL NOISE MITIGATION STRATEGIES

Potential noise mitigation strategies to achieve a favourable acoustic outcome for the Williamtown SAP are discussed below.

### BUFFER DISTANCES

The primary form of noise mitigation is to provide a noise buffer between noise generating activities and sensitive uses. Appropriate space planning analysis should ensure that high noise emitting sources are located as far as possible from sensitive uses or located in a shielded area by surrounding structures. When this isn't possible a noise model is recommended to be established to understand potential impact and to develop appropriate mitigation measures to ensure the acoustic amenity of sensitive receivers are preserved.

### VIBRATION IMPACT ASSESSMENT

A vibration impact assessment may also be considered in areas where impact is expected. Typically this ensures sensitive equipment within medical facilities or laboratories, for example, can operate in a safe environment shielded from external vibration sources.

### NOISE MANAGEMENT PRECINCT

A Noise Management Precinct (NMP) is a form of economic instrument which should be considered when managing noise amenity in each future sub-precinct. The NMP approach allows noise from multiple sites to be managed as a single site by giving the operator of an activity or proposed activity the flexibility to take action to reduce noise in another nearby location, or work with others to take action to reduce noise on their behalf.

## Recommendations for Master Plan & Delivery

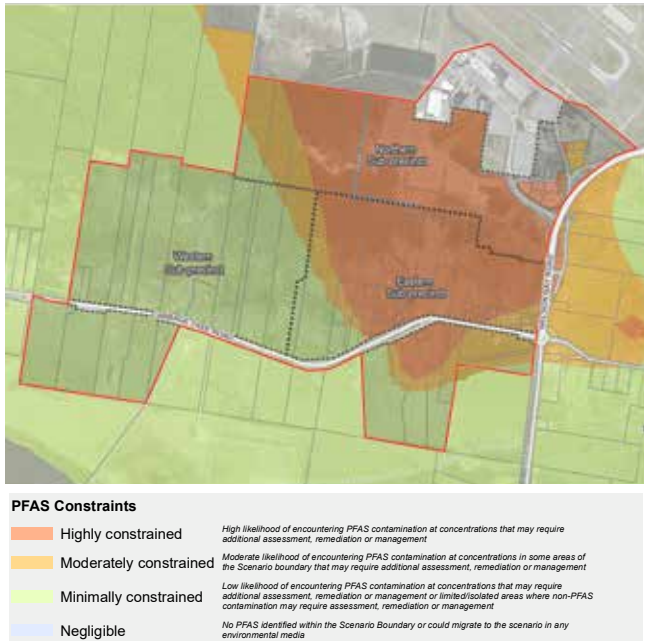
### DETAILED NOISE ASSESSMENTS

Following confirmation of some particular industries or activities with each sub catchment, a detailed noise assessment will allow for a more concrete investigation to ensure the acoustic amenity of the local community and individual sensitive land uses is not adversely impacted. This process will also allow for a more cost effective way of noise mitigation/management.

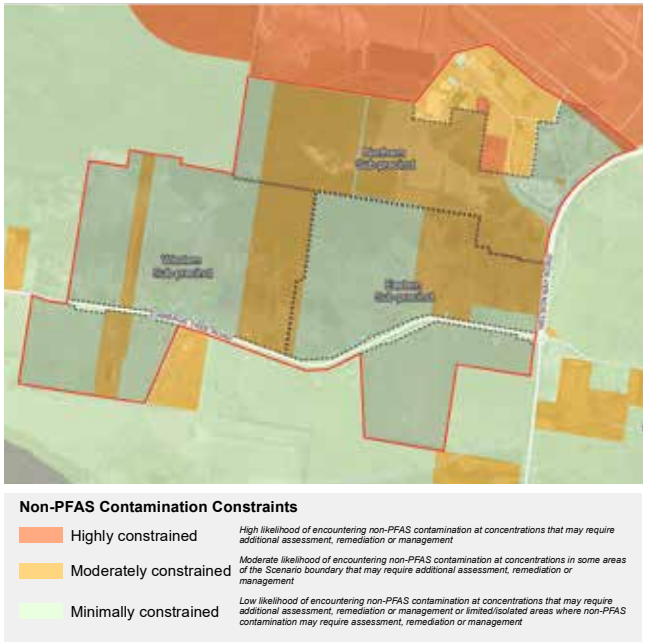
# PFAS & NON-PFAS CONTAMINATION

*The SAP includes areas impacted by per- and poly-fluoroalkyl substances (PFAS) and Non-PFAS contamination. During future construction, the potential risks from the contaminated environmental media will need to be managed.*

**PFAS** Figure 047. PFAS Groundwater Constraints Map




**NON-PFAS** Figure 048. Non-PFAS Contamination Constraints Map




## PFAS OVERVIEW

Review of the available background information indicates that extensive PFAS assessment has been conducted at the RAAF Base Williamtown and the surrounding areas. The EPA has delineated three Management Areas, Primary, Secondary and Broader Management Zones, each with corresponding tailored advice to minimise PFAS exposure within the SAP.

The areas of PFAS impacted environmental media are well defined relative to the proposed catchments within the Structure Plan.

Aurecon reviewed environmental media collected from 2016 to 2019 by AECOM on Base and in the Structure Plan area. The previously collected data indicates that soil, sediments, surface water and groundwater within the Structure Plan boundary are impacted with PFAS. The Structure Plan boundary is situated directly down gradient of Lake Cochran and other secondary sources on Base. The approximate eastern half of the Structure Plan is situated over the groundwater plume that is showing the highest PFAS concentrations.

## NON-PFAS OVERVIEW

Numerous Areas of Potential Environmental Concern (APECs) throughout the SAP area have been identified where non-PFAS Contaminants of Potential Concern (COPCs) may be present at concentrations above the applicable Tier I screening values. There are several within the Structure Plan boundary.

## Matters for Consideration

### FLOODING AND WATER MANAGEMENT

Flooding is a major constraint to the developable area within the SAP. To facilitate development within the floodplain, bulk filling to above the regional 1% Annual Exceedance Probability plus year 2100 climate change flood level (approximately 2-4m thickness) will be required. The filling must strike a balance with not creating flood impacts and not mobilising PFAS. This will require design of floodplain management measures to mitigate and offset flood impacts. Bulk filling is also required to facilitate drainage of development lots and roads within the precinct. WSUD measures such as wetlands will also be incorporated to treat stormwater and operate as detention basins during major events.

### OTHER MEASURES TO MITIGATE THE POTENTIAL MOBILISATION OF PFAS

- Groundwater could be pumped, treated and reinjected into the aquifer to maintain current recharge levels during the construction phase.
- Installation of a geosynthetic clay liner (GCL) in areas of bulk filling to separate clean material from potentially PFAS impacted groundwater and soil.
- Stabilisation of any PFAS impacted soil /sediment with powdered activated carbon (PAC) and off-site disposal.
- The new drainage pit and pipe network could be sealed to prevent groundwater intrusion.
- There is a low likelihood of encountering elevated concentrations of PFAS in soil or groundwater in the area where the water quality wetlands are to be constructed.
- Passive treatment systems constructed of PAC should be installed at the stormwater collection outlets to treat any minor amounts of PFAS that has entered the drainage system prior to release to local waterways.

## Structure Plan Response

### PROPOSED COMBINATION OF PFAS MITIGATION MEASURES

The Structure Plan is not a remediation response, however it has considered the existing constraints as part of any future development:

- The eastern portion of the Structure Plan is situated over the centre of the PFAS plume. In this area, a Geosynthetic Clay Liner (GCL) would be necessary. The addition of Powdered Activated Carbon (PAC) to the bottom 0.5-0.75 m of the clean fill material could also be considered as complimentary and conservative measure.
- The analytical data prepared by Aurecon indicates limited to no elevated PFAS concentrations in the western portion of the Structure Plan boundary. In this area, the need for a GCL should be critically evaluated. Addition of PAC into the bottom 0.5-0.75 m of fill material should be sufficient to mitigate risks of clean fill interacting with PFAS impacted environmental media or becoming a secondary source.
- A passive treatment system should be installed at the most downstream end of Dawsons Drain and Learys Drain. The majority of the water that would flow through these drains would be considered “clean” as it would only interact with the clean fill material and future buildings and ancillary facilities. However, there are likely PFAS impacted soils / sediments in the drains that could continue to leach to stormwater. These drains will continue to receive drainage from the RAAF Base as well which has to be assumed to be PFAS impacted. As a precautionary and conservative measure, the outlets to these drains should be equipped with a passive treatment system.

### SUMMARY OF NON-PFAS MITIGATION MEASURES

- Specific mitigation measures cannot be developed without additional information on the Areas of Potential Environmental Concern (APECs) and environmental media analytical data. See “Recommendations for Master Plan & Delivery” (opposite) for more detail.

## Recommendations for Master Plan & Delivery

### ADDITIONAL CONSIDERATIONS - PFAS

- Future monitoring of the water quality leaving the SAP’s constructed basins will be required during the operational phase of the SAP.
- Where WSUD measures in the street or on lot are proposed with unlined bases, the risk of PFAS intrusion into these measures should be assessed during concept or detailed design and the design adapted accordingly.
- Finally, an additional consideration for the SAP development will be the maintenance of the monitoring well network in the Williamtown SAP. These monitoring wells were installed by Defence and will need to be maintained for long term monitoring of the groundwater plume. Protection of these monitoring wells should be integrated into the bulk filling plan.

### ADDITIONAL CONSIDERATIONS - NON-PFAS

Investigation of soil and / or groundwater should be undertaken as part of, or prior to, concept design in order to confirm the extent and significance of non-PFAS contamination in the identified APECs. The data collected will inform likelihood of remediation required under the State Environmental Planning Policy (SEPP) 55 process, inform potential design constraints, risks to human and ecological receptors as well as establishing a preliminary waste classification of the excavated soils.

# LAND USE SAFETY

*A hazard and risk assessment has been completed based on the proposed SAP against a set of case studies, general industries and existing activities.*

## STUDY OVERVIEW

The study:

- Identifies potential land use safety conflicts using a set of case studies and risk criteria from Hazardous Industry Planning Advisory Paper (HIPAP) 10.
- Identifies preferred locations for potentially hazardous developments.
- Proposes buffer distances based on typical inventories and land use safety considerations along with proposed beneficial activities that may be appropriate in the buffers.
- Assesses types of development that may not be appropriate for the SAP.
- Identifies additional areas for consideration in the Master Plan.

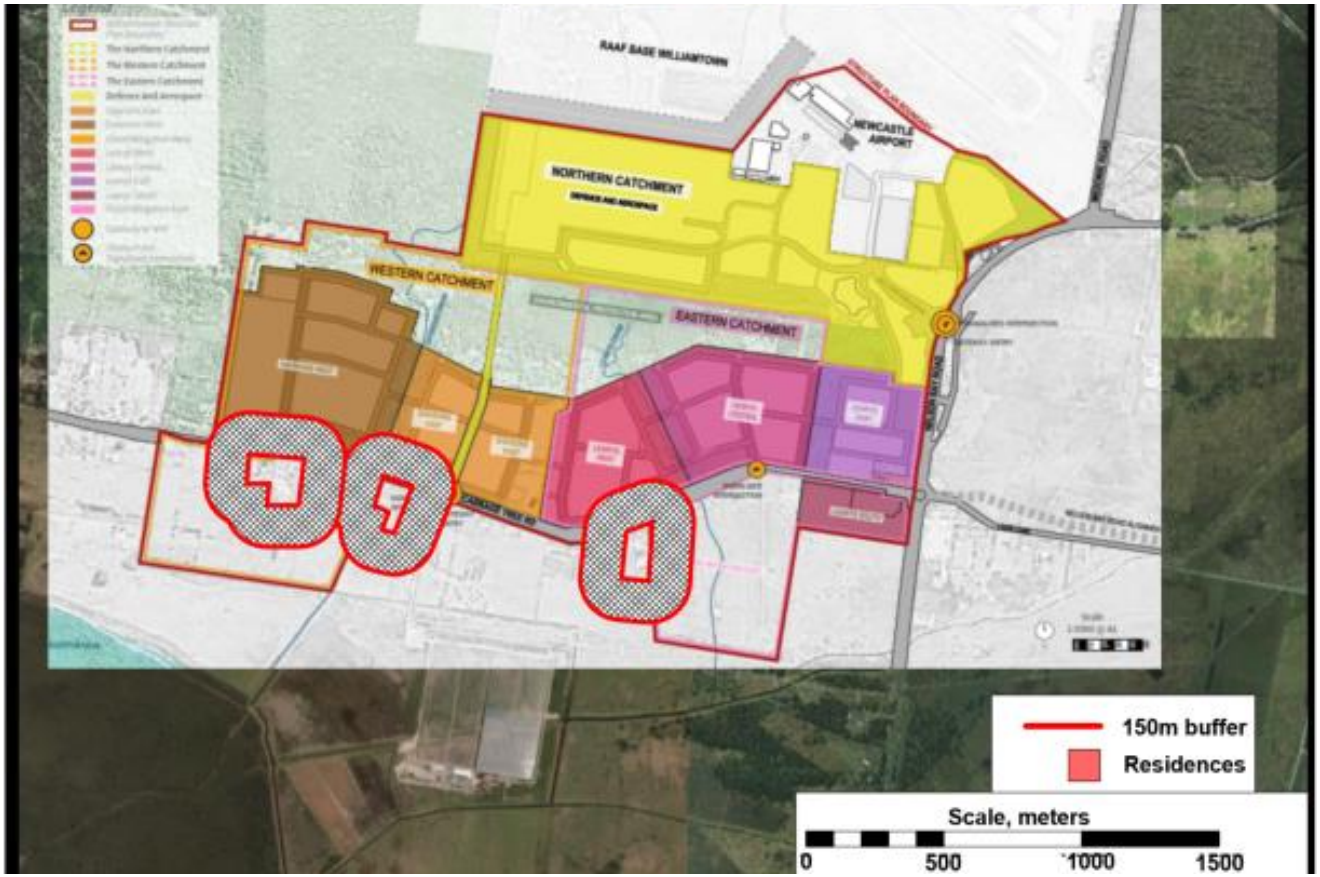



Figure 049. 150m buffer zone from Residences

## Matters for Consideration

### HAZARDOUS MATERIALS AND ACTIVITIES

Notwithstanding the potentially permissibility under State Environmental Planning Policy (SEPP) 33, based on the relatively small area available for development in the SAP and the proximity of existing and proposed populations, developments with the following hazardous materials and activities are not considered appropriate for the SAP as they may preclude development more aligned to the proposed character of the SAP:

- Any facility that exceeds the 10% of the Major Hazard Facility (MHF) threshold as detailed in Schedule 15 of the NSW WHS regulations.
- Handling or storage of Ammonium Nitrate (such as fertiliser manufacturer) in quantities that exceed the SEPP 33 screening threshold.
- Handling or storage of ammonia (such as fertiliser manufacturer or food/abattoir with ammonia refrigeration circuit) in quantities that exceed SEPP 33 screening thresholds.
- LPG storage in above ground tanks that exceed the SEPP 33 screening threshold. Storage in mounded or buried tanks will minimise the consequences of the largest events and should be assessed in a PHA.
- Facilities that handle and/or store toxic substances (Class 6) that exceed the SEPP 33 screening threshold (such as freight facility with toxic substances).
- Facilities that import liquified petroleum product by pipeline and store in above ground atmospheric tanks are not appropriate due to the potential for overfill and subsequent large vapour cloud explosion.
- Storage of hydrogen in bulk is likely to result in land use safety conflict due to the relatively small scale of the SAP. Hydrogen generated for immediate consumption (e.g. vehicle refuelling) is unlikely to result in land use safety conflict.

## Structure Plan Response

### SEPP 33

- SEPP 33 and the requirement to complete a PHA for potentially hazardous industries is an appropriate framework for managing land use safety conflicts.

### PREFERRED LOCATION FOR HIGHER RISK USERS

- The preferred location for higher risk (potentially hazardous industries) users is the western precinct, with a transition to lower risk industries in the east and north of the SAP.

### RESIDENCES IN THE SAP

- Controls will be required in the Master Plan to manage the transition from residential to employment. The timing of any change will be dependent on the staging of the SAP development taking into account the need to manage risk levels at residences.
  - There are existing residences adjacent to the SAP boundary. To manage land use safety conflict with existing residences outside the SAP the following controls are proposed 150m buffer zone around existing residences would limit the potential for land use safety conflict with the potentially hazardous developments assessed in this study for all but the largest toxic releases (See image opposite).
  - Buffer zones to manage the consequences of toxic spills or toxic products of combustion could extend up to 900m resulting in unnecessary limitations on developments in the SAP. Given the small scale of the SAP and the exiting residential developments buffer zones are unlikely to be practicable. Such risks are best managed through the risk-based SEPP 33 process.

## Recommendations for Master Plan & Delivery

### HIGH PRESSURE GAS PIPELINE

- A high-pressure gas pipeline runs along the eastern boundary of the SAP. It is recommended that DPE consult with Jemena (the pipeline operator) to determine the requirements for buffer zones or any implications of rezoning or population intensification in the vicinity of the pipeline. The consent authority should notify the pipeline operator of any development applications in Learys East, Learys South and the eastern section of the northern precinct and ensure the safety risks from the pipeline or safety risks to the pipeline during construction and occupancy of the development are taken into consideration.

### DEVELOPMENT CONTROLS

- Development controls will be required to manage development in the environmental protection area to limit the potential for commercial activities that result in an increase in population in the area (e.g. café or sporting fields).
- Development controls will be required to manage risks that relate to research and development activities due to:
  - Risks and required controls not well understood and activities that may not fall under a standard approach.
  - Risks associated with scaling up facilities that may not be understood at the initial development application stage.
  - Activities that may be perceived to be temporary in nature and hence not require development approval.

# AERONAUTICAL LIMITATIONS & BIRD STRIKE

*The Structure Plan has been designed to provide ongoing safeguarding of the adjacent airport, defence and aeronautical activity.*

## Matters for Consideration

### MAIN CONSTRAINTS

The main constraints identified in the Structure Plan process that have been considered are:

- Birdstrike - The birdstrike planning overlay requires assessment and management of any development that may attract wildlife in the vicinity of the airport
- Extraneous lighting - land uses and developments intersecting with the extraneous SAP lighting overlay must be designed with consideration for the safety of aircraft, and not interfere with clear visuals of airport lights, signals, and outlines of air routes or airway facilities
- Prescribed airspace heights - SAP lands covered by the Height Trigger Map. The airspace heights do not preclude development however do not necessitate appropriate assessment and referral to the Department of Defence / Newcastle Airport and in some cases the Civil Aviation Safety Authority (CASA).
- Managing the risk of building generated windshear and turbulence at airports.

## Structure Plan Response

### OVERVIEW

The Structure Plan is consistent with the objectives of National Airports Safeguarding Framework (NASF) and key stakeholders including Department of Defence. All of the main aeronautical constraints still need to be appropriately managed and monitored to ensure bird strike potential (from both planting and waste) is limited, building heights are maintained under the controlled airspace, lighting to be under the horizontal plane, activities within the public safety zone are limited.

### Recommendations for Master Plan & Delivery

#### NATIONAL AIRPORTS SAFEGUARDING FRAMEWORK

Recommendations for 6 NASF policy areas are provided of relevant planning controls that ensure the implementation of each guideline across the SAP development area:

- Aircraft Noise
- Building Windshear and Turbulence at Airports
- Wildlife Strike in the Vicinity of Airports
- Distractive Lighting
- Intrusion into Protected Airspace
- Protecting Aviation Facilities - Communications, Navigation and Surveillance

All the future developments within Williamtown SAP will need to be supported with more detailed statutory controls based on further mapping studies and design refinement. In addition, appropriate mitigation and monitoring controls should be addressed within the Master Plan and or Delivery Plan in collaboration with the Department of Defence and Newcastle Airport.

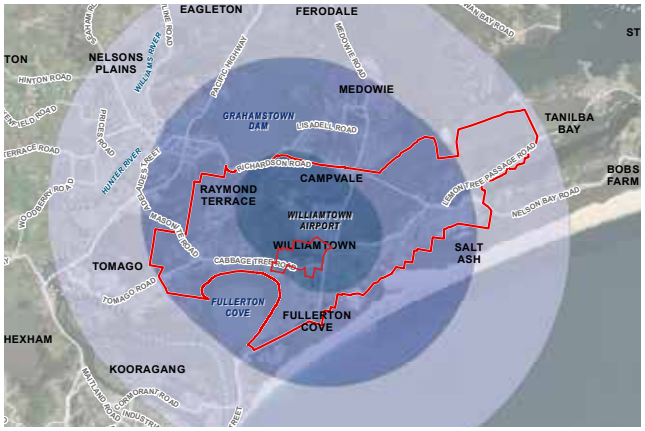



Figure 050. Bird Strike Radius Map

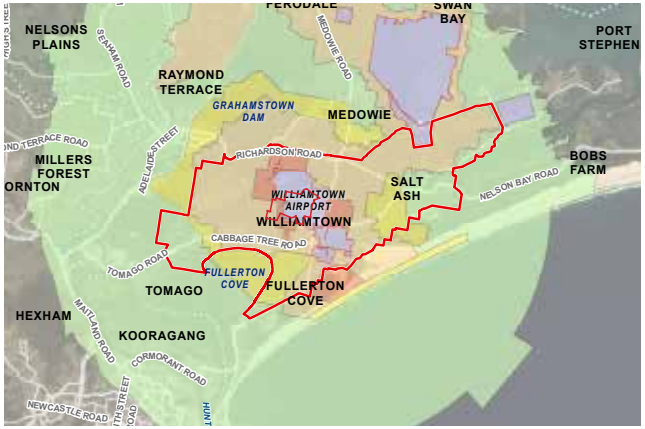



Figure 051. Height Trigger Map

# SUSTAINABILITY

*A key objective for the SAP planning process is that the design and operation of the site should showcase leading practice in the application of sustainability concepts.*

## PRELIMINARY RECOMMENDATIONS & INDICATORS

### SYSTEMS FOCUSED

- Integrate UN Sustainable Development Goals into decision making framework for the precinct
- Adopt ISO 14001 Environmental Management Systems (EMS) requirements across precinct and its operations
- Align precinct to United Nations Industrial Development Organisation (UNIDO) Eco-Industrial Park framework principles

### BUILT ASSETS

- Align with the Infrastructure Sustainability Council of Australia (ISCA) and Green Star rating schemes to ensure infrastructure and building embeds a range of sustainability and circular economy across the lifecycle of assets.
  - Best practice sustainability outcomes for the SAP would likely desire a 4-6 star rating or equivalent (aiming for as high as practicable) for commercial, institutional and government building developments pending land use constraints. Potential industrial sustainability rating applications should also be considered (once matured) across the Precinct.
- Procure products and services for circular outcomes across all lifecycle stages and scales of the SAP, leveraging ISO 20400 for best practice.

### CARBON

- Precinct achieves net zero carbon certification. At a minimum this would be achieved by 2050 however ongoing revision of these goals should be undertaken regularly e.g. every 5 years to strengthen short term goals.

### CIRCULAR ECONOMY AND RESOURCE OPTIMISATION

- Provide a Circular Economy Concierge as part of park management responsibilities
- Stakeholders should be aware working within or adjacent defence based industries should have consideration of the ADF's 'Whole of Life' approach which optimises sustainability outcomes across it's estate.
- As the SAP contains some pre-existing development, it should leverage the built assets that are already on site as much as possible, and work with existing tenants to embed circular economy and lifecycle thinking into their product and service design and operations.
- Incorporate circular design strategies across all lifecycle stages (planning, design, development, operations, and decommissioning) and scales (meso, micro, and nano) of the SAP to achieve world-leadership in circular precincts.
- Conduct Life Cycle Assessments (LCAs) on critical processes and products to enable evidence-based decision making at relevant scales and stages of the SAP lifecycle.

### CLIMATE CHANGE AND ADAPTATION

- A precinct specific Climate Change Risk Assessment should be undertaken to consider specific climate change and adaption risks at a precinct level, action respective treatment plans and review regularly.
- Dedicated easements for future technology advancements (e.g. hydrogen pipeline) are considered and planned for during the early stages of the Precinct planning.

### ENERGY

- Industry is powered from 100% of renewable sources
- Microgrids and Virtual Power Plant (VPP) concepts are utilised to reduce dependency on regional grid
- SMART Technology systems installed across all sub-catchments to track and monitor energy requirements

### MOBILITY

- Maximise active transport participation across the SAP through landscape and asset design (e.g. active transport corridors) and cycle sharing schemes.
- Consider implementation of electrified (or other renewable energy source) autonomous shuttle service across the Precinct.
- Consider minimum electric or hybrid fleet procurement standards for organisations within the Precinct. At a minimum, this could reflect existing NSW Government procurement commitments.

### WATER

- Implement planning controls to minimise impervious development areas
- Where impervious areas are unavoidable, such as car parks, consider installation of roofing structures to act as rainwater capture devices. Installation of roofing across these areas may also provide additional supply of solar generated electricity for the precinct.

# CLIMATE CHANGE ADAPTATION

### OVERVIEW

There are a number of identified local climate change triggers for the development of the SAP:

- The significant capital investment required to construct new buildings and infrastructure and the need to ensure that they remain in safe efficient operation throughout their operating life, and for the SAP master plan development timeline which extends to 2061.
- The significant business and societal risk impacts as a result of climate change and the flow on impact on the health and productivity of business and the broader community.
- The need to ensure that future impacts on the environment are mitigated, and that the expected economic performance of the Structure Plan developments is not overly compromised by climate change impacts.

Throughout the development of the Structure Plan and Master Plan, and during the stakeholder engagement undertaken to develop this Climate Change Adaptation Plan, it is clear that the climate change mitigation measures will only be followed through into action if there is a clear, strong, and fully funded governance structure in place. The over-arching recommendation is that a formalised governance structure is in place, with supporting policy, planning and operational legislative requirements, monitoring and reporting mechanisms facilitating the implementation of the Climate Change Adaptation Plan. The governance structure will require membership and investment from multiple agencies and businesses to be successful.

## *Matters for Consideration*

### TEMPERATURE INCREASE AND INCREASED HOT DAYS

- Increased building energy use for cooling.
- Increased heat island in public spaces and around developed/ industrial areas.
- Rising utility infrastructure demand (electricity and water).
- Heat stress for the community population, including workforce, residents and visitors (relative heat wave impacts).
- Reduced reliability and functionality of infrastructure services including roads/rails, public buildings, and electricity supply.

### INCREASED BUSHFIRE RISK/INTENSITY

- Bushfire season expected to start earlier and extend into prescribed burning season (spring).
- Increased risk ratings and fire life safety standards for new and replaced infrastructure.
- Damage/loss of utility infrastructure (electricity, water pumping stations, telecommunications).
- Disruption to transport and evacuation routes due to road closures.
- Impact on airport operations due to reduced visibility, ash, and direct flame impact on runway operations.
- Loss of biodiversity and threatened species (particularly in Environmental Protection Area).
- Bushfire smoke inundation due to increase in potential frequency/ intensity

## *Structure Plan Response*

### TEMPERATURE INCREASE AND INCREASED HOT DAYS

- The final Master Plan incorporates sea level rise projections in the planning of infrastructure, with critical and major infrastructure and emergency access roads located outside of or raised above tidal inundation levels. Due to coastal adaptation and existing levees falling outside of the SAP boundary and responsibility, this should be developed cognisant of any improvements that may be implemented outside of the SAP to reduce this risk.

### INCREASED BUSHFIRE RISK/INTENSITY

- The Master Plan incorporates adequate bushfire buffer zones and emergency access and evacuation routes, and ensures critical infrastructure (e.g. utility infrastructure) is located in lower bushfire risk areas.

## Matters for Consideration

### LOSS OF BIODIVERSITY

- Migration or loss of species that are unable to cope with increasing temperature.
- Increased invasive weed and pest animals competing with native flora and fauna.
- Increased risk of severe bushfire events.

### INCREASED RAINFALL INTENSITY

- Increased frequency and intensity of extreme rainfall events impact on flood levels causing damage to buildings and road infrastructure.
- Increased waterway and catchment area flooding impacting stormwater management systems by decreasing their drainage capacity and effectiveness.
- Increased risk of PFAS mobilisation including infiltration of ground water.

### SEA LEVEL RISE (SLR)

- Higher inundation risk of built infrastructure including roads, buildings, utility infrastructure and community services.
- Increased risk for coastal erosion due to higher sea level and expected increase in frequency and intensity of storm surges.
- Increased risk of PFAS mobilisation and widespread contamination.

## Structure Plan Response

### LOSS OF BIODIVERSITY

- The Master Plan maintains and supports existing biodiversity in the Environmental Protection Area and wildlife corridors, and incorporates quality landscaped outdoor areas that support increased vegetation and biodiversity, cognisant of bushfire risk.

