5.3 Infrastructure capacity

Key to the successful implementation of the framework will be a better understanding of where infrastructure capacity constraints exist, where upgrades are planned and whether there is sufficient infrastructure, such as schools, hospitals, open space, water, sewerage, electricity and roads, to accommodate urban growth. Consultation with infrastructure delivery agencies during the preparation of the draft framework informed this identification process.

The framework identifies where development is likely to take place, which provides more certainty to infrastructure agencies in respect to forward planning and the allocation of funding and resources. The objective is to ensure the timely, efficient and cost-effective delivery of electricity, water, wastewater and other service infrastructure that is aligned with the staging of development and encourage shared use of infrastructure corridors by the various service providers. The delivery of infrastructure will be encouraged to be staged and coordinated with the phasing of urban and industrial land development, to improve coordinated service delivery and ensure the timely and efficient supply of serviced land.

Further refinement of infrastructure capacity and staging for new infrastructure works will be undertaken as part of local planning strategies and scheme amendments, in accordance with the level of infill and density of proposed development. Where possible, the shared use of infrastructure reserves by the various service providers is encouraged.

The service capacity of existing infrastructure to accommodate the proportion of the 3.5 million people who will live in the city in infill developments within the next 30–40 years has been taken into consideration and proposed infrastructure, primarily upgrades, has been identified in Plan 11 and Table 12.

Improved technology and changing environmental conditions, coupled with business confidence, economic efficiency and changing household choices, may impact on how infrastructure services are generated, distributed, reused and recycled into the future. In this regard the ongoing management of service provision by the State Government and relevant service authorities will be required to ensure advancements in these fields are facilitated and infill growth can be delivered.

5.3.1. Community and social infrastructure

Investigation of long-term community, public or social infrastructure requirements to meet the projected population growth within the sub-region is required. Social infrastructure includes facilities reserved for public purposes such as hospitals, public open space, sport and recreation facilities, schools, prisons, police stations, TAFE colleges, courts, child protection facilities, cemeteries and many more.

The challenge is connecting land use planning and government infrastructure funding in a strategic way and to plan for all social infrastructure to support urban development. An investigation into options to improve and streamline land use planning for social and public infrastructure across all agencies should occur. A strategy that clearly defines the long-term infrastructure needs of each agency and investigates existing and future funding models and mechanisms is also required. For example, Karrakatta and Fremantle cemeteries have an ongoing strategic use in accordance with the cemeteries renewal process. The aim is to ensure cemeteries continue to service the community's ongoing needs.

This investigation should include the consideration of alternative solutions to optimise social infrastructure, such as:

- considering multi-use of buildings and facilities outside core function hours; and
- co-location of key community and social infrastructure in station precincts or activity centres to promote better use of existing infrastructure and facilities, reduce traffic movements and establish a sense of social cohesion.

The focus for the sub-region will be the co-location of key community and social infrastructure to promote better use of existing infrastructure and facilities, reduce traffic movements and establish a sense of social cohesion. The provision of this infrastructure will be coordinated with the development of urban land and resultant population growth.

Education

The expected population growth within the Central sub-region will necessitate the development of a number of new public schools including a new Inner City College in Subiaco, or the provision of additional accommodation at existing sites. The Department of Education is undertaking a detailed assessment to establish the extent and general location of schools. Part of the solution will involve ensuring that there is a sufficient number of land holdings across the Perth and Peel regions available for educational facility purposes and investigating new approaches to the built form of new school buildings and facilities.

Health

Through its comprehensive network of hospitals and community care services, WA Health delivers the bulk of primary, secondary and tertiary care services to the more than 2.5 million people who live in Western Australia. Underpinned by population projections, health service activity and role delineation, the Clinical Services Framework provides a detailed picture of what services Western Australians will need and where and when they will need them.

A key challenge for WA Health is the ongoing provision of quality health services in a timely and affordable manner, within an environment of increasing demand and consumer expectations, diverse and growing populations, changing demographics, increasing costs for service provision and rapidly changing technology. There is a significant need to efficiently manage demand while ensuring that the health and wellbeing of Western Australians are maintained at, or improved to achieve, world-class standards.

In response to the changing needs for the healthcare of Western Australians, there have been unprecedented changes in the configuration of WA Health services. This includes a number of

new facilities, such as Fiona Stanley Hospital, Midland Public Hospital and the Perth Children's Hospital.

The majority of health assets have plans in place for further expansion and the timing thereof is dependent on demand, however WA Health has developed a blueprint, the Clinical Services Framework 2014–2024 (CSF), to guide the provision and delivery of safe, high-quality public health care in WA over the next decade. The CSF:

- provides the foundation to meet the demand for health services given changing service capabilities and evolving models of care;
- provides a clear picture for what and how clinical services at each Health Service and health site (hospital or community) should develop over time to achieve better access to safe and quality care with minimum duplication and best use of available resources; and
- remains a reference point for determining requirements in workforce and infrastructure and for integrating new technology.