### INCREASED RAINFALL INTENSITY

- The final Master Plan incorporates increased rainfall intensity and flood levels as part of major infrastructure designs and development areas, with stormwater management systems and drainage designed to mitigate flooding, and reduce erosion and stormwater pollution, both within the Williamtown SAP and to surrounding properties. Based on the Final Structure Plan which incorporates local and regional flood paths, drainage pathways and flood mitigation areas it is expected that this risk will be mitigated, however it is essential that this is carried forward into the Master Plan, Delivery Plan and associated enabling infrastructure works.

### SEA LEVEL RISE (SLR)

- The final Master Plan incorporates sea level rise projections in the planning of infrastructure, with critical and major infrastructure and emergency access roads located outside of or raised above tidal inundation levels. Due to coastal adaptation and existing levees falling outside of the SAP boundary and responsibility, this should be developed cognisant of any improvements that may be implemented outside of the SAP to reduce this risk.

## Recommendations for Master Plan & Delivery

The ongoing development of the SAP and the initiation of all new supporting infrastructure projects and investor led projects, will be driven by the SAP Delivery Plan. The Delivery Plan will reference a series of supporting documents which may include but may not necessarily be limited to:

- Design and Development standards and guidelines;
- Performance targets to be achieved including energy, water, waste, and environmental protection;
- Planning Rules including a new Activation Precincts SEPP, Port Stephens Council LEPs; and
- A SAP Environmental Management System (EMS) framework.

The Delivery Plan is due to be prepared during 2022 and we reinforce the importance of ensuring that climate change risks and mitigation measures are fully recognised within it.

# TRAFFIC & TRANSPORT

## TRAFFIC

The Structure Plan benefits from a compact layout, which results in easier and faster journeys and promotes active travel as a viable and attractive mode of transport.

## PUBLIC TRANSPORT

With increased density, enhanced public transport connections are also more feasible and justifiable. Bus patronage data indicate that there is available capacity to accommodate potential increase in bus usage.

## ACTIVE TRANSPORT

Walkability within the SAP will be integral to its success, with recommendations to consider providing an adequate active transport network including high amenity footpaths and connecting to existing cycleways.

## NELSON BAY ROAD ALIGNMENT

Transport for NSW has recently announced the preferred alignment for the Nelson Bay Road upgrade. It will be a fully off-line route extending from Bobs Farm to Cabbage Tree Road at Williamtown.

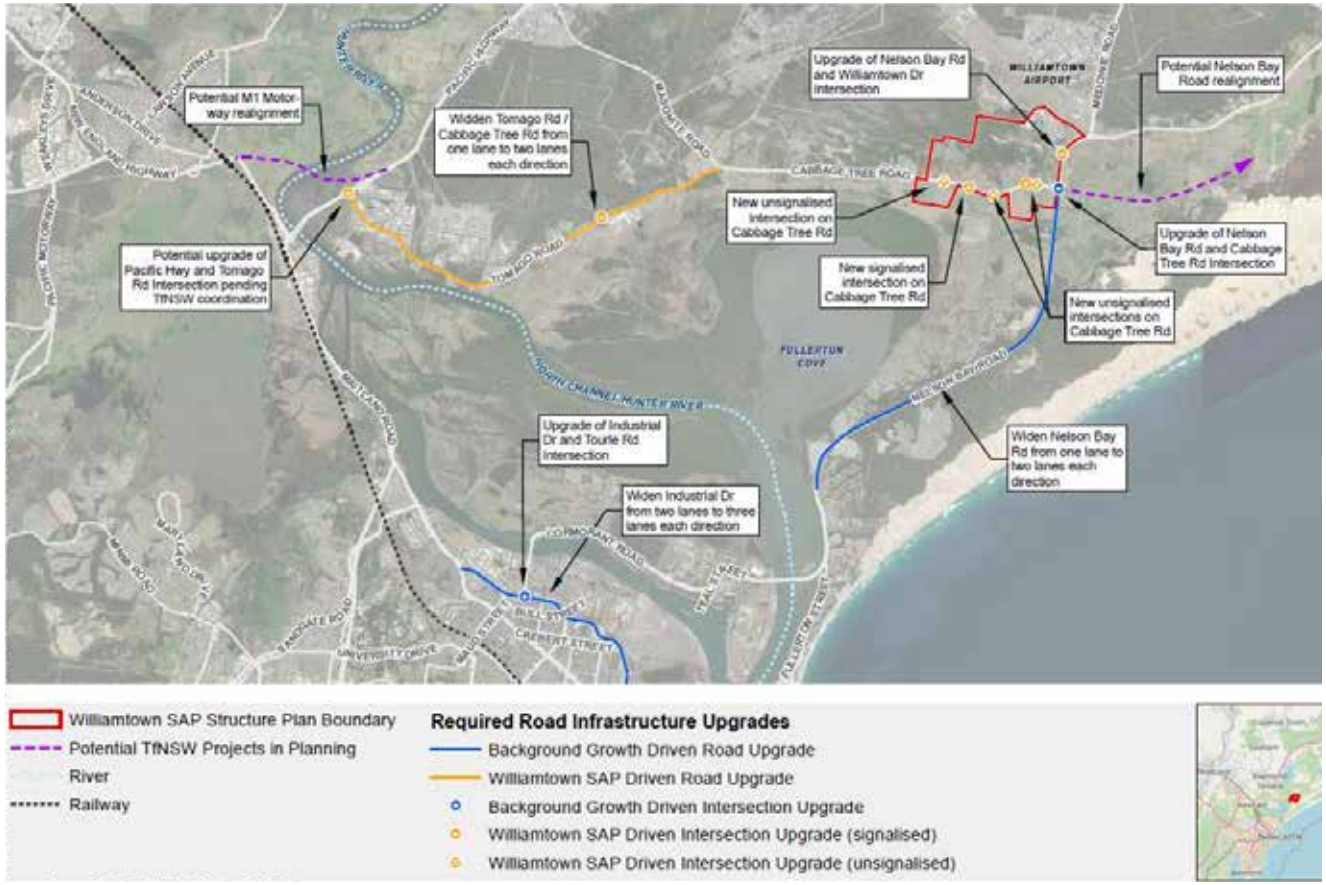



Figure 052. Required Road Network Upgrades

## Matters for Consideration

### ACCESS POINTS
- Consideration to methods for encouraging additional traffic to enter precinct from west along Cabbage Tree Road.

### ROAD UPGRADES
Road upgrades may be required as future demand is known for Nelson Bay Road (south of Cabbage Tree Road), Cabbage Tree / Tomago Road and Industrial Drive.

Signalised intersections that may require construction or upgrade:
- Nelson Bay Road – Williamtown Drive/ Cabbage Tree Road
- Cabbage Tree Road – SAP Access Road (proposed)
- Tomago Road – WesTrac Access Road
- Pacific Highway – Tomago Road
- Industrial Drive – Tourle Street

### ACTIVE TRANSPORT
- Provide a walkway along Cabbage Tree Road as well as along Nelson Bay Road in the vicinity of the Williamtown SAP and high amenity footpaths at least 2m wide, include lighting for after dark travel, incorporate seats to allow pedestrians to rest, bins and drinking fountains.

### BUS NETWORK
- With route 135 to/from Raymond Terrace not stopping at Newcastle Airport, it is recommended to consider bus stops along Cabbage Tree Road. The design of the bus stops will preferably accommodate seating, lighting, rubbish bins and real-time bus schedules.

### SAFETY CONCERNS
- There are several road safety concerns, primarily on the ability to safely allow pedestrians to cross the road to access the bus stops along Cabbage Tree Road.

### MODAL SHIFT
- The current mode share condition is relatively low for bus patronage (average utilization per route yielded results below 6% for all routes except 12% for route 131) and there is high private vehicle use and congestion with Nelson Bay Road and Industrial Drive nearing capacity.

## Structure Plan Response

### ACCESS POINTS
- The road network as indicated in the Structure Plan suggests four access points along Cabbage Tree Road and at the intersection of Nelson Bay Road/Williamtown Drive as well as a freight access point further north. Consideration should be given to providing a freight access point along Cabbage Tree Road also.
- Consideration has been given to banning certain traffic movements such as the right turn into the SAP from Cabbage Tree Road and improving connectivity within SAP for vehicles entering via Cabbage Tree Road.

### ROAD UPGRADES
- Spatial consideration is given to enable required upgrades and modal shift is supported (refer below).

### ACTIVE TRANSPORT
- It is important to connect the cycleway along Nelson Bay Road with the health loop internal to the Structure Plan of the SAP, thereby constituting a connected cycling network.

### BUS NETWORK
- There is the opportunity to introduce bus stops along Cabbage Tree Road as there is available capacity to accommodate potential increase in bus patronage.

### SAFETY CONCERNS
- The Structure Plan will facilitate an internal layout to promote pedestrian safety.

### MODAL SHIFT
- Potential incentives to motivate a modal shift to public transport includes increased service frequencies and reduced fares. An option might be to run a period with reduced fares and test the effect, as trips in this area is typically undertaken by private car. Consider including bus-priority treatments at pinch points in the road network. Consider introducing differential pricing for parking to further motivate bus use.
- Considerations at crossing facilities should focus on safeguarding pedestrians to promote the use of this mode of travel.

## Recommendations for Master Plan & Delivery
- Secondary to freight access, a separate access point for emergency purposes is good practice.
- It is recommended to safeguard for another access point west of the terminal area as it may become necessary to access the airside from both sides.
- It is recommended to provide ongoing monitoring of the usage of these services during the first few years after the SAP has started to be established at six-month intervals.
- During subsequent design development of the SAP, further consideration could be given to the internal layout of the SAP and opportunities to encourage traffic to the site from the west along Tomago / Cabbage Tree Road, a route which is considered to have more available traffic capacity.

# UTILITY & INFRASTRUCTURE

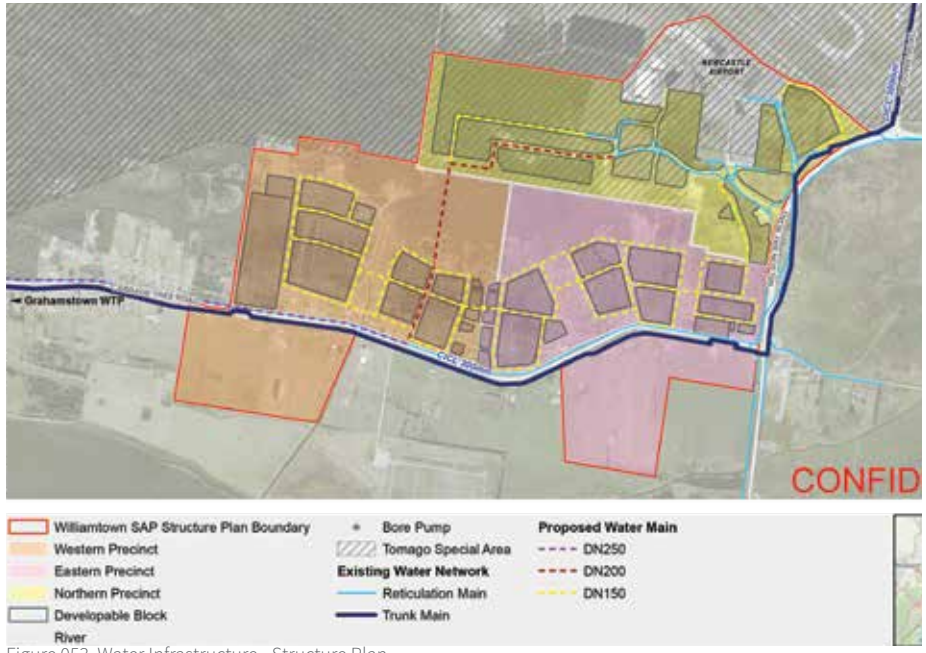



Figure 053. Water Infrastructure - Structure Plan

## WATER

### SUMMARY

Water supply is provided by Hunter Water through an existing network along Cabbage Tree Road and Nelson Bay Road to the Williamtown, Medowie and Port Stephens areas. The Hunter Water network is supplied from Grahamstown Water Treatment Plant (WTP) at Tomago and is capable of meeting the predicted future demands of the Structure Plan without augmentation or additional raw water supply. The initial stage of the Structure Plan can be serviced from the existing mains at Williamtown 1 Water Pump Station (WPS). Further development will however trigger upgrade of the network to meet the expected demand. The key upgrade to the network will include the construction of a new 9 km length of 250mm rising main from Grahamstown WPS to the precinct. The Structure Plan will require approximately 5.2 km of distribution mains and additional reticulation mains to service the expected development within the precinct.

### *Recommendations for Master Plan & Delivery*

Hunter Water has identified that the Williamtown SAP will require approvals in line with the typical Developer Servicing Strategy process. This process will require the submission of Developer Servicing Strategy report to Hunter Water that details the following:

- Development Context
- Options Development including, design water and wastewater loadings, infrastructure and constraints and options assumptions
- Servicing Options including water and wastewater demand assessment, infrastructure description, technical assessment and constraints, community/ stakeholder constraints and social impact, environmental constraints and impact and financial analysis

It is recommended that the following controls are applied to developments within the SAP to enhance the efficiency and sustainability of the Williamtown SAP:

- On-site stormwater detention (OSD) and on-site recycled water systems for non-potable water usage.
- IoT smart water meters
- On-site fire storage for developments identified to have a high fire risk

## WATER

### INITIAL INFRASTRUCTURE INVESTMENT (NORTHERN PRECINCT)

- It is proposed that the Northern Precinct will be serviced by extending from the existing water supply infrastructure constructed for the Astra Aerolab project, without major upgrades to the existing trunk mains to the area.

### FUTURE INFRASTRUCTURE INVESTMENT(EASTERN AND WESTERN PRECINCTS)

- Servicing of the Eastern and Western Precincts is proposed by extending a DN200 main from the Northern Precinct through to Cabbage Tree Rd, with DN150 reticulation offtakes constructed as land development progresses within the Eastern and Western Precincts.
- Ultimate demand will also require construction of a new DN250 main along Cabbage Tree Rd, back to Grahamstown WTP by Hunter Water during the concept design phase.


Figure 054. Sewer Infrastructure - Structure Plan

## WASTEWATER

### SUMMARY

The wastewater discharge of the Williamtown area is serviced by Hunter Water's network via the Williamtown 1 Wastewater Pump Station (WWPS) transferring flows to Raymond Terrace Wastewater Treatment Works (WWTW). Future wastewater infrastructure upgrades will be required as the precinct is developed. The precinct is proposed to be serviced by a pressure sewer system that discharges to Williamtown 1A WWPS.

The pressure sewer system will incorporate approximately 5.7 km of rising mains and associated reticulation mains and chambers. The transfer of wastewater from Williamtown 1 WWPS to Raymond Terrace WWTW will require the upgrade of the existing system to meet the expected demand of the Structure Plan. The initial stage of the SAP is capable of being serviced by the existing configuration. Further developments will however trigger the upgrade of the Williamtown 1 WWPS and the 9 km 300mm rising main to Tomago 1 WWPS to meet the expected PWWF.

### *Recommendations for Master Plan & Delivery*

- Prior to the development of the Williamstown SAP, the developer will be required to liaise with the Port Stephens LGA and private waste management companies to confirm the residual capacity of their facilities prior or during the future Concept Design project phases.

## WASTEWATER

### INITIAL INFRASTRUCTURE INVESTMENT

- During the initial stages of the Williamtown SAP, it is likely that waste could be handled by the Newline Road Waste Facility.

### FUTURE INFRASTRUCTURE INVESTMENT

- As subsequent stages are developed and the waste profile of the Williamtown SAP becomes more refined, it may be found that the development of a waste transfer station within the Williamtown SAP becomes economically viable.

# UTILITY & INFRASTRUCTURE

*On- site renewable energy generation to offset infrastructure upgrades and implementation of a microgrid, remain opportunities to be explored through assessment and sizing investigations.*

## ELECTRICITY

### SUMMARY

Electricity supply is provided by Ausgrid's local 33 kV and 11 kV distribution network, primarily from Williamtown Substation. The Ausgrid network is supplied via 33 kV feeders from TransGrid's bulk electricity supply at Tomago STS. There is limited residual capacity at Williamtown for further development and Ausgrid has identified that a new 33 kV substation south of Cabbage Tree Road would be required to service the initial stage of the Structure Plan. The development would be serviced from the new substation via a 11 kV feeder network that could incrementally expand with new development stages. The predicted ultimate demand of the Structure Plan exceeds the residual capacity of Tomago STS and will trigger the upgrade of the Tomago STS and existing 33 kV feeders from Tomago to Williamtown.


Figure 055. Electricity - Structure Plan

## ELECTRICITY

### INITIAL INFRASTRUCTURE INVESTMENT (NORTHERN PRECINCT)

- New Zone Substation at Cabbage Tree Road (33/11 kV). First Transformer should be able to accommodate ~55 MVA. Building and yard of sufficient size to fit future equipment for ultimate load (~112 MVA). The project can start off with the installation of a 55 MVA transformer to service the Northern Precincts.
- Upgrade feeders TM7 and TM10 to accommodate additional 109 MVA
- New 11 kV switch-room building of sufficient size for the ultimate load.
- New 33kV feeders from Williamtown ZS
- New 11kV underground feeders to new 11 kV switch-room building.
- Three cable pits at designated locations to allow extension of 11 kV feeder conduit run (Refer
- Appendix B).
- Extension of 11kV feeder to and from 11kV switch-room
- New 11 kV feeder bank of conduits from this switch-room building to designated areas of the Northern Precincts. It should make provision for comms and low voltage as well.
- Extension of 11kV feeders from the cable pits to service the Northern Precincts as developed.

### FUTURE INFRASTRUCTURE INVESTMENT (SOUTHERN PRECINCT)

- Upstream upgrade (Tomago STS 132/33kV) needed to accommodate ultimate load with additional 80MVA.
- Second transformer at New substation to accommodate additional (~60 MVA). This would be able to service the southern precincts.
- New 11 kV feeder bank of conduits to designated areas of the Southern Precincts. It should make provision for comms and low voltage as well.
- Extension of 11kV feeders from the cable pits to service the Southern Precincts as developed.

## *Recommendations for Master Plan & Delivery*

### SUMMARY OF PROPOSED PERFORMANCE CRITERIA

Further consultation with Ausgrid and TransGrid will be required to facilitate planning of the proposed upgrades in the Williamtown SAP servicing strategy.

It is recommended that the following controls are applied to developments within the SAP to meet development requirements and enhance the efficiency of the electricity servicing network:

- Smart pole network infrastructure (incorporating street lighting, public Wi-Fi and CCTV technology)
- On-site roof top solar panel systems
- Micro-grid battery networkFurther assessment for the potential feasibility of a Microgrid installation

Provide similar level of detail as stage 1 design for the Astra Aerolab. There is not enough detail in the Structure Plan to develop similar level of detail for all stages especially LV distribution.

# UTILITY & INFRASTRUCTURE

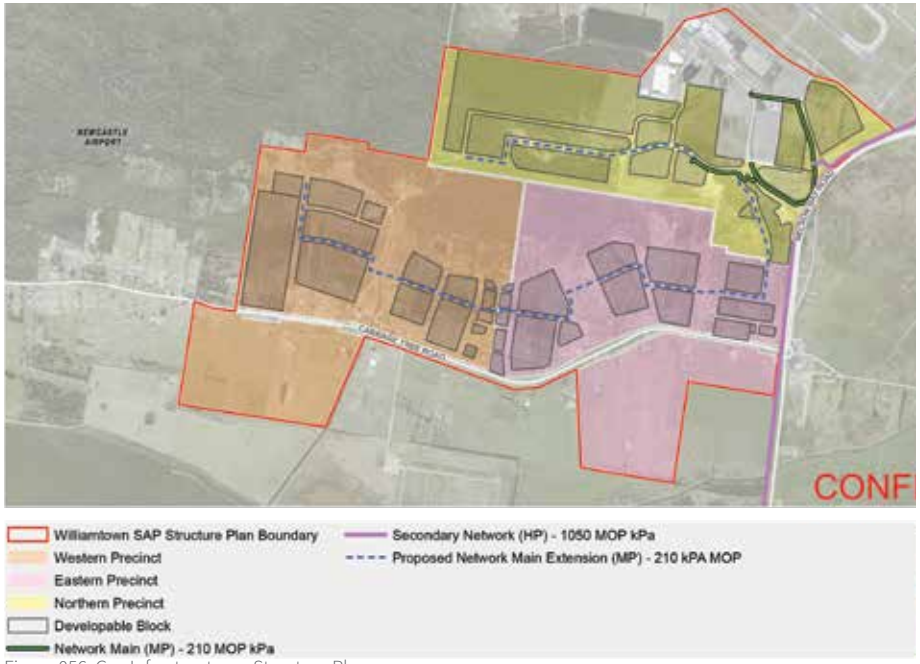


Figure 056. Gas Infrastructure - Structure Plan

## GAS

### SUMMARY

Gas supply is serviced by Jemena's 1,050 kPa gas main along Nelson Bay Road and Medowie Road. The expected demand of the Structure Plan is within the capacity of Jemena's network and augmentations to the bulk gas supply to the area are not expected. The precinct will be serviced through a connection to the existing high-pressure gas main near the intersection of Nelson Bay Road and Williamtown Drive. A proposed distribution main will expand throughout the stages of the development. A District Regulator Set (DRS) will be required to service the ultimate demand and is likely to be required to enable Stage 3 of development.

### *Recommendations for Master Plan & Delivery*

- Jemena will be ultimately responsible for the design and construction of the gas reticulation system.
- During the design stages, it is important to consider overpressure protection, therefore studying whether a pressure relief valve will be needed for this system and if it can be placed close to the different categories to be developed.
- Hazardous area is likely to be introduced at the regulator station and consideration must be taken given that it can affect the development of the allocated land nearby.

## GAS

### INITIAL INFRASTRUCTURE INVESTMENT

- The initial stages of the Williamtown SAP can be serviced by the existing network within the Northern Precinct and expanded as development expands to the west.

### FUTURE INFRASTRUCTURE INVESTMENT

- The staging of earthworks ahead of property developments allows the opportunity to construct utility infrastructure upfront when PFAS capping and fill balancing is undertaken (ie install capped mains), with infrastructure later commissioned as required to service load. This could be adopted to mitigate the risk of future gas infrastructure impacting PFAS barriers and capping layers.

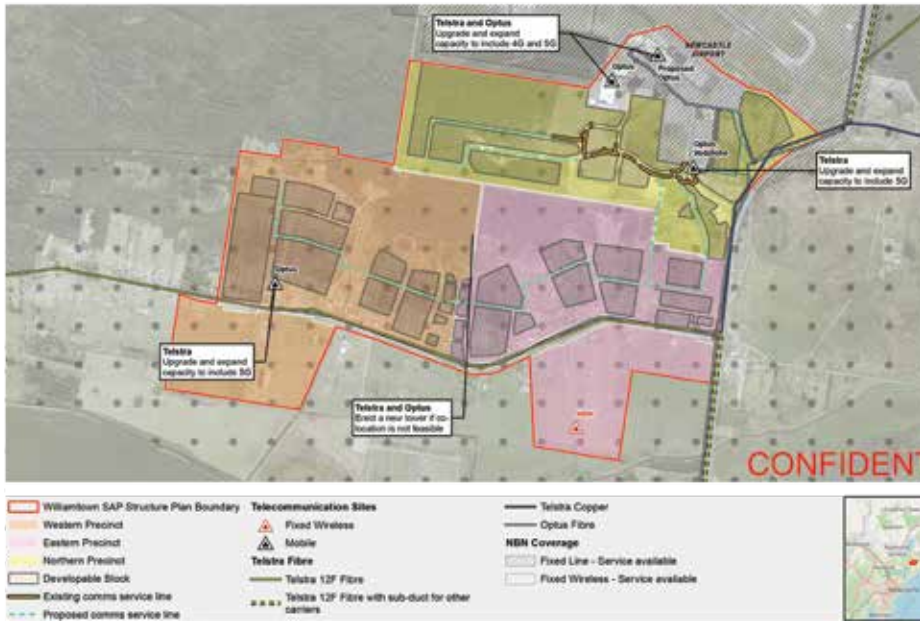


Figure 057. Telecommunications Infrastructure - Structure Plan

## TELECOMMUNICATIONS

### SUMMARY

Several telecommunication providers including NBN, Telstra and Optus currently service the area. The development will be serviced by a rollout of a NBN fibre network as the development incrementally expands. The ultimate development will likely exceed the existing mobile coverage facilities. In the later stages of the SAP, an upgrade to one of the five existing mobile facilities or the installation of a new mobile facility will be required. Data specific facilities for defence contractors and data centres will need to be explored further but there is the opportunity to provide separate secure networks to specific developments. The adoption of 'smart poles' throughout the SAP's road network is a key opportunity to increase the digital connectivity and security of the area and build on the initial 'smart pole' network developed at the Astra Aerolab development.

## *Recommendations for Master Plan & Delivery*

It is identified that the Williamtown SAP will require applications to be made at internet provider (NBN) and mobile carriers (i.e. Optus, Telstra and Vodafone) with details of the following:

- Final Structure Plan
- Number of lots/premises to be serviced.

It is recommended that the following controls are applied to developments within the SAP to enhance the network coverage, capacity and technology of the Williamtown SAP.

- 5G technology coverage across the SAP
- Any new telecommunications infrastructure shall consider smart pole as the default alternative
- High level security cabling for key industries (i.e. defence and airport areas)

## TELECOMMUNICATIONS

### INITIAL INFRASTRUCTURE INVESTMENT

- NBN fibre network expansion to service the Northern Precinct.

### FUTURE INFRASTRUCTURE INVESTMENT

- NBN fibre network expansion to service the Southern Precinct
- Upgrade existing Optus mobile facilities (3)
- Upgrade to existing Vodafone mobile facilities
- Install a new mobile tower – requires a 250m2 footprint within the SAP Structure Plan

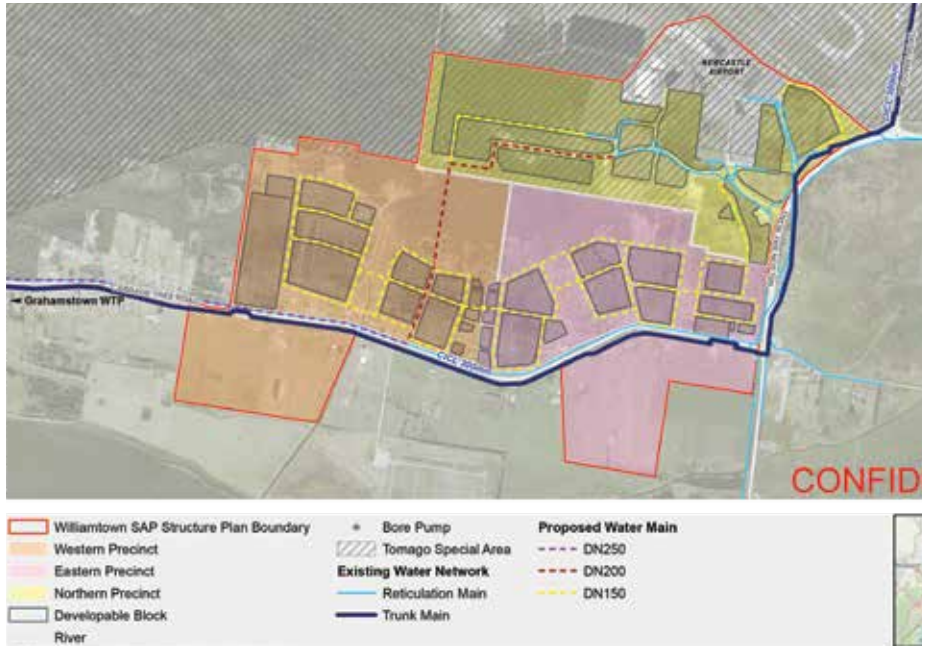



Figure 058. Water Infrastructure - Structure Plan

## WASTE SERVICING

### SUMMARY

Commercial waste production from the Williamtown area is currently serviced by private waste facilities in the region. Within the Port Stephens LGA, the privately owned Newline Road Waste Facility (NRWF) in Raymond Terrace (20km away) is an EPA licensed facility that has the infrastructure in place to process organic waste, recyclate and general waste.

The facility is licenced to process 200,000 tonnes of waste per year and is the most viable option for management of waste produced at the SAP. The SAP developments would need to engage in commercial agreements for waste management by private providers.

Once the SAP develops towards its ultimate state, the provision of a local waste transfer station would be feasible to manage the waste treatment produced locally.

### *Recommendations for Master Plan & Delivery*

- Prior to the development of the Williamstown SAP, the developer will be required to liaise with the Port Stephens LGA and private waste management companies to confirm the residual capacity of their facilities prior or during the future Concept Design project phases.

## WASTE SERVICING

### FUTURE INFRASTRUCTURE INVESTMENT

- Considering the close proximity of the NRWF, the development of a waste transfer station may not be required in the early stages. Should it be found at later stages that the NRWF is unable to process the Williamtown SAP waste or that significant volumes of waste are being treated at another facility further away, the development of a waste transfer facility within the Williamtown SAP may be viable.

# RENEWABLE ENERGY


Figure 059. Transmission and Distribution Staging Works

## RENEWABLE ENERGY SOLUTION

- Rooftop solar distributed energy resources (DER) on the majority of applicable new SAP developments;
- Small-scale battery energy storage systems (BESS) scattered throughout the precinct;
- A Local Use of System network pricing arrangement with Ausgrid to store excess solar generation in peak times, to provide bill savings to businesses in the SAP; and
- Grid supply with carbon offset and electricity supply with green contracts or a Power Purchasing Agreements through a buyers consortium.

## *Recommendations for Master Plan & Delivery*

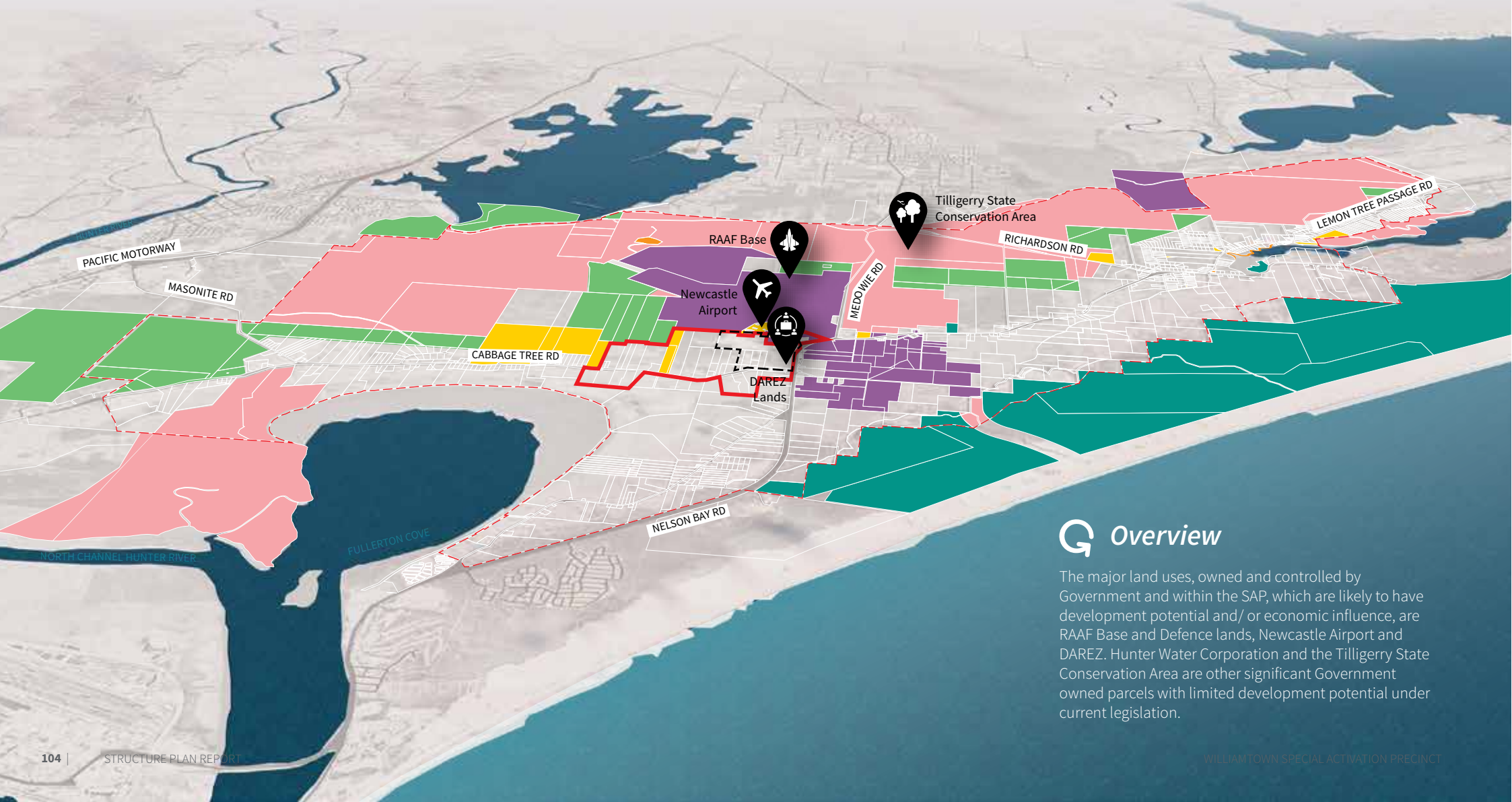
- Installation and management of a control system managed by Ausgrid (or potentially an energy retailer or a third party) to provide control of connected solar and battery resources in the SAP to minimise energy costs to Ausgrid, Retailers and end users. This control system will also be able to function in grid-islanding mode, to balance load and generation for up to 12 hours when there is loss of the main grid supply.
- Require each business that locates into the SAP to either procure a green energy contract directly from an energy retailer or otherwise enter into a buyer's consortium with other SAP businesses to sign a power purchase agreement with a renewable generator.
- Require each business that locates into the SAP to commit to the installation of solar panels on their roof, as feasible.
- In collaboration and agreement with Ausgrid, install at least 250kW sized grid level batteries (and possibly larger as energy densities improve over time) throughout the precinct in the order of one grid connected grid level battery for every 1000kVA 11kV/415kV kiosk installed. These batteries will be owned and managed by Ausgrid. These will be installed as part of Ausgrid's business-as-usual planning function of developing their electricity network as the precinct grows over the next 20 to 30 years.
- Ensure that businesses locating into the SAP are educated about the opportunity to save costs on their electricity bill by first reducing their behind-the-meter consumption with solar on their roof, and secondly, by taking advantage of the grid level battery to store excess energy and to be used to offset their consumption during periods when generation begins to decline.
- If manufacturing businesses locate into the SAP that require gas-derived heat for the business, require them to use heat pumps for low temperature applications and space heating. For high temperature usage (typical high temperature process heat), there is potential to use sustainable biomass or waste-to-energy alternatives.
- Monitoring of biomethane or hydrogen opportunities should continue though as these fuels are promising options to provide a decarbonised alternative once technology matures. For instance, biomethane trials involving
- Jemena/Sydney Water could result in green purchasing opportunities for methane.

# APPENDIX

# 03

# SITE ANALYSIS

# OWNERSHIP




## Overview

The major land uses, owned and controlled by Government and within the SAP, which are likely to have development potential and/ or economic influence, are RAAF Base and Defence lands, Newcastle Airport and DAREZ. Hunter Water Corporation and the Tilligerry State Conservation Area are other significant Government owned parcels with limited development potential under current legislation.

## *63% of the Williamtown SAP is Government owned land.*

**MAJORITY OF THE SAP IS GOVERMENT OWNED LAND PROVIDING A UNIQUE OPPORTUNITY FOR INNOVATION AND LIAISION BETWEEN GOVERMENT AGENCIES**

### *Legend*

- Williamtown SAP Structure Plan Boundary
- Williamtown SAP Investigation Area
- Commonwealth Government Land (9%)
- Crown Lands Division (0.1%)
- Department of Premier and Cabinet (37%)
- Hunter Water Corporation (11%)
- Worimi LALC (1%)
- Port Stephens Council (2%)

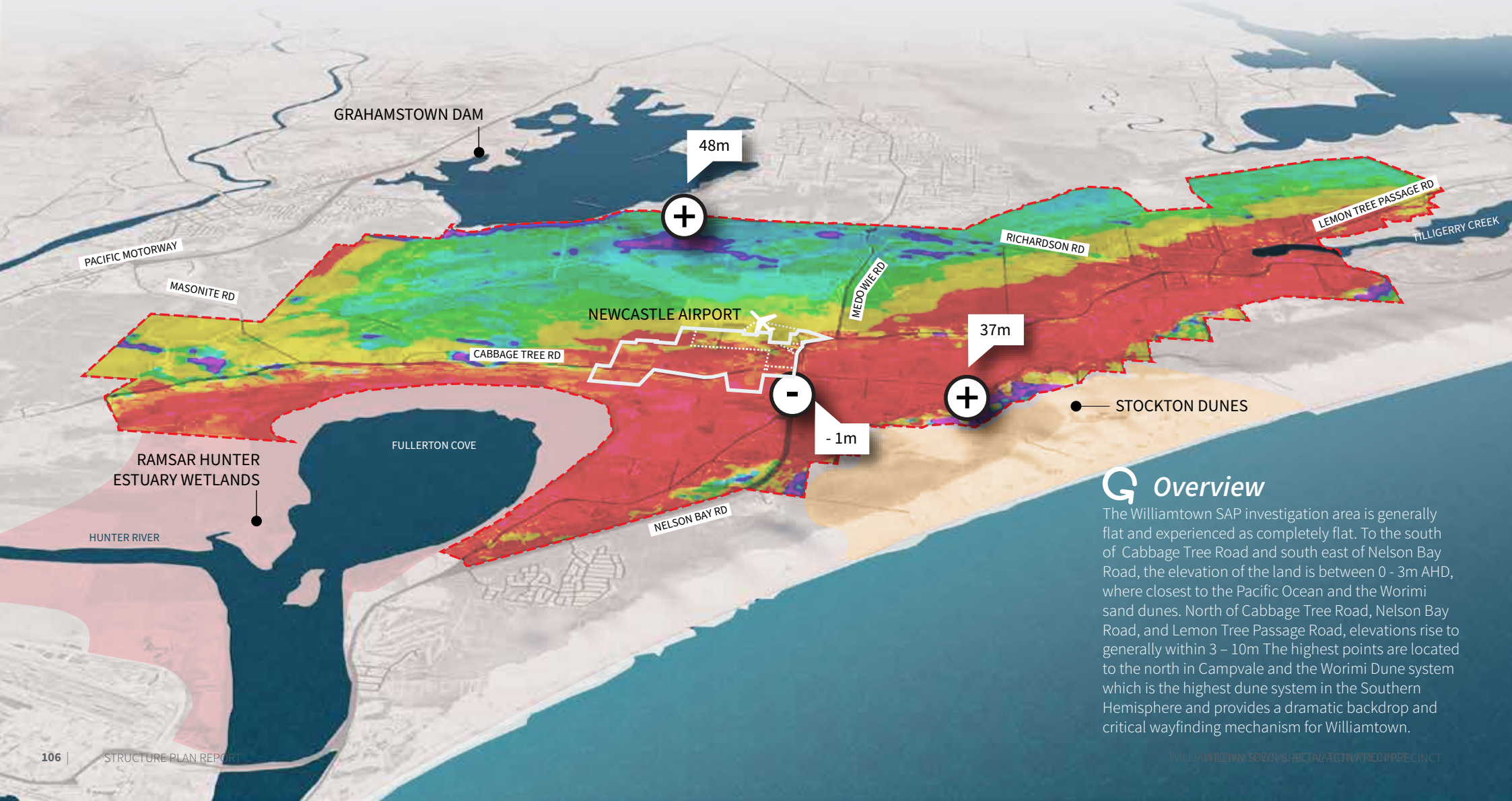
## *Opportunities*

- The significant amount of Government owned land provides the opportunity for streamlined approvals that set the highest standards.
- The RAAF Base is centrally located and provides an inbuilt community (albeit spouses and families reside off base). Training, research, recreation and community activation could leverage this land use.
- Tilligerry State Conservation Area has less hydrology constraints and could be considered for supplemental recreation and/ or active travel trails contributing to a 50- 70km km Williamtown SAP perimeter Health Loop (12 hour walk and 3 hour Cycle) and or eco-tourism and accommodation.
- Consider active, sustainable tourism uses with the conservation areas including BMX, mountain biking, four wheel drive and motorsport activities.
- Given the conservation focus on the Hunter Wetlands National Park, Worimi State Conservation Area, Tilligerry State Conservation Area and Tilligerry National Park, development activities are typically limited to those that have are beneficial to the environment
- Opportunities to enhance on promote tourism related to the land owned by LALC to facilitate strengthening of necessary cultural knowledge and education in a place of innovation.
- The Williamtown SAP is predominantly rural farmlands and is of a high quality in terms of productivity irrespective of the PFAS considerations. Not all of the rural land will have the capability to be included in the final Williamtown SAP development and therefore can be retained as productive landscape.
- Additionally, there is the opportunity to increase and/ or concentrate agrarian uses in logical locations that supplement industry and/ or amenity.

## *Constraints*

- Approximately 4,000 ha of the SAP is privately held and redevelopment potential will be contingent upon integrated solutions to PFAS, flood, drainage and Nelson Bay Road upgrade configuration.
- The Hunter Water Corporation owns 1,207 ha (11%) of land within the SAP; the majority of which is also identified as High Risk Sandbed zones with very limited development potential under current legislation arrangements.
- Fragmented private ownership of existing infrastructure such as drains (i.e. Dawson's Drain).
- The RAAF Base is considered an economic catalyst and critical consideration of the SAP; however we will have limited influence over its development and standards such as environmental criteria.
- Whilst the agricultural value is acknowledged, it does place pressure on the healthy freshwater ecosystems.

# TOPOGRAPHY




## Overview

The Williamtown SAP investigation area is generally flat and experienced as completely flat. To the south of Cabbage Tree Road and south east of Nelson Bay Road, the elevation of the land is between 0 - 3m AHD, where closest to the Pacific Ocean and the Worimi sand dunes. North of Cabbage Tree Road, Nelson Bay Road, and Lemon Tree Passage Road, elevations rise to generally within 3 – 10m The highest points are located to the north in Campvale and the Worimi Dune system which is the highest dune system in the Southern Hemisphere and provides a dramatic backdrop and critical wayfinding mechanism for Williamtown.

*The majority of the Williamtown SAP is extremely flat, with significant topographical changes reserved to the eastern border of the site where the Stockton sand dunes are, and to the south-east of Grahamstown Lake.*

**THIS LOW-LYING AND EXPANSIVE FLOODPLAIN IS PRONE TO SEASONAL INUNDATION AND BORDERED BY LARGE WATER BODIES INCLUDING FULLERTON COVE AND GRAHAMSTOWN LAKE**

### Legend

- Williamtown SAP Structure Plan Boundary
- Williamtown SAP Investigation Area
- -1-1m
- 1-3m
- 3-5m
- 5-7m
- 7-9m
- 9-11m
- 11-13m
- 13-48m

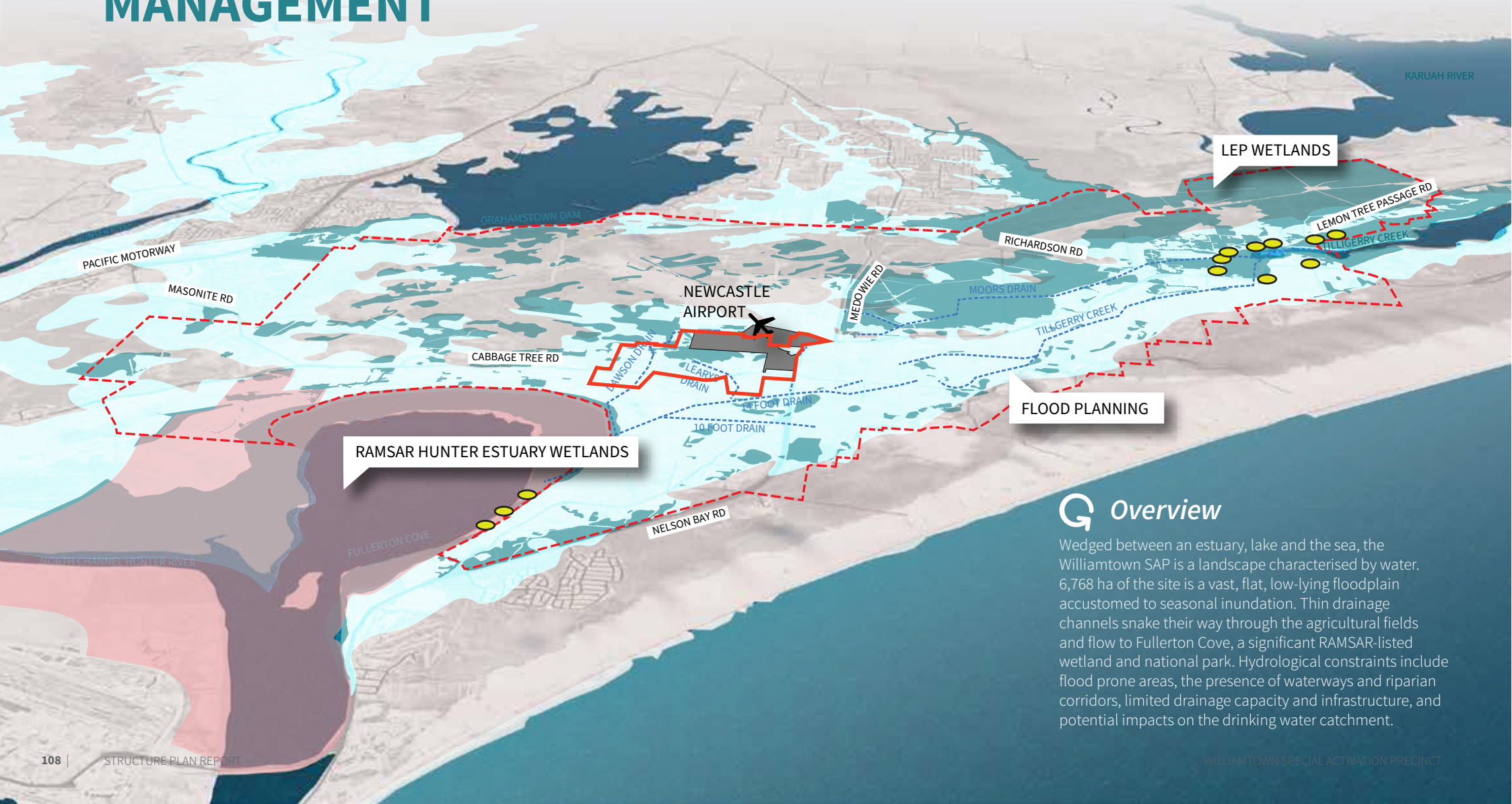
## Opportunities

- At 48m high, this dune system is the highest in the Southern Hemisphere and provides a dramatic backdrop and critical wayfinding mechanism for Williamtown.
- Establish the dunes as a key urban organizing element considered when siting major roads, runway experiences and gateway moments; enhancing identity and legibility of the Williamtown SAP.
- Dune system (part of the Worimi conservation lands) provides a tourism gateway for the Hunter Region.
- Consider the low lying, less visible areas for land uses that can occur in flood affected areas as well as those that are less attractive.
- Views of the water (Stockton Cove, Oyster Cover and Grahamstown Dam and glimpses of the ocean) can drive the location of future public spaces whilst supporting higher intensity development opportunities.
- Prepare a built from strategy to enhance perceived topographical changes and to provide orientation.
- Low points where there is risk of seasonal inundation lend themselves to networks of raised boardwalks where people can recreate and interact with water-based environments.
- High points in topography lend themselves to the addition of lookouts where people can gain their bearings within the landscape and pause.
- Flat areas are ideal for creating cycleways that cover significant distances and pass through a variety of experiences. This can improve the active transport network of the area and encourage people to ride to work.

## Constraints

- Low lying land is flood affected and has limited development potential.
- Potential need for significant earthworks on site which conflicts with PFAS and environmental requirements/ conditions.
- The sandy nature of the area, the presence of acid sulphate soils and a high water table make altering topography/ earthworks difficult.
- Aircraft flight paths limit vertical expansion
- Port Stephens is home to the Port Stephens-Great Lakes Marine Park, which is twice the size of Sydney Harbour, as well as the largest moving coastal sand dunes in the southern hemisphere.
- This significant Aeolian Sand Inundation (movement of sand due to wind) is considered a priority threat as little mitigation action has been undertaken to date and it is causing the smothering of existing landscape assets within the Marine Park.
- The sand dunes are unstable and moving with poor slope stability, restricting what can be done in and around these areas.
- Any development proposed which may impact on the RAMSAR Wetland Area (international significance) requires referral to the Australian Government Minister for the Environment. Development which will or is likely to have a significant impact to the RAMSAR wetland will be subject to a rigorous environmental assessment and approval under the Environment Protection and Biodiversity Conservation Act 1999.
- The Sandbeds occupy a significant amount of the Williamtown SAP, with the high risk sandbed zone being 6,000 ha. Strict development controls and/ or mitigation measures will be required to protect this reserve water supply. Agricultural use (aquaculture and intensive livestock agriculture), on-site sewage management facilities, or engaging in any extractive industry are restricted within the Tomago Sandbed and Grahamstown Catchment.

# FLOODING AND WATER CYCLE MANAGEMENT




## Overview

Wedged between an estuary, lake and the sea, the Williamtown SAP is a landscape characterised by water. 6,768 ha of the site is a vast, flat, low-lying floodplain accustomed to seasonal inundation. Thin drainage channels snake their way through the agricultural fields and flow to Fullerton Cove, a significant RAMSAR-listed wetland and national park. Hydrological constraints include flood prone areas, the presence of waterways and riparian corridors, limited drainage capacity and infrastructure, and potential impacts on the drinking water catchment.

*4% (approximately 500 ha) of the site remains after excluding the Williamtown SAP lands constrained by flood and the Tomago Sandbeds High Risk Zone. This equates to a quarter of the Wagga Wagga SAP investigation area.*

**KEY TAKEAWAY**

**60%** **OF THE WILLIAMTOWN SAP SITS AT/ BELOW THE FLOOD PLANNING LEVEL (6,768 HA)**

### Legend

- Williamtown SAP Structure Plan Boundary
- Williamtown SAP Investigation Area
- RAMSAR Hunter Estuary Wetlands
- Wetlands
- Flood Planning Level
- Existing Flood Gates
- Existing Drains

## Opportunities

- Through a streamlined planning process; we have the opportunity to establish global best practice sustainability and protection targets/ criteria so that Williamtown leads in this area of sustainable development.
- Consider a precinct based approach to managing flooding.
- Consider flood- proof uses that are aligned to the existing and future character including agriculture, solar farms, recreation and tourism.
- Large designated areas vegetated with plants adapted to periodic inundation provide for the eventuality of flood. These spaces can also act as flexible recreational areas when dry.
- Utilise Nelson Bay road, identified as a key hydraulic control, to mitigate regional flooding risk from the Hunter River.
- Utilise Dawson Drain capacity ( drain currently at less 50% AEP capacity) to unlock potential development opportunities
- Delineate and assign appropriate drainage easements along the drainage corridors that take into account and facilitate:
  - » Any riparian reserves or aspirations for rehabilitation of riparian zones
  - » Safe access of vehicles for inspection and maintenance activities
  - » Clear transfer of ownership to the appropriate government authority that will commit to the required responsibilities of the drainage asset ownership.
- Potential to augmented local drainage network to improve drainage efficiency and reduce flood risk
- Utilise bulk filling to facilitate flood protection to development. Subject to the hydraulic behaviour of the affected flooding, compensating for the loss of flood storage caused by the bulk filling can be applied to offset the loss. This would typically be in the form of excavating a similar volume to the fill volume below the flood level.

## Constraints

- Approximately 60% (6,768 ha) of the Williamtown SAP investigation area is currently defined as flood prone based on Council's flood hazard and hydraulic categorisation mapping
- Any development proposed which may impact on the RAMSAR Wetland Area (international significance) requires referral to the Australian Government Minister for the Environment.
- Flood inundation duration is a major constraint that it is controlled by natural process i.e. tride levels and terrain slope. Current inundation durations are in the order of days depending on the flood mechanism. The tidal processes limit and/ or prevent the discharge of local catchment flooding when tide levels are high. Compounding this is the shallow terrain gradient that limits rate which which flood waters leaves the catchment.
- Current planning controls for flood prone land is prescriptive in that certain development types are restricted to certain flood risk zones
- The DAREZ south land could provide critical strategic land to the Williamtown SAP but drainage is prohibitive.
- The existing drainage across the Williamtown SAP is mainly open channels and culverts. Existing studies have identified that these structures have limited capacity and are already not meeting current design standards for major drainage. Additional infrastructure is likely to alter flood and drainage at scale.

# FLOODING MECHANISMS

## *Regional Flooding*


**1% AEP PLUS CLIMATE CHANGE DESIGN PEAK FLOOD DEPTHS AND LEVELS UNDER REGIONAL FLOODING CONDITIONS**

### REGIONAL FLOODING

The predominant flooding mechanism for the Study area, regional flooding is defined as flooding from the Hunter River catchment.

### LOCAL FLOODING

Local flooding is defined as being caused by rainfall over the local catchment areas. This specifically is flood producing rainfall over creeks, drains and minor drainage channels.

*Legend*

- Williamtown SAP Structure Plan Boundary
- Williamtown SAP Investigation Area
- Regional Flood Direction

**Peak Flood Depth (m)**

- >4
- 2
- 1
- 0.5
- <0.2

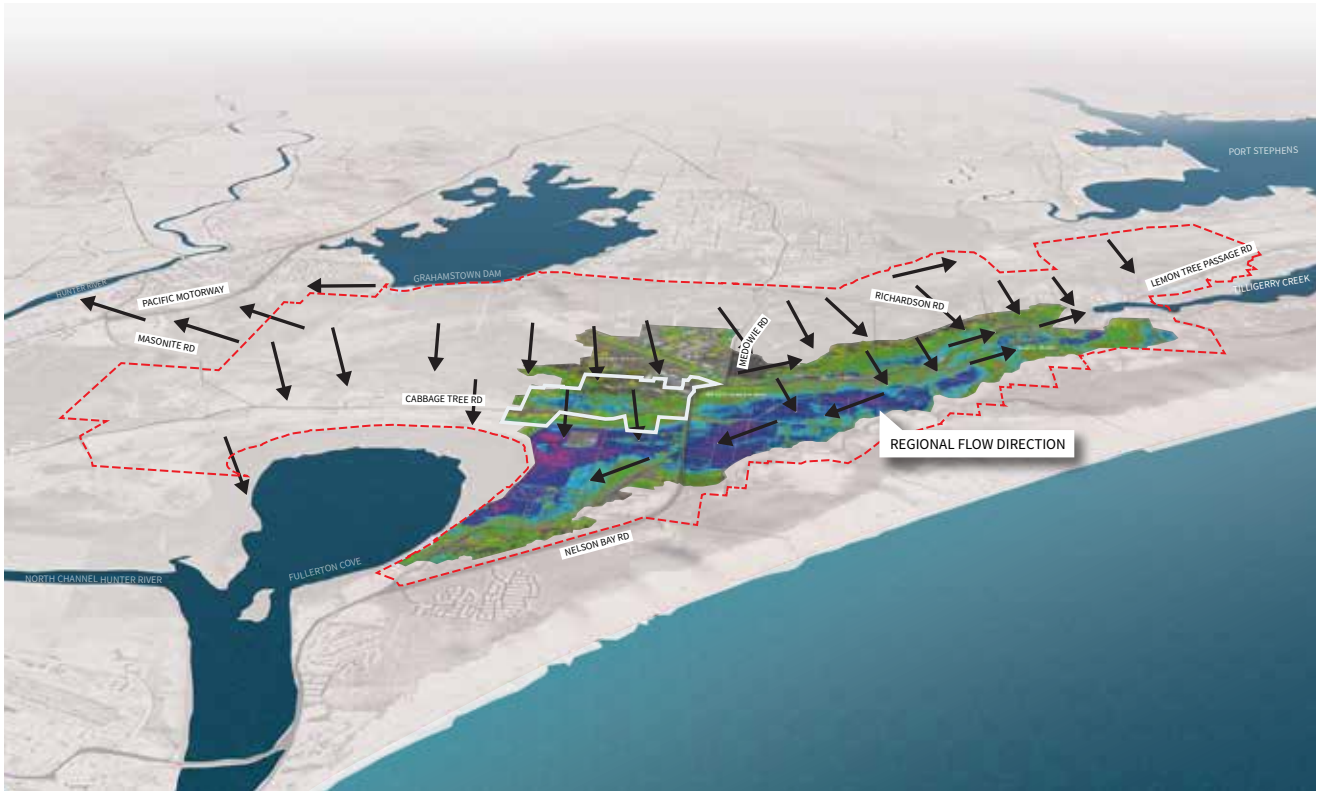
*Legend*

- Williamtown SAP Structure Plan Boundary
- Williamtown SAP Investigation Area
- Local Flood Direction

**Depth (metres)**

- 1.9
- 1.7
- 1.5
- 1.3
- 1.1
- 0.9
- 0.7
- 0.5
- 0.3
- 0.1
- 0.001

## Local Flooding




**1% AEP PLUS CLIMATE CHANGE DESIGN PEAK FLOOD DEPTHS UNDER LOCAL CATCHMENT FLOODING CONDITIONS**

## Tidal Inundation

Flooding resulting from tidal inundation impacts the lower lying areas of the floodplains. A system of levees and floodgates exist to limit the extent of tidal inundation and look to protect the low-lying areas.