Public open space

The envisaged population growth's need for public open space will surpass the existing availability of open space in the Central region. The provision of new quality open space areas, as well as the enhancement and maintenance of existing public open space will be required in order for all public open spaces and playing fields to provide a more usable function. To meet public open space demand into the future, alternative water supply options such as wastewater and stormwater recycling will need to be considered.

The need to meet the challenges of a changing and drying climate, including limited groundwater availability for irrigation of open spaces, and the protection of environmental assets will need to be considered when planning for green spaces. The quality of open space in the Central sub-region will be increasingly important as the population grows and density increases. Public open space should be designed as an integral part of the urban structure and offer a variety of safe and attractive spaces that are multi- functional and easily accessible via public transport, walking and cycling.

5.3.2 Transport infrastructure

Our city's future success will be profoundly influenced by the accessibility, efficiency and reliability of its transport network and how well we are able to manage congestion. More travel will occur to and from employment centres that will increasingly cater for our work, education, health, social and recreational needs. In particular it is expected that the CBD will continue to be a major centre of employment. One of the biggest challenges will be to create additional river crossings so that people can traverse the city without creating bottlenecks into the CBD.

The framework has been developed in close collaboration with the Transport portfolio, which is advancing planning for strategic road and public transport linkages that will complete the transport network for a city of 3.5 million and beyond. This includes priority public transport initiatives as part of METRONET and removing some level crossings to improve traffic movements and safety. The transport network will connect our suburbs, reduce congestion on our roads and give Perth the rail system it needs for the future.

The proposed integrated transport network for 3.5 million people aims to optimise the use of the existing network and integrate with land use and across the public transport, active transport and road networks. It seeks to deliver high-frequency, 'turn up and go' mass rapid transit connected with effective public transport feeder services; provide a safe, connected network of primarily off-road cycle ways and walkways; and maintain a safe, productive freeway and arterial road network for the efficient distribution of people and freight.

The integrated transport network focuses on connecting major activity centres, industrial centres, station precincts and urban corridors and encouraging transit-oriented development that are well-serviced by all modes of transport. Active and public transport will be prioritised to meet the significant increase in travel demand [9] that population growth will generate; the strategic road network will be used more efficiently; and will serve increasing freight demand with efficient links to ports, airports and intermodal hubs.

It should be noted that, unless specifically stated, the transport initiatives are uncommitted projects and a range of issues will require further consideration over time, including further detailed planning, evaluation, timing and funding. The provision of funding for infrastructure will be coordinated with the development of urban/ industrial land and activity centres, based on the anticipated timing shown in Plan 11 and Table 12.

[9] Department of Transport, Public Transport Authority and Main Roads WA 2016, Travel Demand Management Plan , Perth.

Public transport

The key to successful urban consolidation along public transport corridors is to increase the level of public transport service, the variety of destinations accessible, and public transport patronage by offering an easily-accessible, safe and flexible alternative to private vehicle use. Additionally, good public transport will be necessary to reduce congestion in the shorter term and increase road capacity for transport functions reliant on the regional road system, especially freight movement. To ensure that the public transport network can accommodate a city of 3.5 million people in the long term, a number of additions to the public transport network have been identified including additional heavy rail links, high priority public transit corridors and other public transit corridors.

The public transport network will meet the transportation needs arising from population growth and also meet the need to connect people to key employment nodes. The transport network is coordinated with and supports the vision to deliver smart, sustainable and vibrant communities.

The network of public transit corridors includes high-priority and high-frequency corridors. The network of transit corridors corresponds with the distribution of key activity centres, urban corridors, station precincts and industrial centres and will integrate with passenger rail and local bus services. These are the priority for improving on-road public transport services. They will support access to, and employment generation in, key centres and the delivery of higher density urban form outcomes.

The framework identifies high-frequency public transit corridors where rail and/or bus services are available at a frequency of five minutes in peak times and 15 minutes out of peak times. On busy roads where there is a risk of the high-frequency bus service being delayed, queue jumps, signal priority or 'bus only' lanes may be installed, where necessary, to prioritise public transit over other traffic. Together the high-frequency and high-priority public transit corridors form the spine for urban consolidation precincts. Bus services are also an important part of a comprehensive and integrated public transport network. Improving connectivity between bus and rail networks will increase accessibility to the CBD and key centres and reduce commuting times.

The framework supports the concept of transitioning key high-frequency public transit corridors into multifunctional routes that allow for efficient movement and high amenity (as shown in Plan 7). However, urban development should not impact on the capacity of the transit corridor network which is essential for effective transport functions. The transport function can be highly variable both within and between different routes and is influenced by land use, location, role within the wider region, the length and width of the route, volume of traffic and modes that use the route.