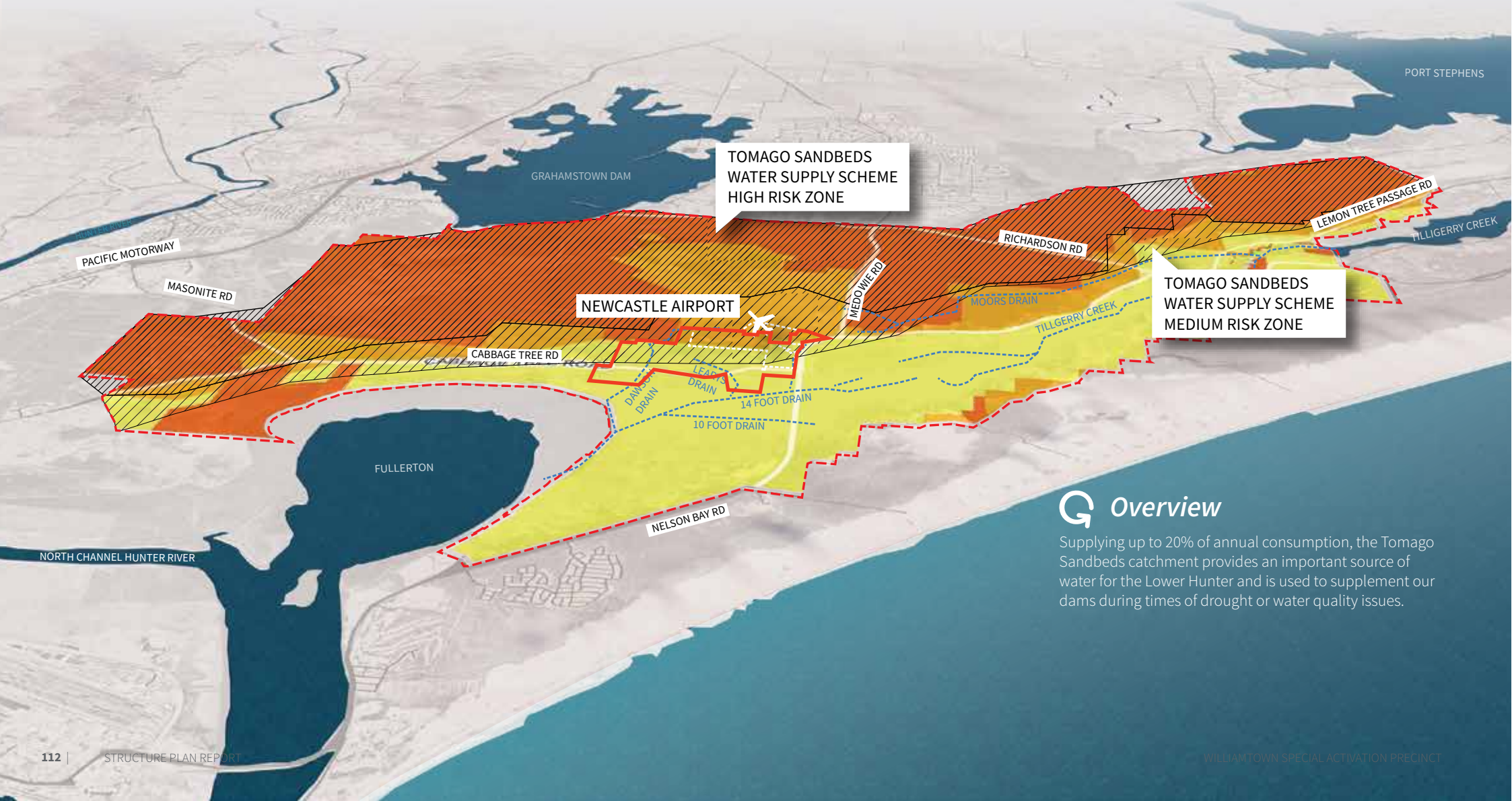
The tidal planes for the Lower Hunter adopted for the current flood planning is shown below.

### TIDAL PLANES FOR HUNTER RIVER AT MALLABULA POINT (BMT 2017 SOURCED FROM MANLY HYDRAULICS LABORATORY (MHL) 2012)

| Tidal Plane | Water Level (m AHD)* |
|---|---|
| High High Water Solstices Springs (HHWSS) | 1.08 |
| Mean High Water Springs (MHWS) | 0.69 |
| Mean High Water (MHW) | 0.56 |
| Mean High Water Neaps (MHWN) | 0.42 |
| Mean Sea Level (MSL) | -0.01 |
| Mean Low Water Neaps (MLWN) | -0.44 |
| Mean Low Water (MLW) | -0.58 |
| Mean Low Water Springs (MLWS) | -0.71 |
| Indian Spring Low Water (ISLW) | -0.99 |

* Conversion to AHD from Port Stephens Height Datum (PSHD) = -0.949m (MHL, 2012)

# WATER SUPPLY AND SECURITY




## Overview

Supplying up to 20% of annual consumption, the Tomago Sandbeds catchment provides an important source of water for the Lower Hunter and is used to supplement our dams during times of drought or water quality issues.

***4% (approximately 500 ha) of the site remains after excluding the SAP lands constrained by flood and the Tomago Sandbeds High Risk Zone. This equates to a quarter of the Wagga Wagga SAP investigation area.***

## Opportunities

- Through a streamlined planning process, we have the opportunity to establish global best practice sustainability and protection targets/ criteria so that Williamtown leads in this area of sustainable development.
- Opportunity through the streamlined planning process to simplify the development approval process with Hunter Water to ensure the objectives of the Act are maintained but expedited approvals are realised.
- The DAREZ south land could provide critical strategic land to the SAP but drainage is prohibitive.
- Opportunity for development in the south with adequate controls and mitigation measures in place.
- Rainwater and storm water harvesting and reuse strategies as well as other alternative strategies are likely to be required to supplement filtration to achieve catchment targets throughout the study area.

## Constraints

- The Sandbeds occupy a significant amount of the SAP, with the high risk sandbed zone being 6,000 ha.
- Hunter Water has identified that land generally to the north of Cabbage Tree Road presents a risk to the Tomago Sandbeds water supply scheme. However, some development in the southernmost extent closer to Cabbage Tree Road and Nelson Bay Road may be able to be undertaken with adequate controls and mitigation measures implemented.
- The future Williamtown SAP should avoid impacts to sensitive aquatic environment catchments and the drinking water catchment of the Tomago Sandbeds and Grahamstown Dam.
- Section 51 of the Hunter Water Act 1991 currently requires DA's to be referred to the Hunter Water Corporation where it is proposed within a 'special area' such as the Tomago sandbeds.
- Providing stormwater management to protect the Tomago Sandbed Drinking Water Catchment will be a critical component of the water cycle management strategy.
- The water cycle management strategy needs to ensure that as much rainfall volume is infiltrated post development without impacting groundwater quality.
- Increasing areas of impervious surfaces in the Tomago Sandbeds catchment (buildings, roads and paved or concrete hardstand areas) poses threats to groundwater quality.
- Sand mining and mineral extraction also present potential risks to groundwater quality within the groundwater catchments.
- Expanding unsewered residential development increases the potential for the discharge of effluent directly to land within or close to the drinking water catchments.

### Legend

- Williamtown SAP Structure Plan Boundary
- Williamtown SAP Investigation Area
- Tomago Sandbeds Water Supply Scheme High Risk Zone
- Tomago Sandbeds Water Supply Scheme Medium Risk Zone
- Existing Drains

**Constraint Category**

- Category 2: May be developable but with additional mitigation to standard controls
- Category 3: May be developable but with significant mitigation
- Category 4: Developments Discouraged

# UTILITIES & SERVICES


## Overview

The investigation area is generally well serviced with existing utility infrastructure, particularly in the western area near Tomago industrial area and along Cabbage Tree Rd to the Newcastle Airport and Williamtown RAAF. The primary water source for the Lower Hunter region, Grahamstown Dam is located to the north and Grahamstown WTP is near the Tomago industrial area to the west of the investigation area, while Raymond Terrace WWTP is also nearby, to the north-west of the investigation area.

### Legend

- Williamtown SAP Structure Plan Boundary
- Williamtown SAP Investigation Area
- Low Constraint
- Moderately Constrained - Engineering Intervention Required
- High Strategic Value - Engineering Intervention Required
- Substation
- Telecommunications Tower
- Wastewater Treatment Plant
- Sewer Pump Station
- Sewer Rising Main

## Opportunities

- Potential utilities sites are preferred along Cabbage Tree Rd and adjacent to Williamtown Aerospace precinct due to the proximity to existing trunk infrastructure, reduced distance to treatment plants, transmission station and high pressure mains.
- Recycled water supply from Raymond Terrace WWTP for industrial use;
- Treated Groundwater supply from Williamtown RAAF PFAS treatment program for industrial use;
- On-site wastewater treatment and reuse;
- Hydrogen gas energy supply;
- Partnering with NBN Co infrastructure expansion;
- Electricity supply and upgradability;
- Hunter Water have current plans to increase capacity and improve quality of treated effluent, with upgrade of the WWTP scheduled for 2025/26. Therefore, capacity to treat domestic sewage at Raymond Terrace WWTW is expected to be sufficient for the SAP.
- The Tomago SPS may provide an opportunity to utilise the existing pump station and rising main to transfer wastewater to Raymond Terrace WWTP, however this is close to capacity.
- Precinct sewer development options further from Raymond Terrace WWTP may require substantial network upgrades, likely requiring developer services contributions from the project. Therefore, opportunities to utilise packaged treatment solutions and water reuse on site will be further explored.

## Constraints

- Potential utilities site to the north-east of Medowie Rd and south of the Cabbage Tree Rd and Nelson Bay Rd intersection would require extensions to the existing trunk infrastructure, to be serviced from the existing utility networks.
- Limited residual capacity in wastewater trunk network;
- Low pressure zones in potable water reticulation network;
- Flat topography limits wastewater gravity reticulation network;
- Development limits near electricity easements;
- PFAS contamination;
- Bushfire prone land infrastructure servicing requirements;
- RAAF Williamtown height restrictions on surrounding structures, particularly telecommunications towers; and
- Ability to utilise existing sewer infrastructure to service additional load from the proposed SAP may be limited. Unsewered land within the SAP cannot be complying development and therefore additional sewer infrastructure would be required for inclusion in the development footprint.

# RENEWABLE ENERGY & SUSTAINABILITY

## Overview

Williamtown SAP will be progressively built out over a time period of at least a decade. Whilst it is unclear what specific industries and businesses will actually locate in the precinct, Based on this high-level assessment and comparison to previous precincts it is anticipated that about 40MVA is required by the Williamtown SAP. The typical profile of industrial loads is of a consistent and flat demand profile during business hours from 8am to 5pm, with only residual demand overnight. However, some logistic businesses and some 24-hour type industrial manufacturing businesses do demonstrate a 24-hour style demand profile, given their round-the-clock operating model.

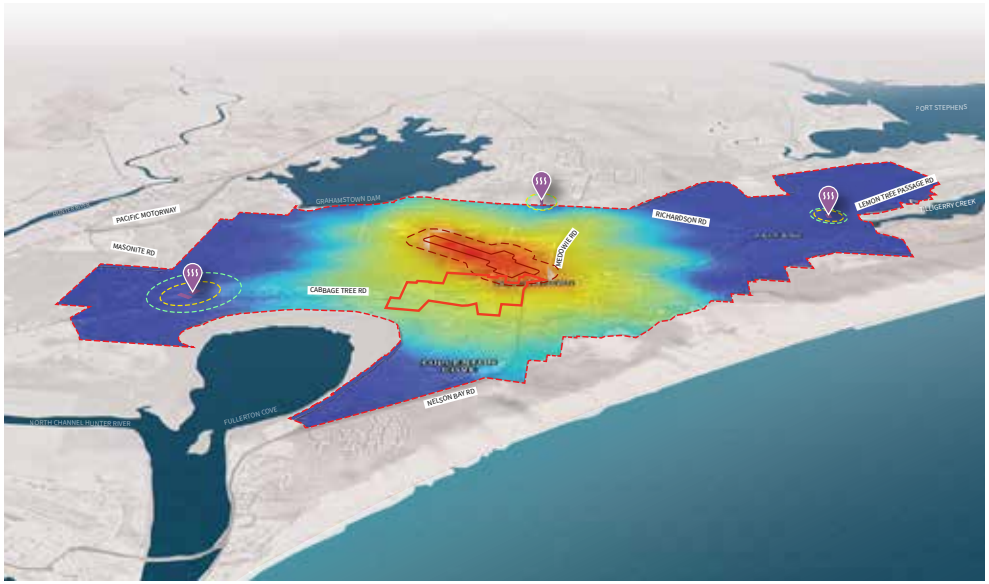
## Opportunities

- Investment in renewable energy as part of the SAP has the potential to contribute towards environmental and socio-economic development goals both locally and regionally.
- This can be achieved by attracting innovative industries with an interest in sustainable business practices and
- Technology development.
- Delivering cost-effective, low-emissions and reliable power, will underpin the ability of the precinct to attract these types of businesses.
- The SAP aspires to be a carbon neutral precinct
- Develop an holistic solutions to deliver the energy trilemma (emissions, security and price)
- Attract leading industries by reducing exposure to electricity price increases through rooftop solar, large scale batteries connected to an LV network
- Use smart grid technology that can coordinate with each electricity customers energy management system
- Learn from Adelaide and Brisbane Airports in terms of safe solar arrays
- Investigate large scale solar PV- Optimise flood and PFAS constrained land for energy infrastructure (refer to plan above). This equates to about 3MW on average.
- On- site aggregated renewable energy
- Precinct generation portfolio
- SAP retailer
- Chemical energy sources such as biomass and waste have the potential to contribute to a circular economy
- A waster to energy facility should be considered
- Large and small scale wind, geothermal, large scale thermal, ocean energy and pumped hydro energy storage are deemed to have good potential at the SAP.

## Constraints

- Potential demand anticipated at 40MVA for the SAP based on traditional industrial load and some 34 hour load types.
- The size of SAP loads will far exceed the solar generation based on industrial load energy intensity and insufficient land for 110MVA of installed capacity. Main energy user groups:
  - » Advanced manufacturing
  - » Freight and logistics
  - » Commercial
  - » Education
  - » Public transport
  - » Aviation
- Infrastructure will not be proposed on culturally significant land
- Developable land is at a premium and energy infrastructure must be balance with opportunity cost of other development
- OLS will limit wind turbines or generators with tall chimneys
- AN off- grid solution has been rejected as being uneconomical

# AIR QUALITY AND ODOUR




## Overview

The main land uses in the Investigation are national park and nature reserves, rural landscape, special activities and infrastructure. A total of 22 activities have been identified either within or nearby to the Investigation Area which may have the potential to impact air quality. The main source of air quality emissions are from Williamtown RAAF Base / Newcastle Airport. There are also a number of poultry farms contributing to odour emissions.

### Legend

- Williamtown SAP Structure Plan Boundary
- Williamtown SAP Investigation Area
- NOx Risk (Low - High)
- Airport Boundary
- 400m Airport Buffer
- Odour Shed
- NSW EPA Method
- Victorian EP Method

## Opportunities

- Some industrial uses can be proposed within the air quality and odour buffers.
- Potential for low density residential within odour buffers.

## Constraints

- The main source of air quality and odour emissions are from the Williamtown RAAF/ Newcastle Airport, quarries, sand mining and poultry farm operations to a lesser extent.
- Based on NOx and PM2.5 limiting pollutant, a 400m buffer zone around the Williamtown RAAF/ Newcastle Airport is recommended for no residential.
- Additional aircraft activities may trigger reconsideration of the air quality buffer.
- Odour buffers of 300/ 400m- 800m (conservative NSW EPA) to poultry farms is recommended for no medium- high residential.

# NOISE


## Overview

The main source of noise emissions are from Williamtown RAAF Base / Newcastle Airport, as well as a number of samll quarries and sand mining operations in the area. Road traffic and and industrial noise are also present but to a lesser extent. There are also some small industries, poultry farms but have minimal noise impact

### Legend

- Williamtown SAP Structure Plan Boundary
- Williamtown SAP Investigation Area
- ANEF Contours 20-25
- ANEF Contours 25-30
- ANEF Contours 30-35
- ANEF Contours 35-40
- ANEF Contours 40+
- NCA

## Opportunities

- Development as a noise management precinct- enabling noise from multiple sites to be managed as a single site (noise offsets).
- Achieve better acoustic outcomes in
- Noise catchment areas (NCAs) with more/ closed spaced recievers.
- Progressive noise mitigation roll- outs consistent with the SAP aspirations.

## Constraints

- The main source of noise emissions are from the Williamtown RAAF/ Newcastle Airport. Road traffic and industrial nosie including small quarries, sand mining operations to a lesser extent (22 total sources)
- Some land uses will require additional investigation to ensure acoustic amenity and the local community is not adversely impacted.

# INDIGENOUS CULTURAL HERITAGE


## Overview

The Analysis found seven recognised sites of historic heritage significance within the Williamtown SAP. Areas with high heritage values focus on RAAF Base Williamtown, the Stockton Beach Dune System and the former Williamtown Public School.

***The Worimi people are the traditional owners of the Williamtown SAP investigation area. By providing opportunities to protect, respect and connect to Country, this precinct can support Worimi visions and values.***

**WORIMI COUNTRY IS RICH IN CULTURAL HERITAGE. THIS HERITAGE CAN BE CELEBRATED BY CLOSELY ENGAGING WITH WORIMI PEOPLE AND COUNTRY.**

## Legend

- Williamtown SAP Structure Plan Boundary
- Williamtown SAP Investigation Area
- Artefacts
- Artefacts/Burials
- Artefacts/Shell
- Artefacts/Potential archaeological deposit/Shell
- Artefacts/Non human bone and organic material
- High Historic Significance Potential
- Moderate Historic Significance Potential
- Low Potential SAP Investigation Area

*NOTE: Artefacts on this map are based on desktop analysis and field work has not yet been undertaken*

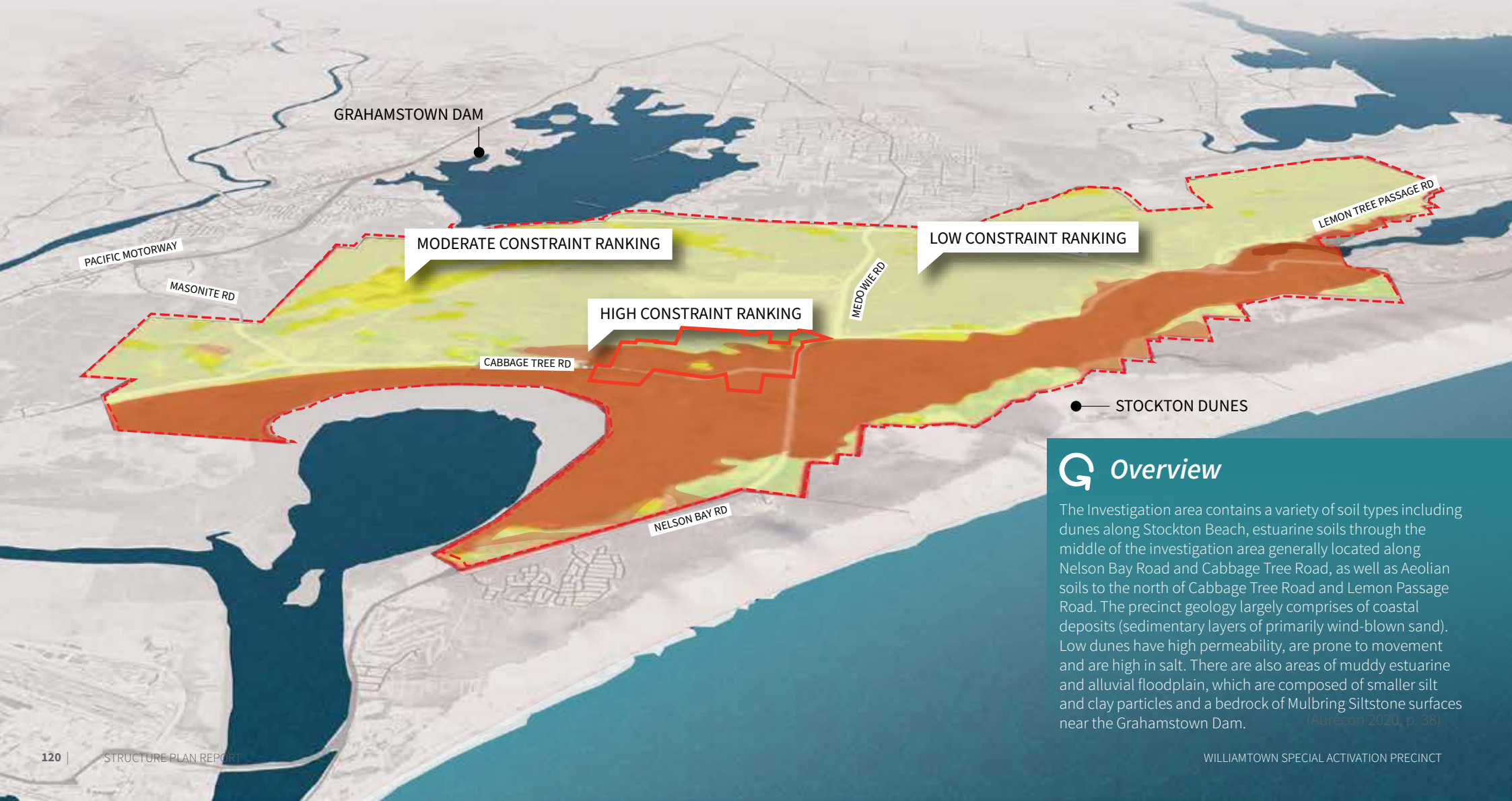
## Opportunities

- Use the Government Architect's *Designing With Country* and *Connecting With Country* documents to guide the creation of the investigation area's masterplan
- Support the expansion of educational and camping experiences for school children to connect with local Indigenous heritage
- Extend opportunities for cultural tourism e.g. Murrook Culture Centre on Nelson Bay Road
- Create unique and memorable signage for the Williamtown SAP that acknowledges and celebrates Worimi Country, peoples and culture
- Improve both active and public transport links to existing Worimi recreational enterprises (e.g. Sand Dune Adventures run by Worimi Local Aboriginal Land Council)
- Create an innovation precinct that celebrates ancient and emerging knowledge side by side
- Use the Williamtown Health Loop as a foundation to integrate and encourage people to connect with Indigenous heritage sites and values
- Implement cultural burning programs to develop partnerships with local Indigenous communities and land councils to promote education and sustainability
- Create opportunities for people to connect with all layers of the investigation area's heritage, including Indigenous, defense and built form heritage.

## Constraints

- Lack of tourist accommodation options
- Airport and RAAF base noise pollution
- Flood risk
- Bushfire risk
- Limited public and active transport networks and links
- Vandalism risk

# GEOLOGY AND SOILS




## Overview

The Investigation area contains a variety of soil types including dunes along Stockton Beach, estuarine soils through the middle of the investigation area generally located along Nelson Bay Road and Cabbage Tree Road, as well as Aeolian soils to the north of Cabbage Tree Road and Lemon Passage Road. The precinct geology largely comprises of coastal deposits (sedimentary layers of primarily wind-blown sand). Low dunes have high permeability, are prone to movement and are high in salt. There are also areas of muddy estuarine and alluvial floodplain, which are composed of smaller silt and clay particles and a bedrock of Mulbring Siltstone surfaces near the Grahamstown Dam. (Aurecon 2020, p. 38)

*Underlying the vegetation communities of this area is a sandy, sedimentary foundation that has received continual coastal, estuarine and alluvial floodplain deposits over time.*

**THE WILLIAMTOWN SAP LIES WITHIN THE BROADER HUNTER RIVER DELTA**

### *Legend*

- Williamtown SAP Structure Plan Boundary
- Williamtown SAP Investigation Area
- High Geology and Soil Constraints Ranking Area
- Moderate Geology and Soil Constraints Ranking Area
- Low Geology and Soil Constraints Ranking Area

## *Opportunities*

- Work with and value the existing geology and soils of the site, acknowledging the food and agricultural crops that would best align to them.
- Creatively remediate and repurpose mined areas within the SAP if they are disused or underutilised.
- Celebrate sand. Sand is a defining element of this area and could be celebrated in many ways.
- The Disturbed Terrain has been previously affected by human activity and may be appropriate for redevelopment if remediation is managed if/ where required.
- Typical light industrial development utilises shallow foundations that could reduce the need for temporary excavations support, dewatering and costs associated with PFAS management. It is noted that point load structures would require deep foundations.
- Use surcharge preloading to improve the underlying soils, support fill pads and reduce long term creep movements under embankments.
- Use driven piles and CFA solutions as an alternative to deep foundation excavations such as basement carparks.
- The majority of the road network can be raised to mitigate against flood impacts; however associated fill embankments may require preloading/ basal reinforcement.
- Alignment with Council's Coastal Management Planning
- The Newcastle Airport could develop an on-site waste to energy plant as part of international service expansions to manage bio security concerns and also contribute to the precinct- wide energy solutions.

## *Constraints*

- According to a Multicrieteria Analysis of Geology, Soils, ASS and Topography prepared by Aurecon, more than 3,000 ha of the SAP have an overall, combined constraints ranking of 2.5- 3 based on the likelihood of encountering geotechnical challenges when designing and constructing infrastructure. The dominant of which are disturbed material, ASS and organic or clayey soils.
- Poor nutrient content of existing soils.
- Soil contamination.
- High risk acid sulfate soil corridor from Tilligerry Creek to Fullerton Cove.
- Underlying active fault line demonstrated by the 1989 Newcastle earthquake.
- Any future development within the PFAS management plan area is to be consistent with the Management Plan to ensure appropriate remediation and management of high-risk areas is appropriately undertaken.
- Highly limited development areas include:
  - » Disturbed Terrain- due to uncontrolled fill placement to need removal and / or rework and/ or unknown excavation conditions.
  - » Bobs Farm- High Foundation Hazard due to High water tables. Deep foundations may be impractical to reach a bearing stratum and saline subsoils may be aggressive. Potential high cost of ground treatments to achieve standard performance criteria for infrastructure based on need for ground improvements, embankments and shoring.
  - » Alluvial Floodplain Deposits and Estuarine Swamp- instability and potential reactive subsoils. Soil removal and replacement required.
- Existing extraction activities (quarries in Fullerton Cove and Salt Ash) withing the SAP investigation area
- International flights can generate bio security hazards

# CONTAMINATION (PFAS AND NON-PFAS)


## Overview

PFAS have first detected in groundwater in the Williamtown area in 2011. From 2011 onwards, elevated levels of PFAS were detected during the routine monitoring program. The most extensive usage has been in firefighting foams at Newcastle Airport, RAAF Base Williamtown and Rural Fire Services establishments at Salt Ash Weapons Range where PFAS are known and confirmed. Additionally it has been identified that certian sites within the Williamtown SAP may have sub-surface Non-PFAS Contamination impacts related to its land uses and others factors (agricultural land uses, industrial land uses, asbestos)

(Aurecon 2020, p. 38)

***The primary constraint will be the need to extract and manage PFAS impacted groundwater during construction such that it does not adversely affect the surrounding environment, and subsequent operations at the SAP occur in ways that minimise or prevent the disturbance of PFAS impacted groundwater.***

### *Legend*

- Williamtown SAP Structure Plan Boundary
- Williamtown SAP Investigation Area

**NSW EPA PFAS Management Zones**

- Primary Management Zone
- Secondary Management Zone
- Broader Management Zone

**Non-PFAS Contaminated Land Constraints**

- High
- Medium
- Low

## *Opportunities*

- A key opportunity is to work closely and coordinate with the NSW Expert PFAS Panel to strengthen and reinforce the PFAS Management Area Plan.
- Groundwater flow direction to the south of Tilligerry State Conservation Area appears to constrain the extent of westward PFAS impact.
- Offset PFAS affected conservation areas with non- PFAS additional conservation land, strategically located within the SAP.
- Concentrate residential intensification of areas proximate/ outside of the SAP to villages that ate not affected by PFAS.
- Appropriate land uses can facilitate development if the potential soil and groundwater management measures are applied:
  - Avoidance – if groundwater disturbance can be avoided during construction and operations, or an area chosen which is not PFAS or non PFAS constrained
  - Isolation – isolating the SAP area from the PFAS or non PFAS groundwater contamination
  - Engineering controls – implementing active and/or passive control measures to mitigate impacts to the SAP area from PFAS or non PFAS contaminated groundwater
  - Administrative controls – implementation of non-engineering controls for PFAS or non PFAS management during construction
- There are no absolute statutory development restrictions due to PFAS contamination. However, all permitted development and consented development listed the Port Stephens Local Environment Plan 2013 and those works requiring referral under the Hunter Water Act 1991 are not constrained by PFAS contamination.
- Tomago Station 7 and 9 are not currently operational due to PFAS precautions. Consider this for increased development potential where PFAS can be managed.

## *Constraints*

- Results to date indicate that the drinking water network (Tomago Sandbeds) has not been affected by PFAS. As a precautionary measure, Stations 7 and 9 are not operated and Station 5 is operated 'with care' using a slow pumping and draw down monitoring approach (Hunter Water, pers. comm., 2020). This has reduced supply by approximately 10% making further reductions due to development challenging.
- The highest detected groundwater impacts are directly south of the base within the Primary Management Zone, extending up to Cabbage Tree Road.
- Elevated concentrations of PFAS were detected adjacent to surface water streams leading to the south of the Primary Management Zone however, PFAS concentrations reduced by an order of magnitude outside these areas, indicating groundwater impact is likely surface water derived. Surface water flow and increased volumes based on additional development will need to be closely planned, monitored and managed.
- Groundwater levels are very shallow in the Primary Management Zone and during heavy/prolonged rainfall surface expression of groundwater is exposing PFAS impacted groundwater to surface waters.
- Areas immediately west of the base within the Tilligerry State Conservation Area are also recording groundwater PFAS concentrations similar to those detected in the Primary Management Zone however, the groundwater flow direction to the south appears to constraining the extent of westward impact.
- To the east of the base moderately elevated groundwater PFAS concentrations are present across a large part of the Tilligerry State Conservation Area, extending up to Lemon Tree Passage Road and the Tilligerry residential area
- The highest groundwater PFAS concentrations are contained within RAAF Base Williamtown and the Newcastle Airport precinct.
- PFAS impacts within the SAP area have the potential to pose hazards to the construction and operations activities in the preferred site option. These hazards broadly consist of:
  - Hazards to onsite construction workers;
  - Hazards to future site users;
  - Hazards to the onsite and adjacent environment from construction activities disturbing or mobilising
  - PFAS; and
  - Hazards to the onsite and adjacent environment from site operations disturbing or mobilising PFAS.

# BIODIVERSITY


## Overview

Williamtown SAP contains a significant and diverse amount of vegetation and is home to a myriad of fauna. Aquatic ecosystems border the site in abundance, surrounded by wetland and swamp vegetation species. Two important green corridors run through the focus area, supporting the movement and migration of animal species.

***The Williamtown investigation area contains 43 vegetation communities, 2 endangered ecological communities, 11 threatened flora species and 32 threatened fauna species.***

**IMMEDIATELY SOUTH OF WILLIAMTOWN SAP LIES FULLERTON COVE, AN INTERNATIONALLY SIGNIFICANT RAMSAR WETLAND**

### *Legend*

- Williamtown SAP Structure Plan Boundary
- Williamtown SAP Investigation Area
- High Conservation Value Area
- National Park
- Nature Reserve
- State Conservation Area
- Existing Green Corridors
- Opportunity to Connect and Expand Conservation Areas

## *Opportunities*

- Contribute to achieving Goal 2, Direction 14 of the *Hunter Regional Plan 2036*: "protect and connect natural areas". This can be done by creating green links between Hunter Wetlands National Park, Tilligerry State Conservation Area, Worimi Conservation Lands, Medowie State Conservation Area and Tomaree National Park. This interconnected network will ultimately strengthen biodiversity and the ecological resilience of the area, whilst also providing a robust recreational network.
- Protect existing natural areas by positioning new development in low biodiversity value areas.
- Provide smaller biodiversity bridges and habitat stepping stones that link existing fragmented habitats and support migrating fauna.
- Rezone and revegetate areas with vegetation communities endemic to the area. Providence seed can be collected and grown by dedicated teams of revegetation specialists.
- Create new green belts or buffers that act as protective barriers from development (ERM 2020, p. 5).
- Create walking/cycling loops through biodiverse areas to present new opportunities for people to meaningfully connect with nature.
- Engage the local Worimi Green Team to revegetate areas and expand existing vegetation patches.
- The potential exists to offset development impacts on the Tomago Sandbeds by extending conservation areas

## *Constraints*

- Current land uses, zoning and ownership restrict the expansion of vegetated areas.
- Current road and infrastructure corridors create barriers and dangers for wildlife. Requirements for asset protection zones also limit areas where habitat can be established.
- Current soil conditions are limited in their ability to support vegetation establishment due to disturbance, contamination and their acid sulfate character.
- The Tomago Sandbeds/aquifer supplies the lower Hunter with drinking water, therefore development on these areas is heavily restricted.
- Ensuring biodiversity offsetting is successful through:
  - Consistent data collection
  - Securing biodiversity stewardship sites ideally within the investigation area
  - Engaging skilled and committed stewards working with effective management plans

# KOALA PROTECTION


## Overview

The investigation area contains a large amount of dry open and swamp forest that could support a significant koala population. Approximately 1,050 hectares of this is primary koala habitat. Further research is required to ascertain exact koala numbers within the Williamtown investigation area.

*The Port Stephens LGA is home to a vulnerable koala population. Preservation of this population is a key issue for the local community and one that with good precinct design can be enhanced and strengthened.*

**BY CREATING SAFE SPACES THAT PROVIDE FOOD, SHELTER AND WATER FOR KOALAS THE INVESTIGATION AREA CAN CONTRIBUTE TO PROTECTING LOCAL KOALAS INTO THE FUTURE**

### *Legend*

- Williamtown SAP Structure Plan Boundary
- Williamtown SAP Investigation Area
- Koala Record
- **Potential Koala Habitat**
- Unknown
- Primary
- Secondary

## *Opportunities*

- By installing technology to help monitor koala populations we can better understand their specific needs and threats within the SAP.
- Provide signage that educates people about issues facing koala populations
- Buffer zones, comprised of primarily koala habitat could envelop future SAP development that may pose a risk to koalas.
- Extend koala habitat areas and revegetate with a range of koala fodder species.
- Provide a range of points where koalas can go to access drinking water, particularly in times of drought, fire or heatwaves. Installing elevated water stations within tree canopies can help protect koalas against attack from ground-dwelling predators.
- Create multiple and a diverse range of underpasses/ overpasses that allow koalas and other fauna to cross transport/infrastructure networks safely.
- Decrease vehicle speed limits in areas to minimise the risk of koalas being hit by cars.
- Limit off-leash dog-walking areas to minimise the risk of dog attack on koalas.

## *Constraints*

- Development pressures within Port Stephens LGA
- Fragmentation of existing koala population due to prior land-clearing, development and infrastructure creation.
- Existing private ownership lots that are not koala-safe (due to the risk of dog attack).
- Feral animal control
- Weed control

# BUSHFIRE


## Overview

Ongoing bush fire management and mitigation strategies are required for any future development. The low bushfire prone areas (green) will locate the majority of any future implementations with care and consideration given for any high to extremely prone areas.

*The low risk level areas located outside of any National parks, reserves and conservation areas will locate a majority of any future development to reduce the risk of bushfire to the new site users.*

**ENCOURAGE CULTURAL BURNING FOR SUSTAINABILITY & EDUCATION**

### *Legend*

- Williamtown SAP Structure Plan Boundary
- Williamtown SAP Investigation Area

Bushfire Class

- Extreme
- High
- Moderate
- Low

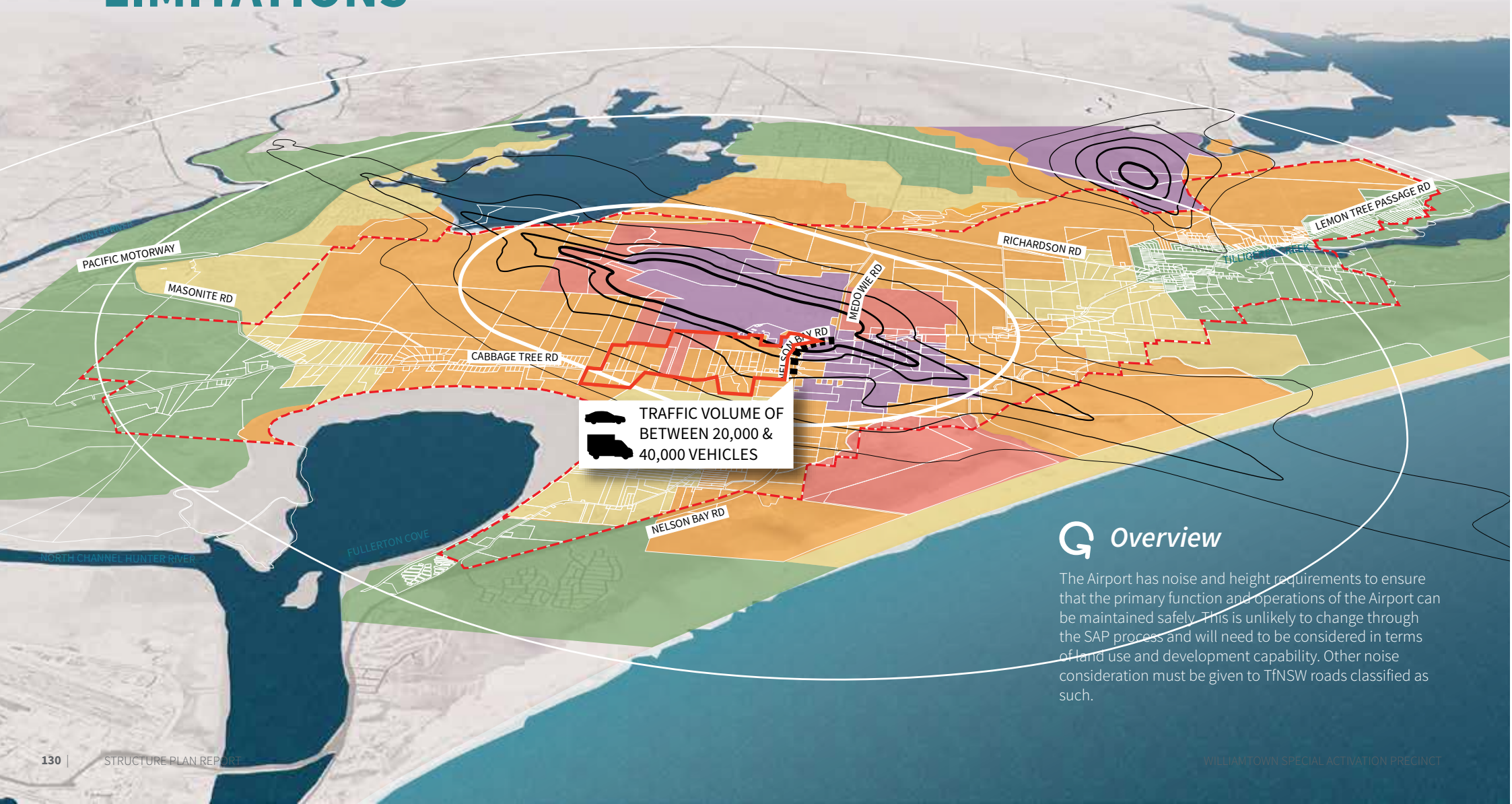
## *Opportunities*

- Opportunity to provide complying development on bushfire prone land with a Bushfire Attack Level (BAL) rating of less than 40, but additional clauses are to be met. The RFS in Planning for Bushfire Protection 2019 outline a series of protection principles to guide planning and development including controlling the types of development in bush fire prone areas (RFS 2019, p. 10). BAL Risk Assessment Certificates must be included in complying development applications. Designing with fire principles include:
  - Locating future development adjacent to existing roads or ensuring all new developments have compliant accessibility (See SEPP ECDC 2008).
  - Creating clusters of development (See SEPP 3D.6).
  - Incorporating safe spaces and evacuation routes that people and animals can move through/congregate during a fire.
  - Incorporating water bodies, limited canopy cover, and create small vegetation patches rather than continuous lines.
  - Selecting less-flammable plants in landscaped areas and incorporating windbreaks to trap embers and debris.
  - Ensuring access to reticulated water, rainwater collection infrastructure and on-site retention, water recycling, and fire hydrants.
- Existing low-lying areas can be used for water retention and a supplementary water supply to mitigate fire risk.
- Construction and maintenance of APZs around assets within the Williamtown SAP can be considered rather than reliance of protection measures of surrounding areas.
- Utilise controlled cultural burning to protect against extreme/out of control bushfires. This is a process that has been carried out for at least 50,000 years in order to assist regeneration, make pathways and assist in food gathering and production.
- Cultural burning processes can develop partnerships with the local Indigenous community and land councils to promote indigenous education and overall sustainability.

## *Constraints*

- Large parts of the Williamtown SAP are located within Bushfire Prone Land and have been signified as a high bushfire hazard.
- Small pockets of the Investigation Area are mapped as extreme.
- Bushfire season is predicted to increase in severity in future years.
- Consideration of appropriate site access points required due to predicted increase of traffic volume on roads.
- High risks to loss of visual amenity and biodiversity and other ecological values.
- Frequent dry lightning storms are prone to the region throughout bushfire season. Winds during these storms can cause difficulties in predicting behaviour and movement of bushfires.
- As the 2019/20 bushfires have shown, bushfires do not recognise boundaries.
- Can cause erosion and pollution to wetlands.

# AERONAUTICAL LIMITATIONS




## Overview

The Airport has noise and height requirements to ensure that the primary function and operations of the Airport can be maintained safely. This is unlikely to change through the SAP process and will need to be considered in terms of land use and development capability. Other noise consideration must be given to TfNSW roads classified as such.

***Under existing legislation 1,841 ha (16% of the precinct) of the SAP, near Fern Bay, Tomago and Salt Ash can be developed up to 45m (or approximately 15 storeys) without referral.***

## *Legend*

- Williamtown SAP Structure Plan Boundary
- Williamtown SAP Investigation Area
- Bird Strike Radius Group A
- Bird Strike Radius Group B
- Bird Strike Radius Group C
- ANEF Contours 20-25
- ANEF Contours 25-30
- ANEF Contours 30-35
- ANEF Contours 35-40
- ANEF Contours 40+
- Defence Boundaries
- Refer all Structures
- Refer Structures higher than 7.5m
- Refer Structures higher than 15m
- Refer Structures higher than 45m

## *Opportunities*

- Respond to a consistent Australian trend whereby 82% of people attended at least one arts, cultural and/ or live music event last year by locating noisy uses such as event spaces at the Williamtown SAP.
- Co-locate noise- sensitive land uses and facilities at high amenity locations such as surrounding waterbodies of Fullerton Cove, Grahamstown Dam and Tilligerry Creek.
- Acknowledge that land use limitations due to bird strike are not always prohibitive but rather seek creative, integrated solutions that does not affect aviation operations. Considerations may include building siting, location, height, lighting and plant species.
- In relation to Aeronautical Limitations & Bird Strike limitations, engage early with DoD and the Airport to understand potential land uses and streamline planning processes.

## *Constraints*

- We have no control over the noise within the SAP and this will limit the desirable future land uses.
- Other noise generating industries or uses in addition to the Airport include quarries and sand mining operations, as well as major roads.
- Transport for NSW identify Nelson Bay Road south of Newcastle Airport, between Cabbage Tree Road and Meadowie Road, as a road with a traffic volume of between 20,000 and 40,000 vehicles. On roads of this traffic volume, Transport for NSW recommend assessing noise levels and meeting noise level criteria outlined in the Environmental Criteria for Road Traffic Noise and levels stated in State Environmental Planning Policy (Infrastructure) 2007.
- Only 1841 ha of the Williamtown SAP, near Fern Bay, Tomago and Salt Ash can be developed up to 45m (or approximately 15 storeys) without referral.
- The potential upgrade of the runway to Code E (i.e. larger planes) may impact on the height and noise limitations.
- Certain land uses are to be avoided in accordance with Aurecon's Aeronautical Limitations & Bird Strike Baseline Analysis:
  - » Group A, 13km radius of runway- avoid putrescible waste disposal sites
  - » Group B, 13km radius of runway - development types are avoided within 3km or provide measures that prevent food sources attracting wildlife within 8km
  - » Group A, 3km radius of runway- measures to manage waste disposal and avoid; Race tracks, Sports grounds, Fair grounds, Outdoor theatres and Dine-in restaurants

# ACTIVE TRAVEL INFRASTRUCTURE




Figure 060. Land use plan (Source: 2036 Newcastle Airport Vision)



Figure 061. Newcastle Airport Vision for 2076 (Source: 2036 Newcastle Airport Vision)

## Overview

There are current plans to expand, and increase connectivity to, the active travel network including the Active Transport-Regional Cycle Plan and the Greater Newcastle Active Transport Plan. The route planning for future buses is critical to the activation and reduced congestion. This will only be viable with a destination - based multi modal strategy.

*The best way to improve liveability across Port Stephens is to invest in 'Walking/jogging/bike paths that connect housing to communal amenity (shops, parks etc.)'. (Port Stephens Placescore Executive Summary, 2020).*

**KEY TAKEAWAY**

**94 KM** **OF EXISTING CYCLEWAYS AND TRAILS**

### *Legend*

- Williamtown SAP Structure Plan Boundary
- Williamtown SAP Investigation Area
- Potential Williamtown Health Loop
- Bus Routes
- Bus Shelters
- Existing Cycle Path
- Proposed Cycle Path
- Trails
- Newcastle Airport
- Proposed Rail Link to Newcastle Airport

## *Opportunities*

- Link into the Active Transport-Regional cycle plan across the state, the Greater Newcastle Active transport plan and the unique Local Network that is generally recreational/ training.
- Establish the Williamtown Health Loop as an extension of the existing cycleways and/ or fire trails and recreation paths within the conservation areas.
- Multi purpose function and movement system based around the existing fire trails.
- Extend the local cycle network to connect Stockton, Fern Bay and the like but ensure the route connects destinations.
- The Williamtown SAP can be a demonstration project for Movement and Place implementation including bus stops with dignity, identity and wayfinding.
- Bus demand is key to achieving regular services and will require significant destinations along routes.
- Investigate solutions such as Wagga whereby on-demand service options work within a connected network organised around origins and destinations rather than in and out.
- Ensure all adopted infrastructure within the Williamtown SAP does not hinder future incorporation of technologies to support connected and automated vehicles.
- Electrical Vehicle charging stations and facilities to supplement the active travel, future- proof the network and leverage the emerging advanced manufacturing and energy industries.
- Optimise opportunities with a potential future fast rail connection between Sydney and Newcastle and leverage of these opportunities.
- Improve public transport links from Newcastle CBD to the Airport and to other centres such as Raymond Terrace and Medowie

## *Constraints*

- Local Cycle Network is generally recreational/ training and meander on Nelson Bay and Cabbage Tree Road.
- Existing cycleways are off road and shared but safety and speed are always an issue on 100kph thoroughfares.
- Nelson Bay Rd Project intersection treatments will need to facilitate permeability in all options.
- Current stock is mostly standard rather than increased quantity of smaller stock. This is heavily driven by school children patronage.
- Staggered bus times would reduce traffic but impacts patronage and is less desirable.

# TRANSPORT


## Overview

Current plans to expand, and increase connectivity to, the transport network include the Regional NSW Services and Infrastructure Plan, Greater Newcastle Future Transport Plan, and NSW Freight and Ports Plan. 'With more people being able to live and work in and close to the Williamtown SAP, opportunities will increase alongside the promotion of sustained growth which includes a well-functioning transport system.' (Aurecon Traffic and Transport Baseline Analysis, 2020)

*'It is important that key transport corridors and bus services are identified for Williamtown to support increased worker and passenger movements.' (Aurecon Traffic and Transport Baseline Analysis, 2020).*

## Opportunities

- As identified by the Regional NSW Services and Infrastructure Plan, a potential higher speed connection could benefit the SAP, as the SAP area and Newcastle could gain faster access for areas located to the north and south.
- To realise The Greater Newcastle Metropolitan Plan 2036 goal to achieve a 25 minute drive/ 45 minute bus ride between Newcastle City Centre and the RAAF, Airport and Aerospace Precinct.
- DAREZ presents a unique opportunity to build a unique industry cluster that is a catalyst for expansion of science, technology and manufacturing industries. Key transport corridors must be delivered to support increased worker and passenger movements.
- Freight is vital to the economy and growing within the SAP. There is the opportunity to increase freight efficiency by shifting some commodities away from road to rail and coastal shipping.
- Diversify and expand Port of Newcastle's trade base to include a wider range of exports.
- Leverage the improved direct access from the Pacific Highway to the Hunter Region Botanic Gardens, made possible through the M1 Pacific Motor way extension to Raymond Terrace, as a tourism attraction and enhanced green offering to the SAP.
- Improve the freight transport to/ from the SAP; attracting employees and investment.
- Promoting ridesharing can be a first step toward fostering more sustainable travel choices which can lead to additional public transport offering for the SAP. Thereby targeting increased public transport usage via multi-dimensional strategies.
- As the transport offering is improved throughout the SAP, the existing tourism industry will also reap the benefits. It is an opportunity to include the tourism organisations as stakeholders to further guide and motivate the development within the SAP.
- Being in close vicinity and having access to a major trade gateway at Newcastle Port is a significant opportunity.

## Constraints

- Newcastle Port is Australia's largest terminal for coal exports. Specifically, the top four commodities for the Port Stephens Statistical Area level 3 (relating to the SAP) including the below. The Cabbage Tree Road Sand Quarry also contributes a 29% increase in heavy vehicles. Freight and heavy vehicle movements are not going away and the character of streetscapes and pedestrian/ active travel amenity will always be impacted in key locations.
  - Manufacturing 43.6%
  - Construction Materials 39.3%
  - Alumina and Aluminium 12%
  - Waste 4.3%
- Further expansion is constrained by the pressure on the shared rail network in the Upper Hunter Valley and access via the New England and Golden Highways.
- Development within the SAP must not significantly impact road access and businesses in the region:
  - Nelson Bay Road, Cabbage Tree Road and Medowie Road provide key road access throughout the SAP for commuters and freight operators, any development will need to limit the impact on the efficiency of these roads.
  - Currently operating businesses (e.g. sand mining, WesTrac, Tomago Aluminium) are significant employment and economic drivers. They will need to be consulted throughout development to minimise impact to their business.

### Legend

- Williamtown SAP Structure Plan Boundary
- Williamtown SAP Investigation Area
- M1 Pacific Highway - Regional Fast Charger
- M1 Pacific Highway Motorway Extension to Raymond Terrace
- Roads
- Kings Hill Concept Access Road
- Potential Higher Speed Connection

# NELSON BAY ROAD UPGRADE OPTIONS


## Overview

The Nelson Bay Road Upgrade Testing provides online, partially offline and completely offline options to ease traffic congestion along the current alignment. Economic impact and opportunity, environmental, active travel and urban consolidation consideration must be given to the broader intent and movement network of the Williamtown SAP prior to establishing a preferred option.

***The Williamtown to Bobs Farm duplication is the last major piece of this upgrade creating about 600 jobs. The various options will be explored as part of the EBD #1 Scenario Testing.***

**THE OFFLINE OPTION REQUIRES 1-2M ELEVATION SOLUTION**

## Pros

- Work closely with TfNSW as part of the master planning process to determine a preferred alignment that will benefit the future development of the Williamtown SAP
- The duplication of the existing
- The blue option provides better travel times.
- Orange offline  option is preferred within the community submissions (90% in support)
- Orange offline option provides less restrictions to the existing Nelson Bay Road alignment in terms of limited access. This provides the opportunity to unlock development potential along existing Nelson Bay Road.
- Orange offline option may provide employment diversification opportunities in the form of an energy corridor whereby solar farms or the like; which are not impacted by flood prone land or lack of direct connectivity to some of the more urban/ active uses envisaged for the Williamtown SAP core.
- The flood free elevation of the orange option could be designed as bridge and/ or viaduct structure providing permeability, environmentally sensitive response and opportunity for innovative on-site design and manufacturing.

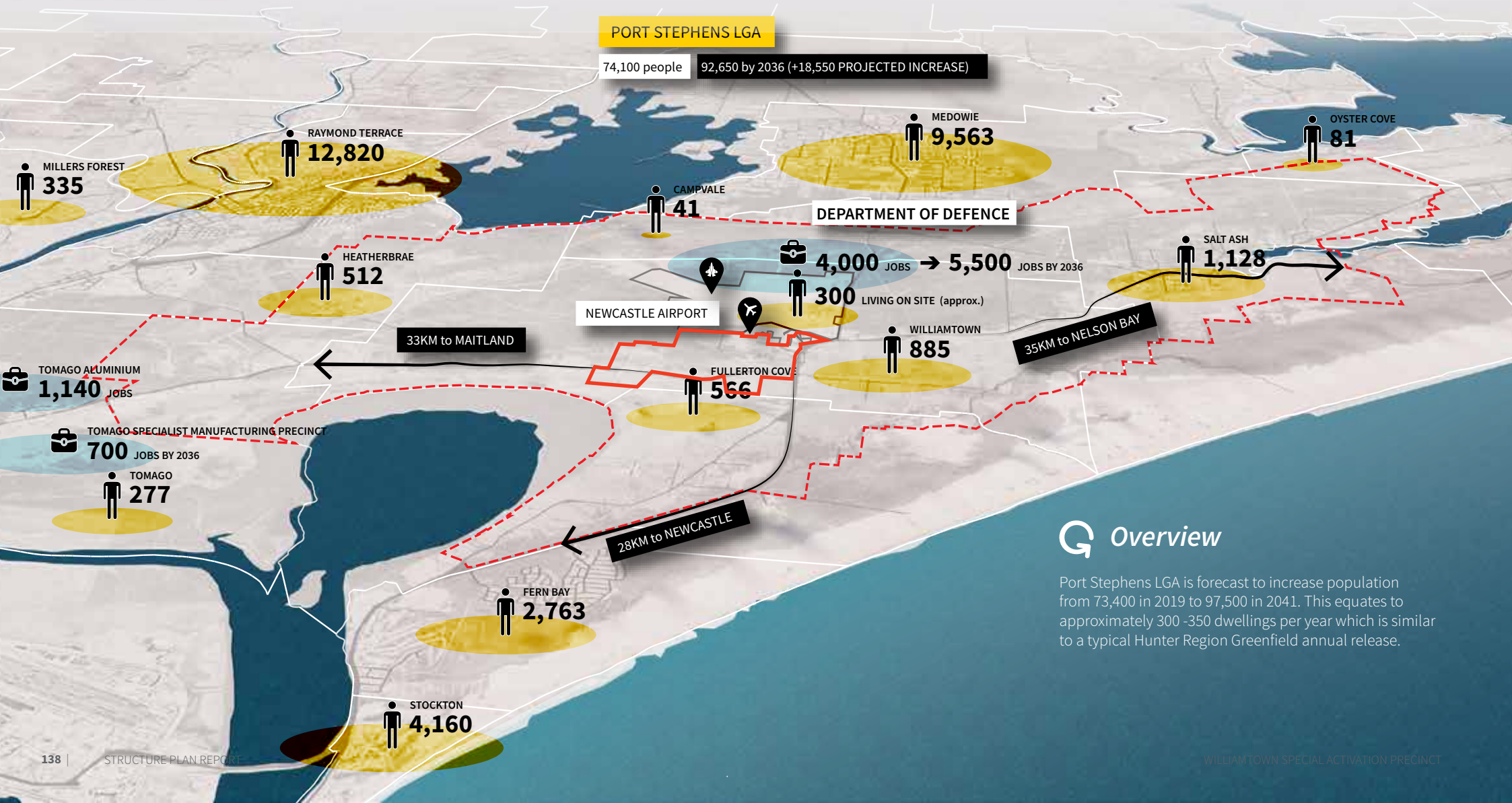
## Cons

- All options will have a minimum speed of 80kph which is not ideal for active transport and/ or bus stop safety.
- The Nelson Bay Road orange offline option would require 1-2m lifting to be flood free in a 1:100 flood event. The interface to development, perpendicular movement and landscape would need to be managed to mitigate the road as a barrier.
- Orange option limits access to surrounds with sand quarry operations access only.
- Orange option reduces movement economy along the existing Nelson Bay road and will impact existing business viability.
- Orange option will require environmental testing and response.

### Legend

- Williamtown SAP Structure Plan Boundary
- Williamtown SAP Investigation Area
- Option 1 - Widened Nelson Bay Road
- Option 2 - Nelson Bay Road Alternative Alignment 1
- Option 3 - Nelson Bay Road Alternative Alignment 2

# POPULATION & JOBS




## Overview

Port Stephens LGA is forecast to increase population from 73,400 in 2019 to 97,500 in 2041. This equates to approximately 300 -350 dwellings per year which is similar to a typical Hunter Region Greenfield annual release.

*There is currently an inbuilt (internal and immediately peripheral) residential population catchment of approximately 26,000 that can be leveraged to activate, commercially support and work and play within the Williamtown SAP.*

**KEY TAKEAWAY**

**36%** **OF THE WILLIAMTOWN SAP IS CURRENTLY DEVELOPED**

*Legend*

- Williamtown SAP Structure Plan Boundary
- Williamtown SAP Master Plan Investigation Area
- Population
- Number of Jobs

## Opportunities

- Create new job opportunities, leveraging off existing clusters and industries as well as existing skills base in Hunter Region.
- Defence/ Airport Cluster- ancillary industries of tourism, education and freight and logistics.
- Defence/ Aerospace Cluster- will have knowledge share/ skills capabilities benefits that will support mining and education industries.
- Airport/ Aerospace Cluster will have cargo/ freight logistics benefits that will support ancillary industries of agribusiness, tourism and mining.
- Economic Corridor- New vehicle infrastructure will promote movement economy/ freight expansion.
- Recreation/ Ecology/ Tourism/ Culture Nodes- create authentic destinations supporting and attracting businesses and promoting the growth of existing, proximate residential clusters.
- Residential Villages- existing residential villages will have the capacity for housing, culture and mixed growth based on the rebranding and regional economic growth.
- Identify opportunities, in proximate and existing residential settlements, for increased residential density and/ or mixed use centres which would further activate the Williamtown SAP and create logic for meaningful social infrastructure such as the elite aquatic facility that facilitates as long term community and investment.
- Support the strategic and smart growth of existing surrounding centres such as Medowie, Fern Bay, Stockton with a focus on attracting the future Williamtown workforce.
- Provide on- site training and up-skilling for existing residents. This does not have to be the advanced manufacturing and/ or aerospace training but could utilise shared facilities, educators and/ or provide other social collaboration/ collision opportunities.

## Constraints

- 76% of people working in Port Stephens also reside there. It is expected that roads connecting Port Stephens south and southwest will remain busier unless internal movements are designed to significantly change the network and capacities.
- Williamtown residential population is unlikely to significantly grow, and many of the people that choose to work in Williamtown will often reside in other LGAs, Maitland, Newcastle, Lake Macquarie which are all 30 mins away.
- There are zoning complexities to facilitating residential within a Williamtown SAP whereby the economic growth and jobs are the priority.
- Staging- A permanent population attracts industry but industry attracts a permanent population.
- Residential land use will be the most constrained by the hydrology and contamination issues.

# POINTS OF INTEREST


## Overview

According to the Port Stephens Placescore Executive Summary, 2020; Port Stephens' "best performing attribute" is considered to be its natural environment (natural features, views, vegetation, topography, water, wildlife etc.) whilst the "worst performing attribute" is the lack of local employment opportunities (within easy commute) as well as a 'lack of things to do in the evening.

*Culture is a bigger economic generator than agriculture and employs more people than mining. Regular access to culture improves educational attainment. It helps with health and well being. It fosters a sense of belonging.*

(The Conversation)

**>10,000** **IMMEDIATE HOMES SEEK ENTERTAINMENT, LEISURE AND CULTURE OUTSIDE OF THE WILLIAMTOWN SAP**

### *Legend*

- Williamtown SAP Structure Plan Boundary
- Williamtown SAP Investigation Area
- National Park
- Sand Dunes

## *Opportunities*

- The Murook Cultural Centre is an extraordinary community asset and should be a model and catalyst for community gathering, empowerment and activation.
- Create community nodes to support the Defence families and encourage them to spend more time in Williamtown rather than the satellite suburbs where they reside.
- If designed and curated correctly, the Astra Aerolab Precinct could provide on-site activities and destinations for their own employees as well as locals and surrounding students and employees.
- Locate and design community spaces and facilities as innovation and collaboration hubs.
- Leverage the significant economic contribution that the eco-tourism industry already provides to the region in peak season by providing enhanced north- south connections and eco- tourism accommodation opportunities.
- Provide a large scale and destinational entertainment or event facility, not impacted by noise, that leverages off proximity to the Airport.
- Meet Council's objectives within the Port Stephens 2020 to 2021 Community Advocacy Priorities to provide a high class, multi-functional sports complexes at Williamtown rather than Nelson Bay and Raymond Terrace that will significantly enhance the region's visitor economy and drive demand from national sports event organisers, particularly in the off-peak tourism season.
- Create unique and identifiable character areas or clusters to attract investment and tenants that are distinct from Newcastle in order to attract skilled and younger people without needing to compete with Newcastle.
- Raymond Terrace Central Library, located 10km from the Williamtown SAP, could be a catalyst for enrichment uses and redevelopment potential at Raymond Terrace including residential.

## *Constraints*

- Currently there are very few reasons to remain in Williamtown beyond a worker/ visitor primary purpose.
- Skilled workers and younger demographics choose to live in Newcastle and will likely continue to do so.
- There is untapped potential at Williamtown if we cannot facilitate quality, competitive offerings where people can work and play within WIlliamtown within close proximity to sufficiently diverse living opportunities. This requires spatial considerations to connect existing surrounding residential settlements to key destinations within Williamtown. Upzoning to accommodate a mix of uses and increased densities in surrounding settlements may also be beneficial for activation and employee attraction.
- The future residential population and lack of centre designation within Williamtown makes it inappropriate for a much needed elite aquatic facility and/ or significant social infrastructure.
- Key destinations are less then convenient in terms of proximity/ time:
  - » Newcastle to/ from the Airport- 1 hour public transport and 30 minutes by car
  - » Dunes to/ from the Airport- 20 minutes by car

# COMMUNITY PROFILE

*In the following analysis, existing and aspirational key personas have been identified that reinforce the continued and evolving objectives of the SAP.*

*Their values, lifestyles and routine have been analysed to identify specific design implications and help inform the spatial planning for the SAP.*

## HIGHLY SKILLED WORKERS

There is currently 4,000 people on site working and living with a forecast of up to 5,500 by 2044. There may be up to 300 personnel living at the base. The Defence industry employs 39.1% of employed people living in Williamtown (ABS 2016).

### VALUES & LIFESTYLE

- Routinely work Monday to Friday
  - » Seeking weekend activities, including trendy brunch spots
  - » With a dedicated lunch hour (12 - 2pm), they are looking for grab-and-go, cheap lunch options, as well as higher brow places for lunch with colleagues
  - » Value quality open spaces to rest and enjoy breaks
  - » Desire easy access to and from workplace
- Routinely work standard office hours (8am - 5pm)
  - » Seeking early morning and after work activities including health and fitness programs
- Social work culture
  - » Desire options for social events and after work drinks, particularly on a Friday
  - » Value a sense of being part of a community, rather than being in isolation

### DESIGN IMPLICATIONS

- Co-location of industries and institutions with similar and/or complementary skills, knowledge set and culture to form innovation clusters from which to be inspired and with which to collaborate
- Co-located bars, restaurants and gyms with place of work
- Multi-modal connections to and from place of work
- On site accommodation or within close proximity
- Child care and schools located on the way to place of work

## 24 HR DEFENCE PERSONNEL

The RAAF base operates 24 hours, 7 days a week meaning the site is active around the clock. Ideally, personnel should benefit from 24 hour access to services that are either on site or in the near vicinity of the base.

### VALUES & LIFESTYLE

- Work around the clock
  - » Seek after hour activities including gym and food places
  - » With a dedicated lunch break, they are looking for grab-and go, cheap lunch options even after normal working hours
  - » Desire easy access to and from workplace
- May reside in on-site accommodation for easy access to work place
  - » Desire access to ‘third spaces’ - communal places that encourage and support people socialising and gathering
- Transient, often from another city
  - » Seeking a sense of community

### DESIGN IMPLICATIONS

- On site or proximate accommodation and activities such as 24 hr gym and food and beverage outlets
- After hours public transport services

## STUDENT

With the exploration of education and R&D partnerships in the SAP, students are likely to be attracted here. Currently, of the 27.4% of people attending an education institution in Williamtown, 8.3% were in a tertiary or technical institution. (ABS, 2016)

### VALUES & LIFESTYLE

- Reside in student style/shared accommodation
  - » Desire access to 'third space' - communal places that encourage and support people socialising and gathering
- Likely to use alternative modes of transport (walk, cycle, public transit) for daily life essentials, and to get to places of work, attractions and places of interest
  - » Value quality active travel routes and frequent public transit services
- Spend discretionary income on food and beverages during the day and night-time at affordable price points
  - » Attracted to late-night restaurants, bars and weekend brunch spots
- Transient, often from another city/country
  - » Seeking entertainment and restaurants to host and show off to visiting friends and family
- Have an irregular routine characterised by frequent time voids throughout the day
  - » Desire a diverse range of public open spaces that are welcoming and where they can participate in activities such as studying, socialising and relaxing
  - » Seek experience-based activities

### DESIGN IMPLICATIONS

- Co-located uses such as student accommodation, open spaces, food and beverage outlets at affordable price points including late-night restaurants and bars
- Multi-modal connections to and from educational institutions, Newcastle city and surrounding recreational destinations including beaches and national parks
- Opportunity for shared uses for student and defence personnel accommodation

## ECO-TOURIST

With passenger airline travel expected to increase and the potential for international flights, more tourists will be choosing to fly to Newcastle in the future. This key persona will be attracted to the SAP to experience its pristine natural areas including national parks and conservation areas that foster environmental and cultural understanding, and conservation.

### VALUES & LIFESTYLE

- Seek to explore and learn from sustainable activities and environmental areas/organizations during the day
  - » Value sustainable modes of travel, living and food production
  - » Looking for after-dark activities and food and beverage options
- Staying in a range of accommodation depending on budget from camp sites and hostels to hotels or Airbnb accommodation
  - » Attracted to quality green open spaces for relaxation
- Looking to be immersed in the authentic local culture
  - » Seek activities that are unique to the cultural fabric of the SAP
- Travelling mostly on foot, but also public transport
  - » Require effective wayfinding, frequent rest points, enjoyable walking paths and reliable transit services

### DESIGN IMPLICATIONS

- Opportunity for shared accommodation uses with students and defence personnel
- Reliable transit services to and from airport and accommodation options, and destinations including beaches and national parks
- Effective way-finding and legible spatial layouts
- Frequent rest spaces

# APPENDIX

# 04

# LANDSCAPE CHARACTER ANALYSIS

# LANDSCAPE VIEWS


## OVERVIEW

There are expansive views from Stockton Bridge which capture the south east entry to the investigation area. Within the site the key most unique views are to the east to the Stockton Sand Dunes. The most common prevailing views consist of open rural landscapes and the Tilligerry State Conservation Areas consisting of native bushland.

The relatively flat topography minimises the opportunities for elevated vantage points, instead long expansive views can be captured across the cleared vegetation areas.

## VIEWS

**Image 1:** Prior to entering the SAP, the Stockton Bridge provides extensive views across the SAP due to its elevation. From here, there are views across the North Channel Hunter River, Stockton Sand Dunes and the ocean. The combination of these and the Conservation Areas, provides an outlook to what lies ahead.

**Image 2:** The cleared rural landscape provides direct views to the back of the Stockton Sand Dunes. Developing a connection to the coastal typology of the site.

**Image 3:** The Stockton Sand Dunes are famous for many activities. Although located outside of the SAP, they are a key attraction that bring people in. Due to the scale, and topography of the dunes, the views here are significant.

**Image 4:** Although surrounded by water, there are very few opportunities to visually connect with water in the SAP. The northern edge of the SAP is one opportunity that allows for vistas across the Grahamstown Dam.

**Image 5:** A large portion of the SAP is home to uncleared dense native bushland. There are many different types of ecological communities, giving a variety of views and outlooks.

**Image 6:** A significant portion of the SAP has been cleared to accommodate agricultural and development purposes. This cleared land accommodates expansive views capturing the areas iconic rural identity.



Photo Credit: 4WD Tours R us. https://www.nationalparks.nsw.gov.au/things-to-do/guided-tours/worimi-sand-boarding-with-4wd-tours-r-us




# LANDSCAPE CHARACTER AREAS

## OVERVIEW

Williamtown's strategic location set between Newcastle and Port Stephens establishes its identity as a rural hub that is at the brink of economic growth, technological advancement and tourism. Its existing character is defined by the prevalent aviation activities that take place at the RAAF base and Newcastle Airport which are situated at the heart of the investigation area.

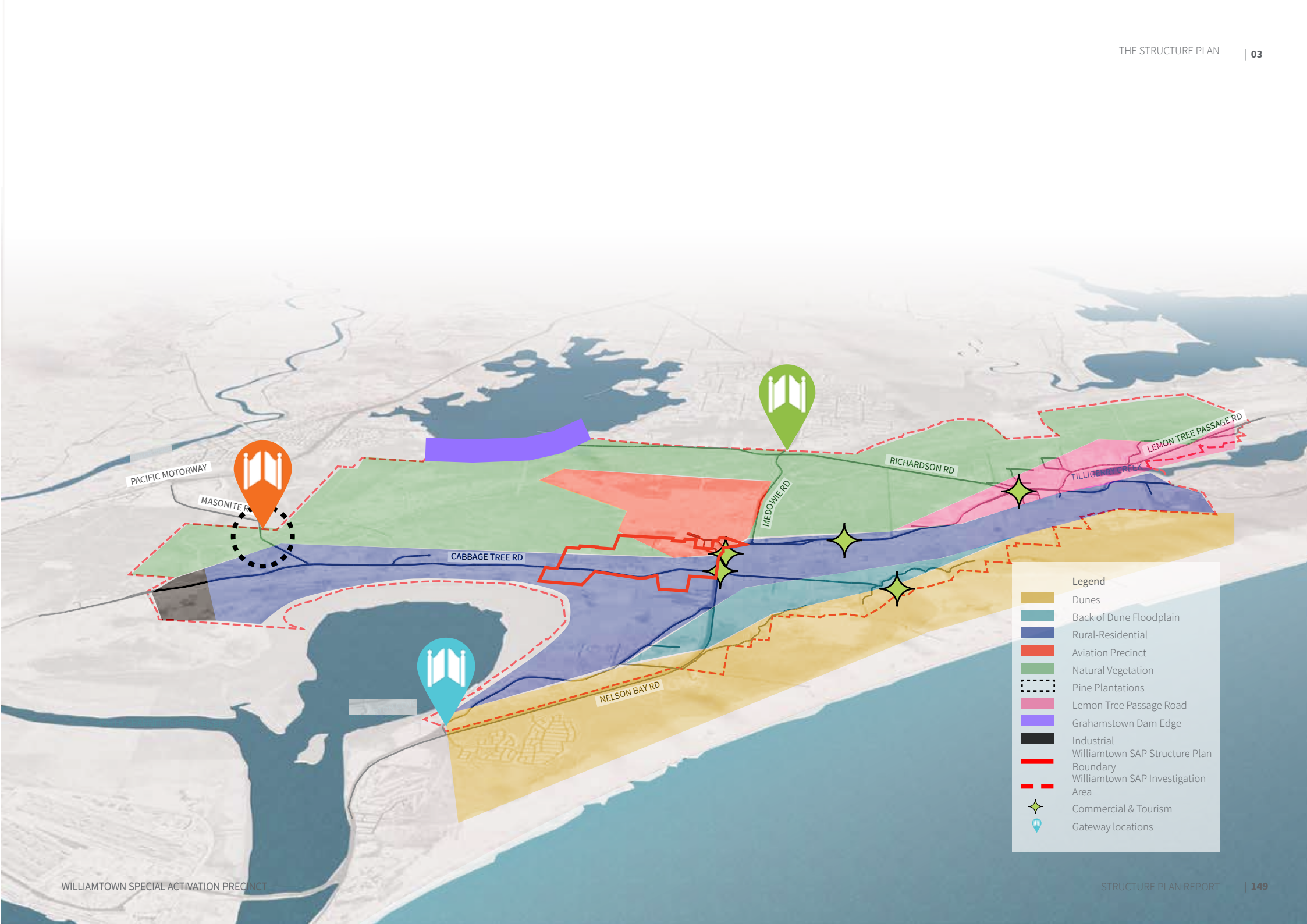
The commercial and defense aviation aspect begin to set the tone and pace of this rural area and its surrounding character. The investigation area is defined by low density rural residential housing; the vast expanse and openness of farmlands engaged in animal grazing and hobby farming; pockets of industrial activity in areas located closer to Tomago and Salt Ash; and tourism interests that are generated by commercial entities such as Fighter World, Quadbike tours and the Stockton Bight Sand Dunes.

The investigation area's surrounding context also has a large impact on its identity which is transitioning from a rural agricultural hub to a center for economic growth and innovation. Surrounding towns such as Meadowie, Raymond Terrace, Heatherbrae, Fullerton Cove and Fern Bay host small residential populations. Tomago's strong industrial character spills into areas at the western edge of the investigation area whereas the eastern edge is characterised by low to medium density rural housing in Salt Ash, along Lemon Tree Passage Road and around Tilligerry Creek. The Stockton Bight Sand Dunes and Hunter Wetlands National Park along the southern edge of the investigation area inhibit the extension of agricultural and industrial activity and contain these land uses along Nelson Bay Road and Cabbage Tree Road. In many ways the Tilligerry State Conservation Area which spreads across the investigation area encompasses and contains these activities in the low-lying flood-prone agricultural land parcels along these two major roads.

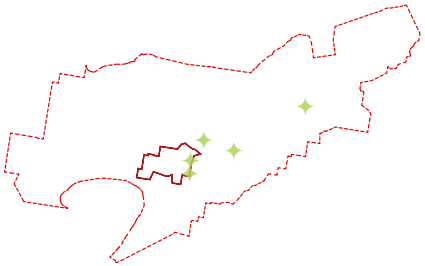
The overall topographical character of the site varies gradually with gentle undulations along the north to a more flat, low-lying character in the central areas which extend across most of the site from west to east; followed by the dunes which create a topographical barrier and present a dramatic change in the landscape's visual character. Together, these elements are experienced at various scales which range from human to bird's eye levels. Their quintessential natural character allows them to be recognised as distinctive landscape character typologies that have associated scenic values and sensitivity to change.

A visual assessment of the arrival experiences at the gateway entry locations and prevalent character areas offers a baseline study for the subsequent analysis and identified opportunities and constraints. The following arrival experiences and character precincts have been identified in the investigation area:

- Gateway 1: Nelson Bay Road
- Gateway 2: Masonite Road
- Gateway 3: Medowie Road
- Aviation precinct
- Rural-residential character
- Lemon Tree Passage Road precinct
- Industrial character
- Commercial and tourism character
- Grahamstown Dam edge character
- Back of dune floodplain
- Dune character
- Natural vegetation character
- Pine plantations


PACIFIC MOTORWAY
MASONITE RD
CABBAGE TREE RD
MEDOWIE RD
RICHARDSON RD
LEMON TREE PASSAGE RD
TILLIGERRY CREEK
NELSON BAY RD
Legend
Dunes
Back of Dune Floodplain
Rural-Residential
Aviation Precinct
Natural Vegetation
Pine Plantations
Lemon Tree Passage Road
Grahamstown Dam Edge
Industrial
Williamtown SAP Structure Plan Boundary
Williamtown SAP Investigation Area
Commercial & Tourism
Gateway locations

# COMMERCIAL & TOURISM



## OVERVIEW

Currently tourism activities include quad bike tours and four-wheel drive dune experiences at the Stockton Bight Sand Dune Adventures, Fighterworld, the Worimi Cultural Centre on Nelson Bay Road and the Oakvale Widlife Park.

Commercial nodes include fast-food outlets, petrol stations, and truckstops with associated small scale groceries and food stores.

The landscape character of these nodes is highly modified. In order to attract patronage, these outlets have a very obvious presence from the road networks, with little in the way of softening of the built form elements. Large billboards are dotted along the road edge on the approach to these nodes and significantly impact the visual quality of the area.


### VISUAL SENSITIVITY: LOW

**Susceptibility to change**: The existing landscape is highly modified to suit the functions of these nodes and comprises of a mix of native and exotic vegetation.

**Value of the landscape:** Low landscape value of modified areas.

### SCENIC VALUE: LOW

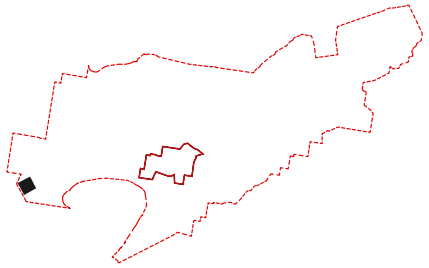
The scenic value of these nodes can be classed as low. These nodes offer minimal existing vegetation and prohibit views to the surrounding context.

## OVERALL VISUAL QUALITY RATING

***Low visual quality***

Highly modified spaces with minimal softening of built form elements, contribute to the low visual quality of this landscape character.

# INDUSTRIAL CHARACTER



## OVERVIEW

The western edge of the SAP comprises of large-scale industrial activity which takes place at the Westrac CAT NSW head office.

Further west outside the SAP is the Tomago Industrial Area, which is one of the largest industrial sites in the region. The area is largely flat, low-lying and cleared, offering expansive views to surrounding areas.

### VISUAL SENSITIVITY

**Susceptibility to change**: The existing area has been highly modified from its original condition. Current industrial facilities and road networks suggest it has a low sensitivity to further change.

**Value of the landscape:** The landscape value can be categorized as low. The surrounding landscape consists of marshlands and remnant agricultural lands with little existing vegetation remaining.

### SCENIC VALUE

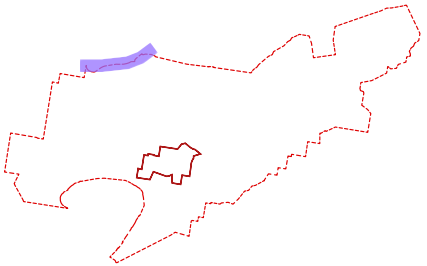
Views to the surrounding marshland and vegetation corridors are visible in the distance which offers a low to moderate scenic value. The scenic value of the existing industrial facility can be classed as low, due to its heavy visual impact in the landscape and low level of screening to facility boundary.

### OVERALL VISUAL QUALITY RATING

***Low visual quality***

Cleared, open landscape character with industrial elements contribute to the low visual quality.

# GRAHAMSTOWN DAM EDGE



## OVERVIEW

Grahamstown Dam lies just outside the Williamstown SAP but its edge can be accessed via Finnan Park. A large expanse of water, associated infrastructure, minimal canopy cover and close proximity to major roads conntribute to its overall character.

Adjacent and to the south of this area runs a cycle path, which is lacking in shade amenity and safety provisions. When travelling in both east and west directions one can see across the large lake, as well as views into the Tilligerry Sate Conservation Area.

### VISUAL SENSITIVITY

**Susceptibility to change**: Due to Grahamstown Dam being the Hunter's largest drinking water supply, protecting water quality is a high priority and may put restrictions on the level of change in this area. Seasonal change in regard to rainfall and drought sees water levels fluctuate over time.

**Value of the landscape:** The value of this landscape can be classed as moderate. Although, this is a heavily modified landscape, its does offer expansive water views and provides habitat for aquatic animals and birds.

### SCENIC VALUE

Little variation in visual experience combined with the presence of infrastructure and traffic noise reduce the scenic value of this highly engineered landscape.

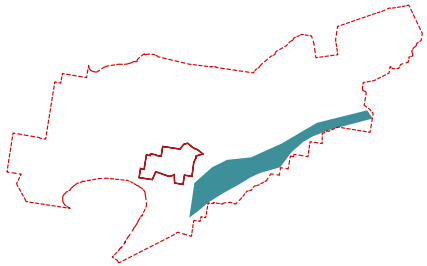
The edge of the dam offers a small range of vegetation variety and no canopy cover, contributing to an exposed and expansive water body vista.

### OVERALL VISUAL QUALITY

***Moderate visual quality***

Overall the visual quality of the dam's edge can be classed as moderate due to the prevalence of water and distant vegetation.

# BACK OF DUNE FLOODPLAIN



## OVERVIEW

Scarred gaps in dune vegetation from sand mining creates a dramatic backdrop for this flat floodplain. Typically the soils here are poor in quality and prone to inundation, making them unsuited to carrying high volumes of stock and land uses sensitive to flooding.

The native vegetation has been cleared and is now dominated by introduced pasture varieties and weeds. Vast expanses of pasture are dotted with remnant native trees, infrastructure poles and overhead power lines.

### VISUAL SENSITIVITY

**Susceptibility to change**: Having been cleared for agricultural use, this landscape does not have a high susceptibility to change. Although, due to its flood-prone nature, high water table, geology and soils, further development on this land presents multiple challenges.

**Value of the landscape:** Views of the dunes can be considered as high in value, due to their scale and form.

### SCENIC VALUE

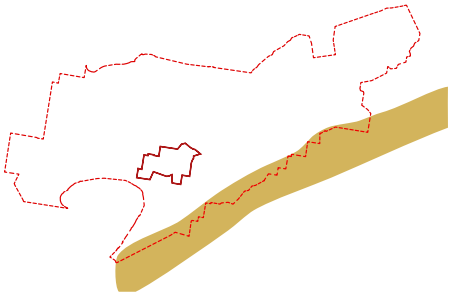
The elevated dune backdrop adds to the scenic value of the area, the sand hinting at the proximity of the ocean. However cleared paddocks and electrical infrastructure limit the overall scenic value.

### OVERALL VISUAL QUALITY

***Moderate visual quality***

Overall the visual quality of this landscape is moderate, considering in combination the dunal backdrop, infrastructure and agricultural elements.

# SAND DUNES



## OVERVIEW

The sand dunes stretch all the way from Stockton in the south to Anna Bay in the north. The dunes exhibit one of the most significant topographical changes in the study area, although the majority of this landscape lies outside the SAP.

This sandscape is also comprised of diverse vegetation communities such as dry open forests, and coastal heath and fern forests. Various adventure/tourism activities are based here including quad-biking, four-wheel driving, camel and horse riding, and camping. Much of the area is owned by the Worimi Land Council, and operate the Worimi Regional Park and Conservation Lands.


### VISUAL SENSITIVITY

**Susceptibility to change**:
Although not conducive to development due to the mobile nature of the dunes, they are still highly susceptible to change.

**Value of the landscape:** The value of the landscape can be classed as high, although there has been some sand mining in the area. The dunes provide a large barrier against the prevailing eastern winds as well as habitat for many ground dwelling species.

### SCENIC VALUE

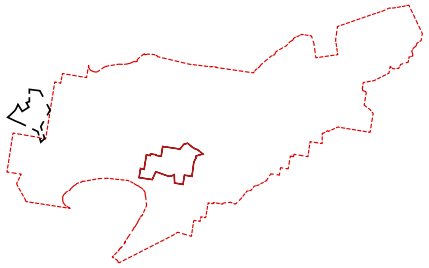
The dunes offer a variety of focal points which can been seen from throughout the SAP due to their contrasting elevation and undulating form. In concert with native vegetation and the ocean, the dunal system offers high scenic value.

### OVERALL VISUAL QUALITY

***High visual quality***

The overall visual quality of the dunes can be classed as high. When viewed from above (arriving aircraft), their presence is dominating in the landscape, and when viewed from ground level their size dwarfs all other elements within the SAP. They are relatively untouched by development and are home to high quality coastal vegetation.

# PINE PLANTATIONS



## OVERVIEW

Pine plantations can be found within the north-west region just on the edge of the SAP. The plantations have a uniform visual character typified by straight trunks and regular planting grids. Lacking understorey layers and densely planted, this monoculture contrasts greatly with the native vegetation communities that also populate the SAP.

### VISUAL SENSITIVITY

**Susceptibility to change**: Being a plantation and destined for harvesting at peak maturity, this area has low susceptibility to further change.

**Value of the landscape:** The landscape value can be classed as low. The landscape is highly modified, and provides little in the way of food and habitat for native species.

### SCENIC VALUE

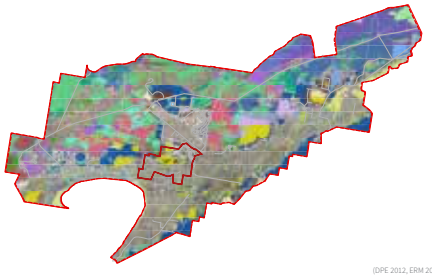
Heavily modified landscape and significant exotic plantings significantly reduces the scenic value of the area.

### OVERALL VISUAL QUALITY

***Low to moderate visual quality***

Pine plantations along Medowie Road represent a high modified landscape but add to the green footprint in the investigation area.

# NATURAL VEGETATION



(DPE 2012, ERM 2020)

## OVERVIEW

The Williamtown SAP contains a significant amount of dry open forests, swamp forests and Wallum/heath vegetation communities, many of which lie within the Tilligerry State Conservation Area. Smaller sections of sedgelands and shrub swamps can be found in patches south of Grahamstown Dam, around the Tomago Sandbeds, and dotted throughout the SAP. Estuarine communities border Fullerton Cove and Tilligerry Creek around the community of Salt Ash.

### VISUAL SENSITIVITY

**Susceptibility to change**: Existing native vegetation communities are highly sensitive to further fragmentation and adverse change due to a range of pressures including land-clearing for agriculture and development, pollution and climate-change. Many of these areas lie within Tilligerry State Conservation Area so are protected at present.

**Value of the landscape:** High value due to the diversity of plants, animals and vegetation communities.

### SCENIC VALUE

Due to the vast range of vegetation communities that exist within the SAP, each with unique keynote species that characterise the visual character of the community, the scenic value of these areas is high.

### OVERALL VISUAL QUALITY

***High visual quality***

Various vegetation communities prevalent within the Tilligerry State Conservation Area present a very high quality landscape. They offer immense visual quality to the investigation area.

# APPENDIX 05

# CASE STUDIES- GLOBAL BEST PRACTICE

CASE STUDY:
# INTEGRATED EDUCATION

**Key Take Out**

*Integrated mixed-uses within a building leverage opportunities provided by co-locating uses*

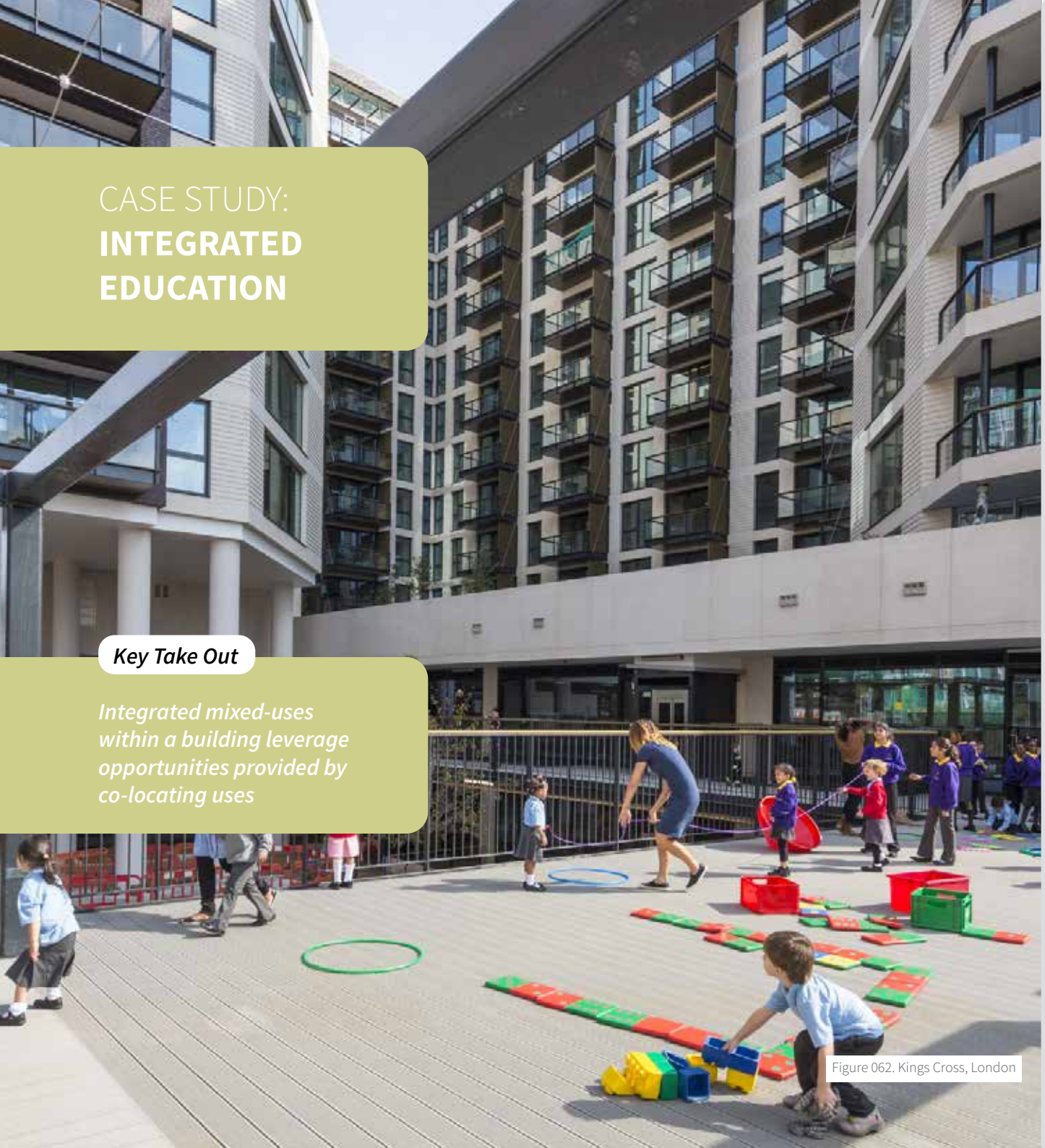


Figure 062. Kings Cross, London

## Quick facts

Typology

No. of Dwellings
School 1

School 2
Height

## Overview

As the King's Cross community grows, the Academy will expand to serve. The school joins up with world-class organisations in the surrounding area. That might mean exploring technology with Google; journalism with the Guardian; medicine at the Francis Crick Institute; or understanding nutrition at the Waitrose cookery school. Pupils are also be able to learn about nature at Camley Street Natural Park, and grow their own food with Global Generation at the Skip Garden

## Opportunities & challenges

- Delivery of a school within a high density development presents an efficient opportunity to MIX residential development with community needs
- Integrated community services create a distinctive residential offer to the market - and a clear benefit to families - in this case the schools specific needs for Deaf Children
- Collaboration between developers , the masterplanner and local residents as part of community engagement
- A risk the interfaces between school and residential will require observation and adaption over time

CASE STUDY:
# MICRO HOTEL

**Key Take Out**

*A home-office hybrid provides an affordable choice for short to medium term accommodation that adds to the diversity of the city*


Figure 063. Zoku, Europe

## Quick facts

| | |
|---|---|
| Typology | Hotel |
| No. of Dwellings | 133 micro-apartments ranging in size from 24 to 46sqm |
| Uses | Shared living spaces, Co-working and maker space, Library, Kitchen, Pantry, Roof Terrace, “Music Corner”, Game room, Gym, Spa |

## Overview

Hotel consisting of micro apartments

- Shared social spaces and programmed to encourage locals and visitors to socialise and share ideas to broaden networks, social circles and horizons.
- Targeted to traveling working professionals (short-mid length stays)
- Locations target ‘creative’ European cities - London, Paris, Berlin, Hamburg, Barcelona, Vienna, Copenhagen.
- Rental price: 1 night from 159 Euro; 1 month 4,020 Euro

## # Opportunities & challenges

- Reduction in room sizes and shared facilities provide greater affordability
- Flexible layout provides multiple uses within a small footprint

CASE STUDY:

# GAYINI (NIMMIE CAIRA) PROJECT

***Key Take Out***

***The project balances environmental and Indigenous cultural heritage protection with commercial use, and by doing so creates an asset for the local community and the Murray Darling Basin.***

Figure 064. City Of Toronto, Canada

## *Quick facts*

Timeframe
Client

Future
Stewardship

## *Overview*

Completed in 2017, the project covers 86,000 hectares of internationally significant floodplain in southern NSW. It adjoins the Murrumbidgee river for approximately 90 km between the towns of Maude and Balranald.

Components of the project included:

- Purchase of property and water entitlements from landholders to meet sustainable diversion limits
- Setting targets to meet environmental water demand within and beyond the project area addressing Indigenous cultural heritage and environmental values and other land managed for commercial use
- Reconfiguring water delivery infrastructure
- Collaborating with the Nari Nari Tribal Council, the Murray Darling Wetlands Working Group and the Centre for Ecosystem Science at the University of NSW.

## *Opportunities & challenges*

- Opportunity for a sustainably managed property preserved for the benefit of people and nature
- Management of the property will focus on three main areas of equal importance: environmental protection, indigenous engagement and participation and sustainable development

CASE STUDY:

# LAND ACTIVATON PROJECT

***Key Take Out***

***The Land Activation Project is a place-based project aiming to improve economic development outcomes, community governance, upgrade of essential services and to provide additional housing.***

Figure 065. Stadskantoor Venlo, The Netherlands

## *Quick facts*

| | |
|---|---|
| Budget | $7.3 million |
| Timeframe | Announced December 2020 |

## *Overview*

Bidyadanga, Western Australia's largest remote community, has been selected as the pilot site for the Lands Activation project. $7.3 million has been committed towards the project where State Government will work with representatives for the native title holders, the Karajarri Traditional Lands Association and the Bidyadanga Aboriginal Community La Grange Incorporated and community members to remove land tenure barriers. This will enable future economic activation, business development and regularisation of services by attracting new forms of investment, creating opportunities for home ownership and improving services.

The pilot project is in addition to the almost $17 million committed to seal internal community roads and upgrade essential water and services infrastructure, directly improving the environmental health standards for residents.

## *Opportunities & challenges*

- Opportunity to engage with the Indigenous Communities on a granular level and deliver physical improvements to their living and working environments
- Creating opportunities for Indigenous Communities to thrive through economic activation

# CASE STUDY:
# A SUSTAINABLE GREENFIELD CITY

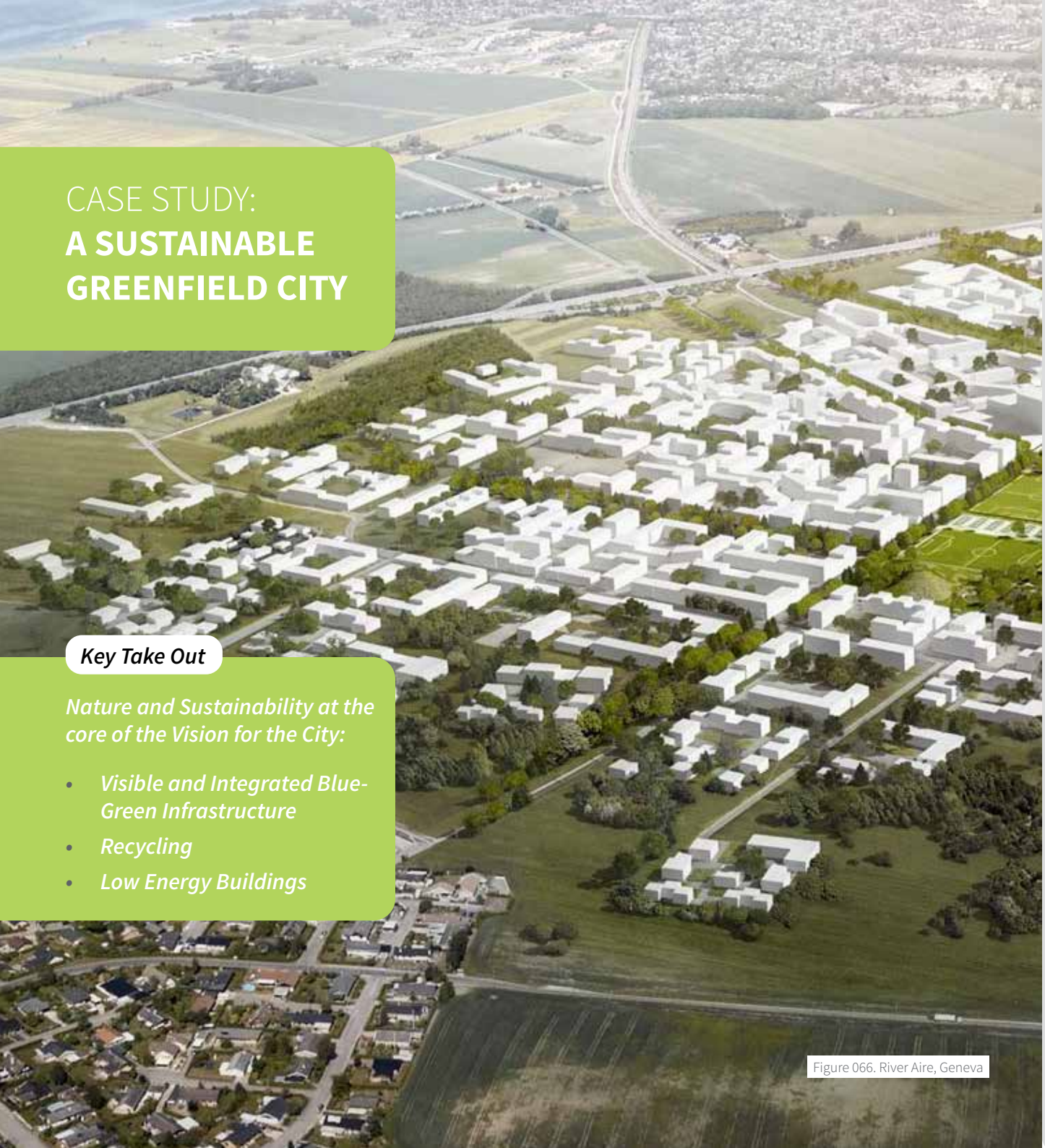


Figure 066. River Aire, Geneva

***Key Take Out***

***Nature and Sustainability at the core of the Vision for the City:***

- *Visible and Integrated Blue-Green Infrastructure*
- *Recycling*
- *Low Energy Buildings*

## *Quick facts*

| | |
|---|---|
| Site area | 370 ha |
| Uses | Residential, employment and services (childcare, shopping and cultural activities) |
| Population | 20,000 residents & 4,000 jobs |
| Density | 65 pp / ha |

## *Overview*

A new town with nature and sustainability at the heart of the vision and a spatial layout that incorporates walkability, waterways and green spaces. The first phase of development is a neighbourhood with 250 to 300 houses located close to a future train station.

Rainwater is an active, visible and recreational part of the future city. Design of the water basins are varied to capture the maximum volume of water possible, act as a catalyst in the natural evaporation of rainwater and work to promote a new type of play.

'Smart city' is a key concept of the city's objectives, to gather data throughout its delivery that will be used to inform future decisions around investments in technology and efficient use of funding for public services, energy and transport.

## *Best practice*

- Demonstrates the value of clear and deliverable principles
- Understand the benefits and value of the circular economy and affordability - specifically in places of higher density
- Leverage the role of digital communication within the development of connected and integrated communities

# Other Relevant Case Studies
# **Further Complementing the Vision for Greenery**

Figure 067. Gubei Promenade, Shanghai

## Gubei Promenade
## **Shanghai, China**

### # *Best practice*

- "Urban nature" promenade connecting open spaces to the adjacent neighbourhoods
- Urban heat-island effect reduction through tree canopy covering and cooling 47% of paving
- Flexible activities with water engagement. The promenade has become a daily use place to gather, socialise, and engage in passive exercise routines.

Figure 068. Gowanus Canal Sponge Park

## Gowanus Canal Sponge Park
## **Brooklyn, USA**

### # *Best practice*

- Dual functioning public spaces
- The weaving of green, blue and social networks
- Modular design for the Sponge Parks easily replicated and modified to suit variable conditions
- Deals with excessive stormwater and pollutant run-off as a result from urbanised and industrialised neighbourhoods (2,000,000 gallons per year)
- Filters water before it enters the canals

CASE STUDY:
# WASTE & PROCUREMENT

***Key Take Out***

***Procurement based on circular economy principles can bring multiplier effects in the economy***

Figure 069. City Of Toronto, Canada

## *Quick facts*

| | |
|---|---|
| Timeframe | 2018-2021 |
| Consultation | +40 events, 3,400 responses |

## *Overview*

Currently 20% of Toronto's emission are from waste, the LTWMS aims to embed circular economy strategies across the city's operations to achieve zero waste. A core challenge in this is establishing a baseline in an established major city.

Strategy has three goals:

- Increase regenerative goods and services that are low emissions, non-toxic, use less raw materials
- Increase procurement contracts focused on life cycle impact, resource potential, and maximum utility
- Re-examine existing contracts as they come for renewal for circular opportunities.

Performance metrics from procurement change:

- CO2 savings
- Percentage waste diverted, recycled content used
- City contracts issued using circular principles
- Number of green jobs created
- Productivity changes

## *Opportunities & challenges*

- The local authority can have a major impact through its procurement activities
- As a new precinct, the Williamtown SAP can embed these principles from the start, avoiding transitional hurdles

CASE STUDY:

# OPEN BUILDING SYSTEMS

***Key Take Out***

***Adaptability can be embedded and subtle, serving present needs whilst accommodating future needs***

Figure 070. Stadskantoor Venlo, The Netherlands

## *Quick facts*

| | |
|---|---|
| Floor Space | 22,700m2 |
| Uses | City Hall offices, plaza, exhibition space, meeting rooms, bicycle parking |

## *Overview*

A circular economy approach is embed in local government policy and was central to the building's design. Separation of the internal elements from the primary structure and strategic positioning and integration of operational systems allows ease of adaptability. Further sustainable features include:

- All products at all levels 100% reusable and 'environmentally friendly'
- 200m2 green wall is largest in the world providing noise attenuation and biodiversity
- Rooftop greenhouse, solar chimney and geo-thermal heat storage provide natural air conditioning
- Rainwater and grey water is treated by an on site wetland system and reused for toilets and the green facade

## *Opportunities & challenges*

- Adaptability means allowing for future change, whether it is known or not. Enabling change to be as simple as possible without defining its result
- Adaptability should work at a variety of scales to allow maximum future value

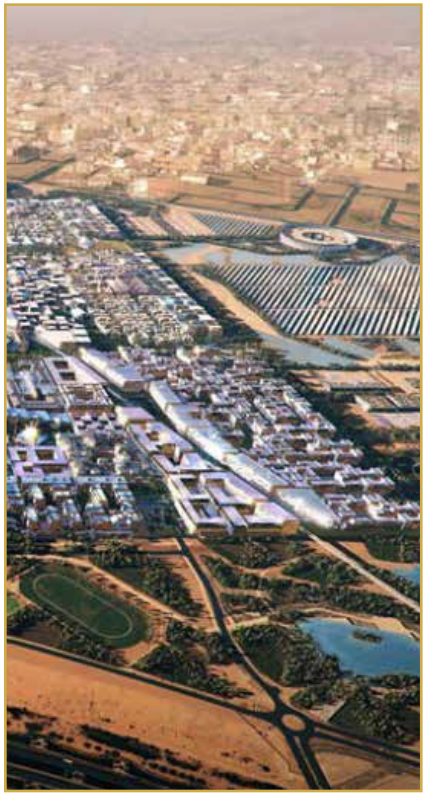
# CASE STUDY: MASDAR

## OVERVIEW

Masdar City is one of the most innovative and determined sustainability projects currently being built. Expecting to become home to permanent residents in 2025 and already grounds for businesses and students.

The underlying goal of the city is to create the highest quality of life with the lowest carbon footprint by,

- A walkable city with futuristic travel options such as electronic driver-less vehicles and autonomous shuttles
- Reduced demand for energy and water by an average of 40%
- All buildings constructed with low carbon cement and 90% recycled aluminum
- Smart waste management and recycling and reuse of waste material.
- Implementing revolutionary solar energy, energy storage and other innovative energy projects
- All landscaping to be desert-bloom variety and completely sustained by wastewater



Masdar. Photo Credit: Welcome to Masdar City Video 2014 https://www.youtube.com/watch?v=LIzq9YMsPP8

## INNOVATIVE

Masdar City calls itself a 'free city'. Insinuating the welcome of businesses from across the globe with 100% tax free benefits. It offers to support start-up businesses with a focus on technology. An expanding 'Tech Park' has been built from eco-friendly shipping containers, creating an economically viable sustainable development.

## WATER SUSTAINABILITY

100% of the landscaping is proposed to be sustained by the site's wastewater. Nothing in Masdar City uses more water than necessary, and as a result, the city uses 60 percent less than the average city of its size. The 'Wind Tower' pictured below is used for capturing warm winds, cooling them and sending cool breezes and water mist into the main plaza.

Masdar. Photo Credit: Welcome to Masdar City Video 2014 https://www.youtube.com/watch?v=LIzq9YMsPP8

Masdar. Photo Credit: Welcome to Masdar City Video 2014 https://www.youtube.com/watch?v=LIzq9YMsPP8

## WALKABLE CITY / ACTIVE TRANSPORT

The solar panels are used for more than just generating energy; they provide shade to pedestrians in the street, motivating active transport and creating more enticing spaces. Smart transportation is one of the Masdar's main goals so the city also uses electric buses, scooters and driver-less. Everything is within walking distance.

https://masdarcity.ae/

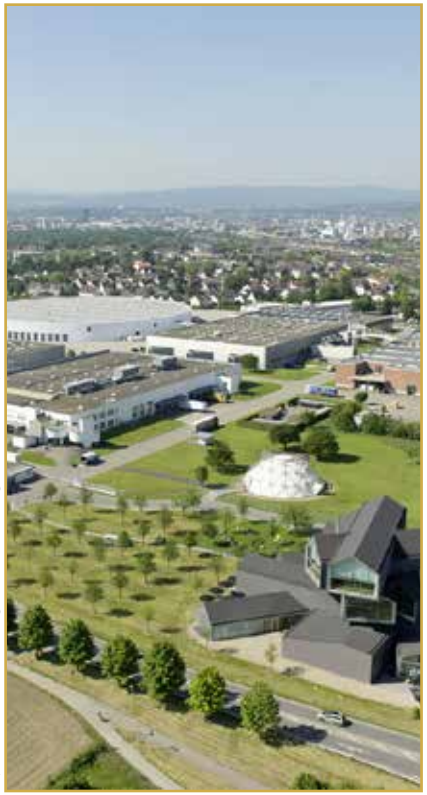
# CASE STUDY: VITRA CAMPUS

## OVERVIEW

Willi Fehlbaum founded Vitra in 1953 as a furniture company. Now, still a family run company it is a campus for collaboration and combing technology and creativity to push the boundaries of design.

Key Principles:

- Uphold a culture of care and diligence, in which sustainability is not a project or a goal, but an all-encompassing attitude
- Provide a fully operational production site and a field of experimentation for architecture, design and ground-breaking research
- Uphold a culture of care and diligence, in which sustainability is not a project or corporate goal, but an overarching attitude



Vitra Campus. Photo Credit: JOlivo Barbieri, Gabriele Basilico, Giovanni Chiaramonte, Marc Eggimann, Paola de Pietri 2009
https://www.vitra.com/en-us/magazine/details/serious-games-the-vitra-campus

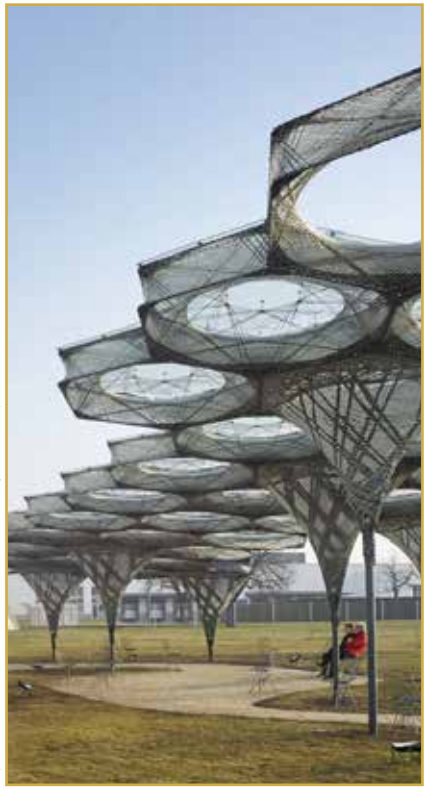
## PUSH BOUNDARIES

The Vitra Campus provides a playing field for a multitude of designers. It is an industrial park in the heart of Europe. At first glance, it does not appear to be the place for risk architecture; however, both technical innovation and artistic exploration is what takes place. Resulting in an amazing variety of signature architecture.

## WILDERNESS IN INNOVATION

Not only a place for experimental architecture, Piet Oudolf has recently created one of his legendary and unique gardens. An ensemble of perennials, grasses, shrubs and meadow flowers, composed down to the last detail, the selection presents a constantly changing “wilderness” and will be the start of a new perspective for the Vitra Campus grounds.

The Oudolf Garten. Photo Credit: Dejan Jovanovic 2020
https://www.vitra.com/en-us/about-vitra/news/details/piet-oudolf-garden



Elytra Filament Pavilion. Photo Credit: Julien Lanoo 2017
https://www.vitra.com/en-us/about-vitra/news/details/elytra-filament-pavilion

## IDEA TESTING

Elytra Filament Pavilion, an outdoor installation in the exhibition ‘Hello, Robot’, which the robotic canopy grows in response to real-time sensing data.
The Vitra campus is home to many examples such as this that exhibit ground-breaking research.

https://www.vitra.com/en-us/about-vitra/campus

# CASE STUDY: **UNIVERSITY INNOVATION PRECINCT**

***Key Take Out***

***Hybrid approach to connect between educational, commercial and civic uses***

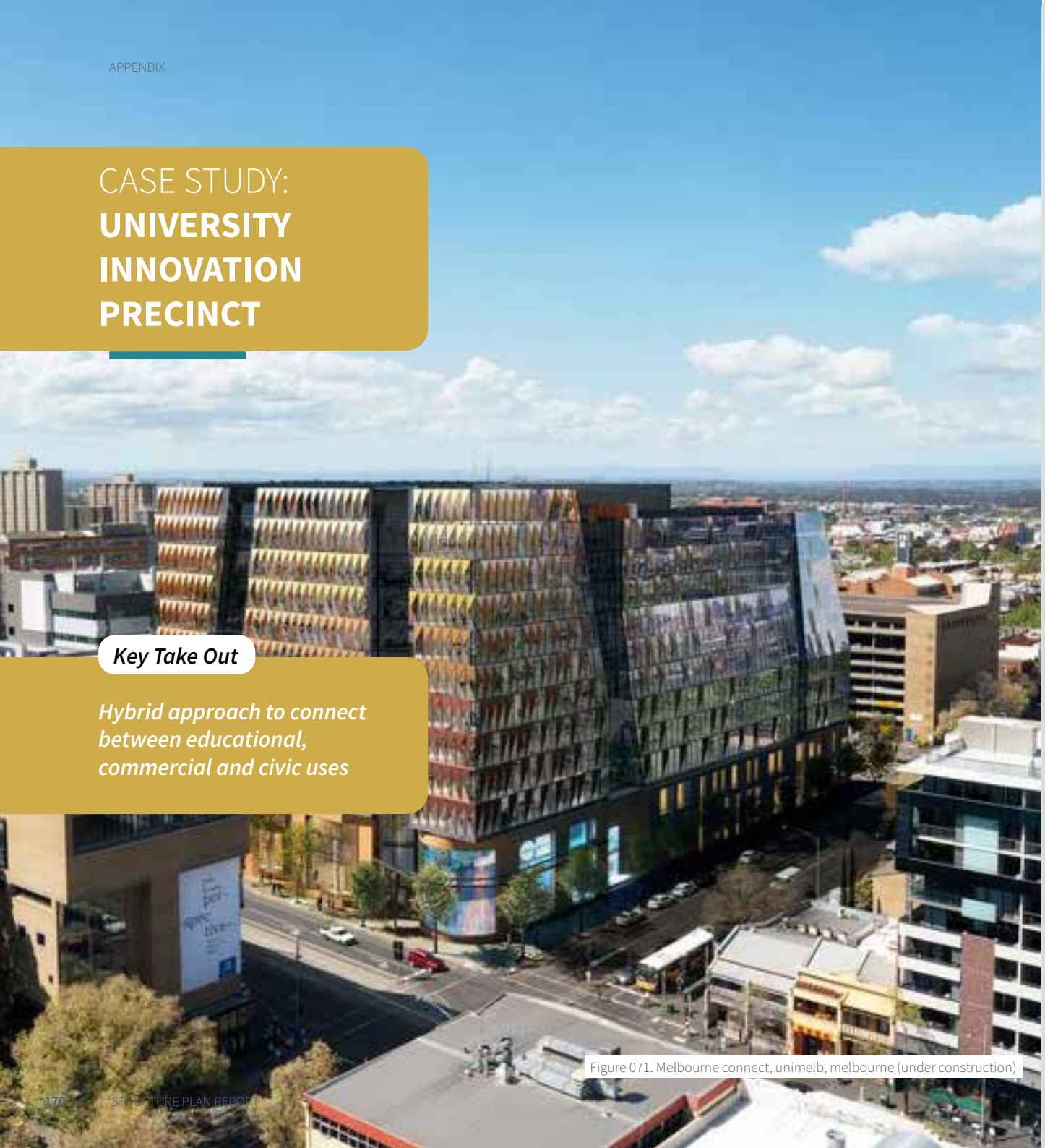


Figure 071. Melbourne connect, unimelb, melbourne (under construction)

## *Quick facts*

Typology
Area
No. of buildings

## *Overview*

The precinct will have a mix of student accommodation, laboratories, research facilities, commercial and co-working spaces, a child care centre and a flagship Science Gallery. All programmes are connected by an elevated 'superfloor', which will provide meeting, theatre and workshop spaces.

- Commercial/child care: 5-storey CLT building
- Education/Commercial: 10-storey building
- Student accommodation: 13-storey building

The precinct is designed to reduce its energy consumption by 40-50%, with its enery-efficient measures including LED lighting, solar roofs and a heating and cooling network.

## *Opportunities & challenges*

- Challenge conventional approach towards educational spaces
- Potential of co-location of commercial and educational spaces within one building
- Integrate the campus into public urban spaces while ensuring student safety at the same time

# CASE STUDY:
# URBAN GROWTH & SMART CITIES

**Key Take Out**

***City scales allow opportunities for improved green space strategies and transport targets***

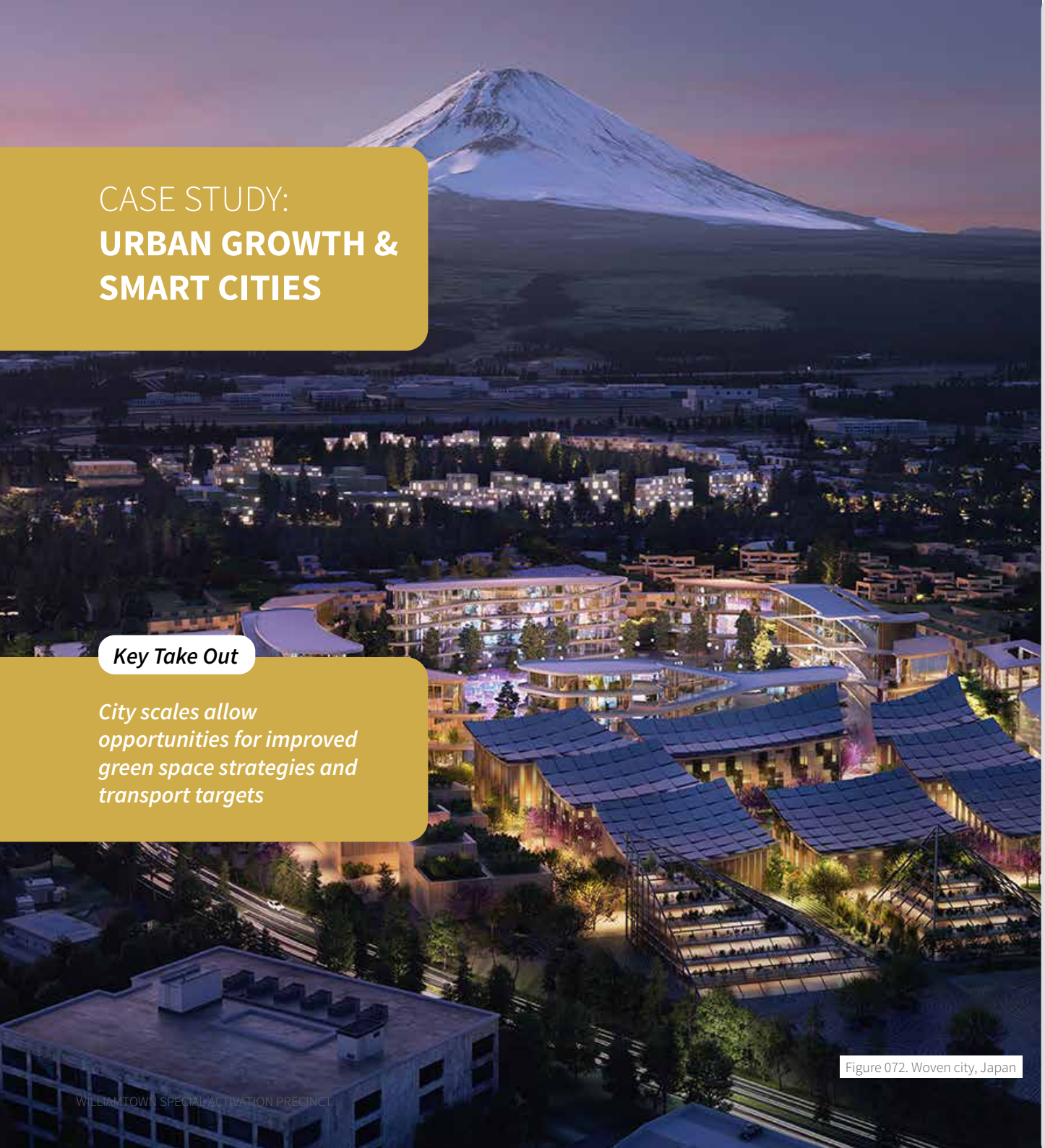


Figure 072. Woven city, Japan

## Overview

Designed by BIG Architects for Toyota the 175 acre smart city will first be occupied by 2,000 employees and their families. The city is intended to be a test bed for new technologies including:

- Autonomous personal and public mobility
- Hydrogen fuel and rooftop solar energy only
- Robotics will be part of the home and manufacture process with timber the primary material t be used throughout

## # Opportunities & challenges

- A primary criticism of smart cities built focus on technology is the lack of social understanding, and allowance for community to build - adaptability of place and community consultation have been missed
- New cities and precincts have unique opportunities to trial new innovations, facilitating their growth and commercialisation. However, incorporation of learning and community feedback must be part of the process

# CASE STUDY: **CAMPUS-STYLE WORKPLACE**

***Key Take Out***

***Provide flexible workspaces that respond to the changing nature of work***

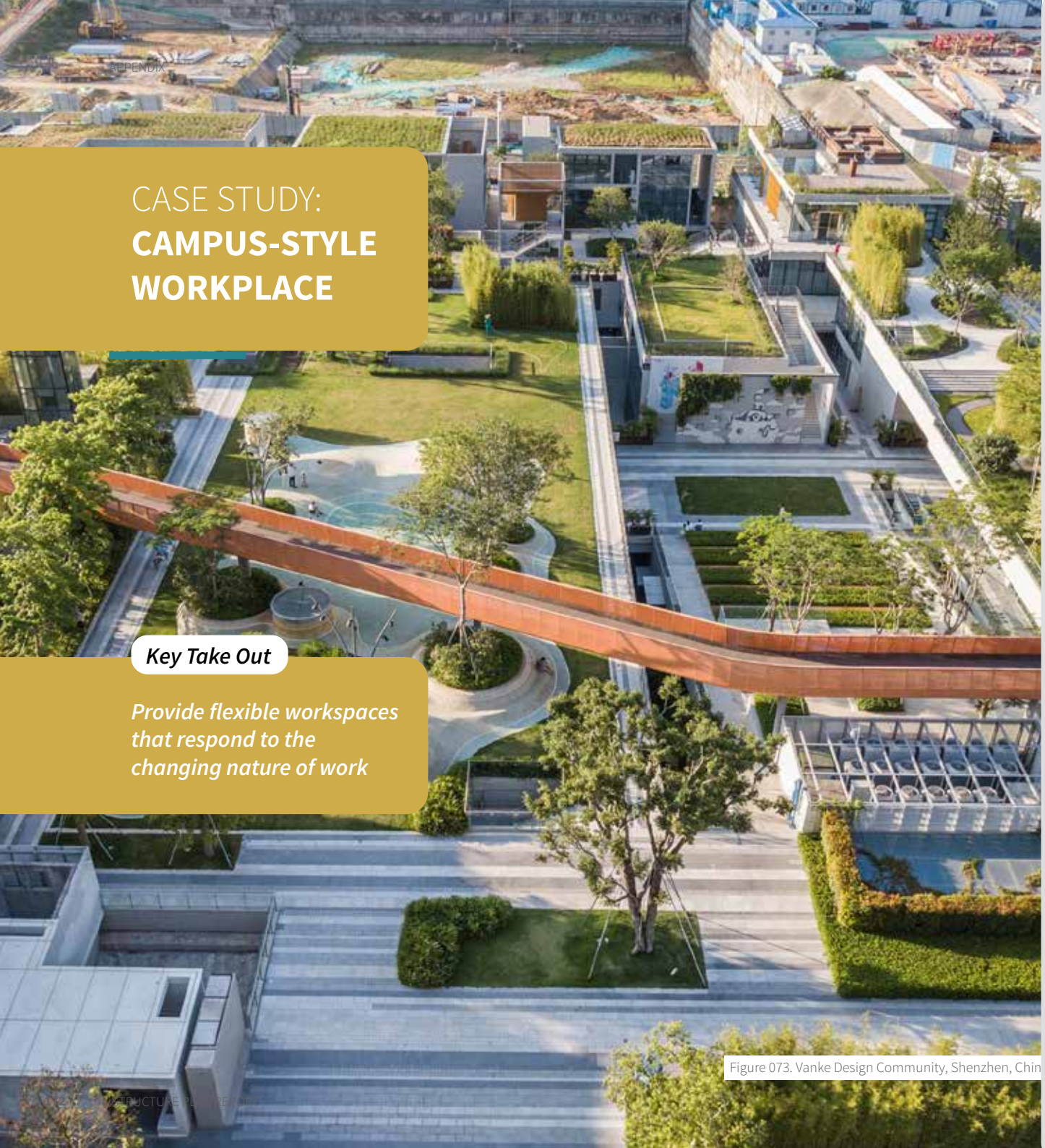


Figure 073. Vanke Design Community, Shenzhen, Chin



## *Quick facts*

Typology
Site Area

## *Overview*

The Vanke Design Community is a multi-level complex that consists of different workspace clusters within a sloping park. The project connects the different parts of the site through large green slopes. The site topography is also utilised to create a central outdoor theatre with stepped areas of planting and seating.

The precinct works like a sunken green university campus, where different workspace typologies are connected by outdoor breakout spaces. Each private office unit have a separate lighted patio and outdoor leisure platform. There is a 2,000m2 underground co-working space and a maker's workshop for collaboration between industries.

The shared office platforms at 700mm height difference allow different offices to communicate with each other while maintaining their privacy. For quiet office spaces, there is an independent office area on each floor which can accommodates up to 30 people.

## *Opportunities & challenges*

- Incorporate amenities required for different work places
- Provide flexible work spaces that suit different industries

# CASE STUDY:
# BUITENSCHOT LAND ART PARK

**Key Take Out**

***Effective land use planning can reduce the impact of airport uses***

***50% of ground aircraft noise is deflected by the park***

Figure 074. H+N+S Landscape Architects & Paul de Kort, 2013, Amsterdam Schipol Airport, Hoofddorp, Netherlands



## *Quick facts*

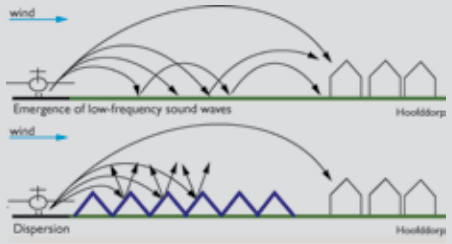
| | |
|---|---|
| Area | 80 acres |
| Feature | 150 grass ridges, which are 1.8m tall spaced 11m apart |

## *Overview*

After the 5th runway was opened at Schipol Airport in 2003, residents complained about the ground aircraft noise (low frequency, long wavelength sound waves).

The land art park uses the ridges and furrows spaced according to the wavelength of the sound waves.
The park also incorporates pedestrian paths, bike lanes and artworks to transform itself into a recreational space.

The heart of the park is formed by a 500 metre long and 100 metre wide plot used for sports or cultural events.




## *Opportunities & challenges*

- Factor in noise pollution outside ANEF 20 zone
- Can manage noise pollution through passive approaches
- Careful land use planning to provide noise buffer
- Other issues from aircraft noise need to be considered
- Shaping landscape can address

# CASE STUDY:
# SHARED MOBILITY
Car-Share, Bicycle-Share

**Key Take Out**

***User habits are changing with technological opportunity:***

***30% Growth in car share membership in USA & Germany over 5 years***

Figure 075. Limebikes, Sydney

## *Overview*

Car ownership costs households $10,000+ per year per car, a significant expense for something that sits idle 95% of the time.

Port Stephens has a greater proportion of households with 2 or more cars compared to the Sydney average (53% vs. 46%), which combined with lower average incomes, is resulting in a significantly higher proportion of household budgets spent on cars.

Car share memberships are significantly cheaper than car ownership, particularly if the total distance driven is less than 10,000km per year.

One car-share vehicle represents around 10 private vehicles in terms of use, reducing pressure on parking. Users of car-share typically shop more locally, benefiting the local economy, and also travel less (approximately 2,000km per year).

Car share enables users to choose the vehicle appropriate for the journey, from a compact through to mini van, enabling reduction in emissions.

A recent US study found the national car fleet could be reduced by a third with widespread adoption of car-sharing.

## *Opportunities & challenges*

- Car-Share has a valuable role in urban living, making more efficient use of individual vehicles and requiring less physical space due to reduction in vehicle numbers. Early support and collaboration with service providers could encourage further behaviour change and reductions in vehicle use across the Williamtown SAP and beyond.

# CASE STUDY:
# ELECTRIC VEHICLES

***Key Take Out***

***integrated Infrastructure roll out is needed to support growth and lower carbon emissions***

Figure 076. www.tesla.com/en_au

## *Quick facts*

| | |
|---|---|
| Current market share | 0.6% globally |
| Market shared required for sustainable development | 14.5% globally by 2030 |
| Growth rate | 68% globally |

## *Overview*

Electrification of transport is critical to reducing emissions, electric vehicles (EV) offer significant improvements in transport emissions:

- electric motors 2-5 more efficient than conventional combustion engines
- three times less emissions produced over vehicles life

90% of locations of EV growth have policy support, in 80% of places infrastructure is part of support.

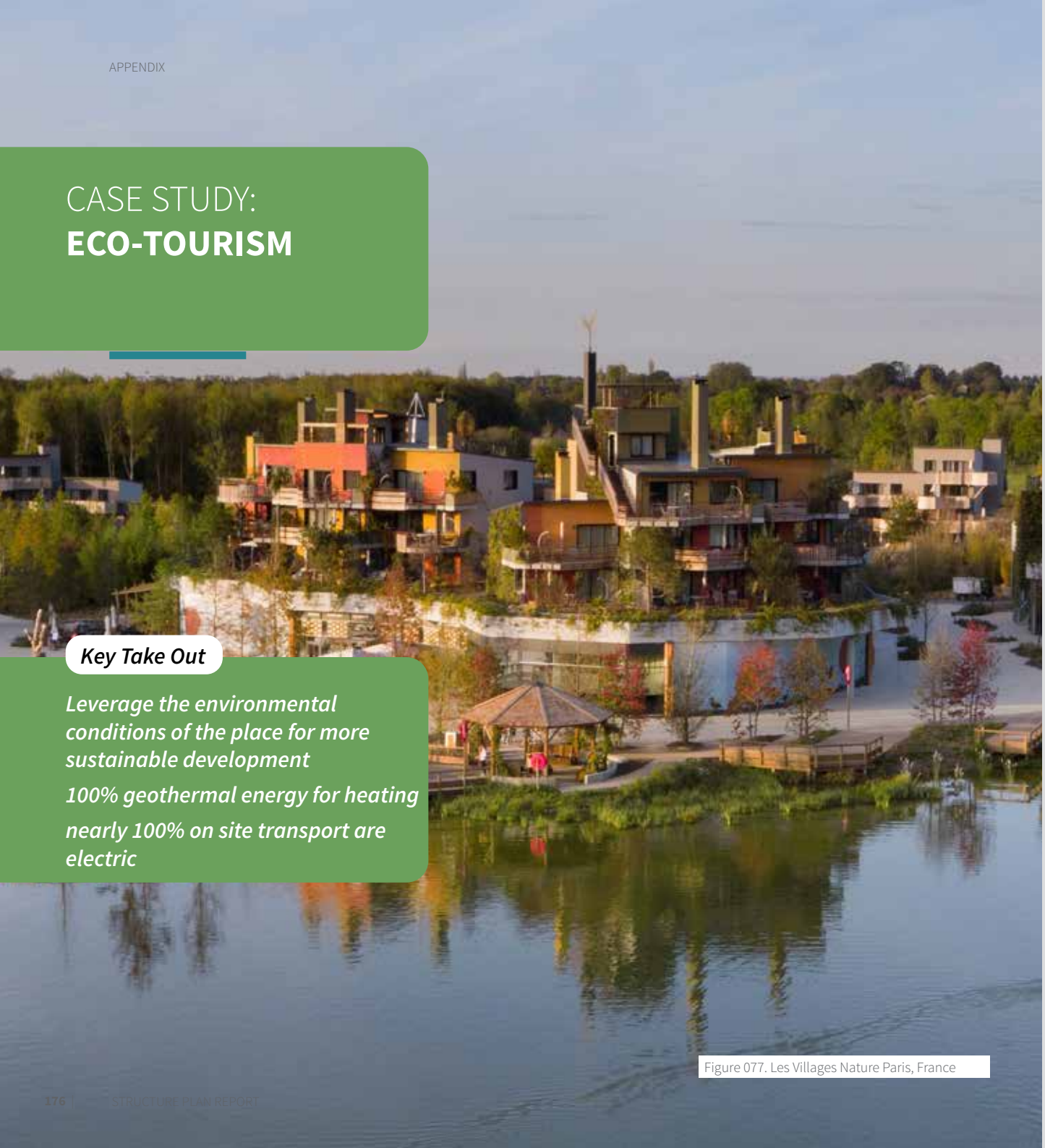
Local authority procurement is also a source of support in EV role-out.

Car sales are expected to 10-50% of market by 2030 depending on the level of policy support.

## *Opportunities & challenges*

- Charging infrastructure must be rolled out, supported by requirements on new developments and public spaces without contributing to street clutter
- User trends are changing - future-proofing by adopting new technologies that are achieving maturity builds resilience
- Local authorities can have substantial impact through their procurement activities, support infrastructure and fleet upgrades has a key role to play

# CASE STUDY:
# **ECO-TOURISM**



***Key Take Out***

***Leverage the environmental conditions of the place for more sustainable development***

***100% geothermal energy for heating***

***nearly 100% on site transport are electric***

Figure 077. Les Villages Nature Paris, France

## *Quick facts*

| | |
|---|---|
| Typology | Recreation; (Eco-) Tourism |
| Area | 259 acres |
| Vegetation | 28,000 new trees and 430,000 shrubs and plants |

## *Overview*

Les Villages Nature Paris is a large-scale sustainable resort located adjacent to the existing Disneyland. It consists of visitor accommodation, a geothermal lagoon, farms, forests, meadows, lake and spa facilities.

Its geothermal sources supplies 100% of heating and hot water energy demand on-site, and 30% of Disneyland's energy. Nearly 100% of on-site transport are electric vehicles. These measures reduce its carbon emissions by 8,000 tonnes.

The buildings are made with carbon-storing timber from European forests and low-carbon concrete. 100% of the soil excavated on site was reused, and 97% of construction waste was diverted from the landfill. Since the inception of the project, 19 new species have been found on site.

## *Best practice*

- Utilise existing natural resources for new developments
- Potential of eco-tourism combined with visitor accommodation
- Utilise precinct's locational advantage and transport links to capture local and global visitor flows

# Other Relevant Case Studies
# **Further Complementing the Vision for Wellness**

Figure 078. Van Gogh Cycle Path, The Netherlands

## Van Gogh Cycle Path
## **The Netherlands**

### # *Best practice*

- Solar charged during the day and glows at night inspired by Van Gogh's Starry Night
- Part of the SMART HIGHWAY project - interactive and sustainable roads of tomorrow
- Located where Van Gogh used to live, celebrates this cultural heritage and connects it with innovation
- Enhancement of public safety and local place-making

Figure 079. The Baton Rouge Health Trail Artist Impression

## Health Loop Trail
## **Baton Rouge, Louisiana USA**

### # *Best practice*

- Designed with input from a large coalition of community partners and health care providers
- District Street Network and Health Loop Trail lined with parks improve pedestrian access, add exercise paths and promote outdoor activity and fitness
- 6.5km of additional sidewalks and trails added in the area
- Streetscape, signage, bus stop, sidewalk improvements, landscaping and art installations

Figure 080. Ku.Be House Copenhagen

## KU.BE House
## **Copenhagen (MVRVD)**

### # *Best practice*

- Integrates physical and social well-being parameters to sustain a productive and meaningful human existence, energising and connecting residents in a digital age and helping them build relationships with one another
- Reflects the flexibility and adaptability of community infrastructure based on community-led issues such as mental well-being and physical activity

Right Angle Studio 2017

# CASE STUDY:
# AERONAUTICAL CENTRE OKLAHOMA CITY

**Key Take Out**

***The Mike Monroney Aeronautical Center (MMAC) provides critical products and services that touch all aspects of aviation and brings business and industries together through it's proximity to military base***

Figure 081. City Of Toronto, Canada

## *Overview*

The US state of Oklahoma has two major aerospace clusters focused around Oklahoma City and Tulsa, with more than 1,100 aerospace entities employing 120,000 people.

## *Success Factors and Relevance to SAP*

**Locational advantage**: firms in the industry explicitly stated their reasons for locating to the cluster were due to the proximity of local military bases which had state support of aerospace and defence industries.

**Skills base**: relocation allowed leverage of the skilled workforce in the region.

**Ancillary industries**: education centres provide support to the state's defence and aerospace industries. For example, the Federal Aviation Administration (FAA) Mike Monroney Aeronautical Centre playing a central role in supporting the training efforts of the FAA and US Department of Transportation, totalling 80,000 students a year. Supporting business activities is the Oklahoma Aerospace Commerce and Economic Services – a body founded by the state legislature dedicated to developing the state's aerospace industry.

**Incentives**: fiscal incentives include tax credits equal to five percent of the compensation of hired engineers, double if the engineer was hired from a local university or college.

# CASE STUDY:
# SOMMERSET / SOUTH WEST UNITED KINGDOM


Figure 082. City Of Toronto, Canada

**Key Take Out**

***Historically defense-based, Somerset has expanded to include wider aerospace activities and advanced manufacturing.***

## *Overview*

Bristol and Bath are home to major hubs of the domestic aerospace industry. Collectively these two cities host 800 aerospace firms, employing 98,000 residents with the local industry valued at approximately £7 billion.

## *Success Factors and Relevance to SAP*

**Ancillary industries**: major educational institutions based in the region, particularly the University of Bristol, are renowned for the close links to the aerospace industry and retention of students working in the area after graduation. Supporting industry is the South West Aerospace and the Invest Bristol & Bath which offers extensive support for firms to relocate and grow in the region. The Department for International Trade works closely with South West Aerospace to encourage FDI from overseas firms to invest in the region.

**Incentives**: business incentivise from the National government for the sector include the Research and Development Tax Relief program that aims to support innovating industries such as aerospace. Through the program, small and medium sized businesses can make a deduction of 230% from their yearly profits if their projects are approved under the program.

# CASE STUDY: **BRINDABELLA BUSINESS PARK, ACT**

***Key Take Out***

***"Brindabella Business Park is a high-tech, campus style business Park designed to create a sense of community and achieve balance between work, health and lifestyle."***

Figure 083. City Of Toronto, Canada

## *Overview*

Brindabella Business Park is located within the Canberra Airport Precinct, 10 minutes from Canberra CBD. It is a high-tech, campus style business Park designed to create a sense of community and achieve balance between work, health and lifestyle. It totals 100,000m2 of office space spread over nineteen A-Grade commercial buildings with 46 businesses, 7000 workers and 4000 car spaces.

## *Success Factors and Relevance to SAP*

**Locational advantage**: Colocation of the business park with Canberra international Airport and Fairbairn and Majura Business Parks.

**Delivery:** The Park is unique in its development; with the same core team of architects, engineers, builders, landscapers and interior designers having worked on each successive building project resulting in consistency and continuity throughout the precinct.

**Sustainability**: Brindabella Business Park is considered to be one of Australia's most environmentally sustainable business centres;
Sustainability initiatives include:

- Central co-generation energy plant serving six linked buildings
- Solar power for domestic hot water use;
- Secure bicycle parking linked to a common shower facility;
- Waste collection;
- Use of recycled concrete in buildings and landscape;
- All waste water is recycled in a "Blackwater Treatment" plant and used for toilet flushing and irrigation;
- Extensive use of sun-shading on buildings;
- All buildings highly insulated, and double glazed in high performance Evergreen glass; and
- Sports centre and sport field incorporated into the master plan to provide a healthy lifestyle.

**Amenity:** The business park consists of a childcare facility, service station, gymnasium, numerous cafe and restaurants as well as sporting fields; all of which make it an ideal business environment

CASE STUDY:

# FLOATING & MODULAR ECO-CITY

***Key Take Out***

***An approach that responds to site specific challenges, is modular and sustainable allows for growth and change over time and a highly livable city***

***2ha***
modular mixed-use neighbourhoods with 300 residents

***12ha***
Village comprised of 6 neighbourhoods

***72ha***
City comprised of 6 Villages

Figure 084. Oceanix City, Big Architecture, NYC

## *Quick facts*

| | |
|---|---|
| Site area | 75 ha |
| GFA | 500,00 m2 |
| Residents | 10,000 people in 6 villages |

## *Overview*

A vision for the world's first resilient and sustainable floating community, responding to the issue of rising sea levels.

The city is designed to grow, transform, and adapt organically over time, with a scalable approach transitioning from neighborhoods to infinite cities.

As a floating city, built forms are below 7 stories to create a low center of gravity and resist wind, while a fan-like form offers shading for internal spaces and the public realm.

## *Best practice*

- Mixed-use space for living, working, and gathering for day and night uses
- Local food production
- Zero waste systems
- Sharing culture
- Neighbourhood concept promotes social cohesion through small communities that integrate into the wider city

# Other Relevant Case Studies
# **Further Complementing the Vision for Resilience**

Figure 085. Fairphone


## Fairphone

### # *Best practice*

- A modular design enables the replacement or upgrade of individual parts to extend the life of the overall phone, reducing waste. Old phones are also collected with 55% being refurbished and 45% recycled with materials recovered.
- Raw materials are sourced and workers paid according to fair trade standards.
- Improvements at one end of a supply chain often have ripple effects, creating improvements elsewhere and amplifying the positive return.

Figure 086. Close the Loop

## Close the Loop

### # *Best practice*

- Recycled ink cartridges and 'redcycle' soft plastics are collected and added to an asphalt mix for road and paving. This reduces carbon emissions by 23% while creating a more durable product than standard asphalt. The recycled content decreases cracking in both high and low temperatures and requires less maintenance.
- Commercialisation of sustainable technologies and approaches requires active purchasers and new opportunities.

Figure 087. #WearNext


## #WearNext

### # *Best practice*

- Campaign aimed at reducing waste clothing by raising awareness of the existing 1,100 collection points around New York City which ran for three months in 2019.
- An interactive map and cross-media campaign increased online views from 30,000 to 118,000 followed by a 15% increase in the volume of clothes received (583 tonnes).
- A public awareness and understanding strategy must be included when introducing or expanding new systems.

# CASE STUDY: **MICROGRIDS**

***Key Take Out***

***Renewable technologies deployed locally build resilience and reduce costs***

***100%***
Renewable Energy Net-Zero Emissions

Figure 088. Monash University Melbourne, Arena, Indra

## *Quick facts*

| | |
|---|---|
| Population Served | 55,000 daily visitors |
| Facilities | Research and education rooms, gym, cafe, restaurant, post office, bank, commercial offices |

## *Overview*

A partnership between Monash University, ARENA and Indra, the Smart Energy city will move the campus toward 100% renewables through improved efficiency, smart management systems and the connection of 'distributed energy resources' (DER).

Key features include:

- 4MW Photovoltaic solar system
- 1MW battery storage
- Smart energy management allowing building sensors to feedback usage to direct energy where required in the most efficient manner reducing energy lost in transmission the cost of peak energy
- Increased resilience through self-sufficiency, removal of fossil fuels and ability for micro-grid operation independent of the national grid

## *Opportunities & challenges*

- Focus on the local level for opportunities to build energy resilience, reducing costs and increasing efficiency
- Allows the microgrid to be both a consumer and 'prosumer' sending energy back to the national grid when in surplus

| | |
|---|---|
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