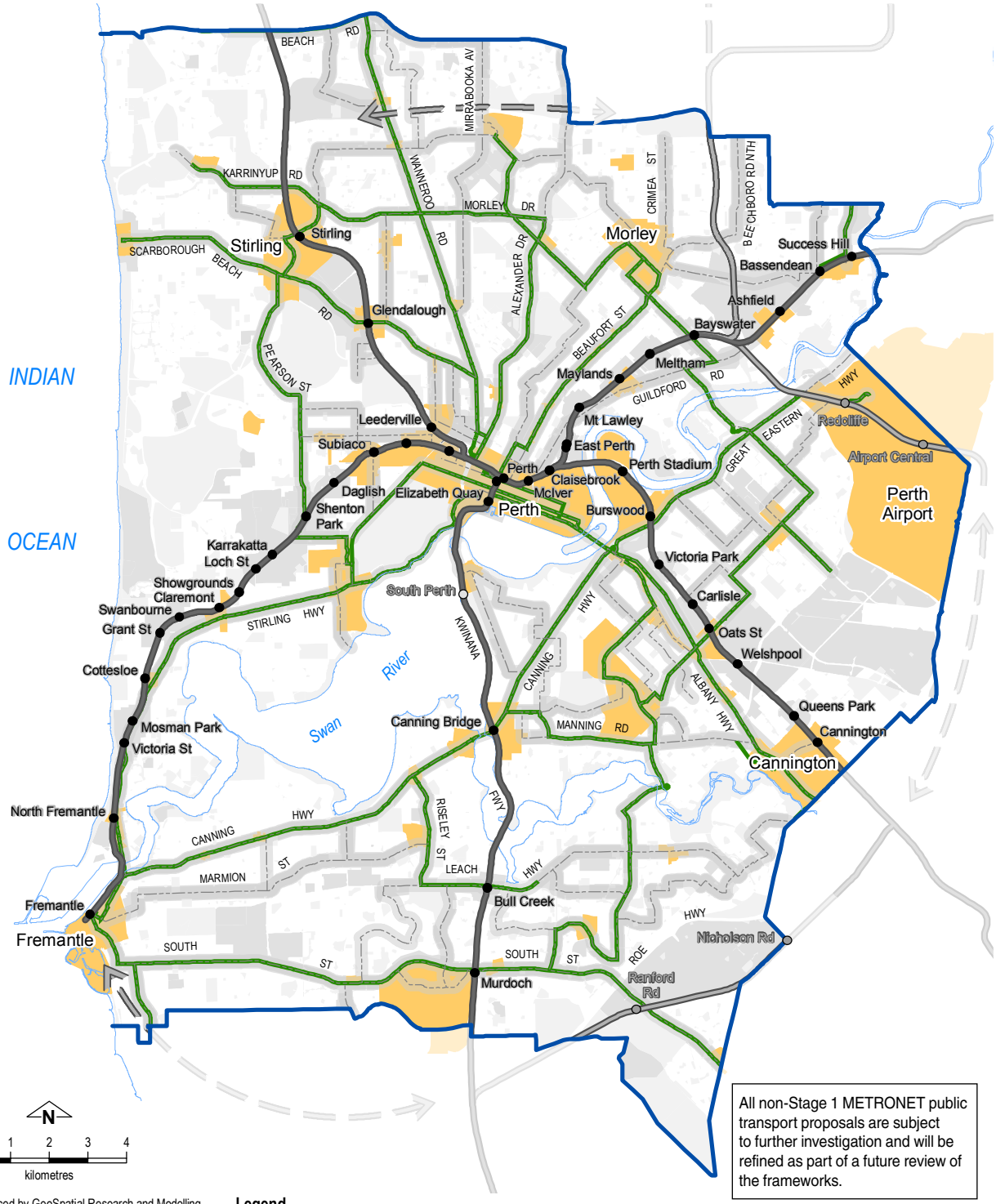
The public transport component of the plan is primarily focussed on high-volume transit routes such as heavy rail and bus rapid transit. Perth's ferries cannot carry the volumes of trains or buses. Nevertheless it is important to note that there is a role for higher-volume ferry services in the future for Perth. Where faster, low-wash ferries have been successful (e.g. Brisbane, Sydney), the key has been to have major attractions/destinations and medium to high-density residential areas adjacent to the ferry jetties. A prime example is Brisbane River's City cats which serve a range of key attractions along the river. Elizabeth Quay is the first site which will generate demand moving forward for additional ferry services. Further planning will be undertaken of opportunities for higher-volume ferry services to sites including East Perth, Claisebrook Cove, new Perth Stadium, Coode Street, Canning Bridge, Point Walter, Old Swan Brewery/Kings Park and UWA.

The transport network includes a plan for a Circle Line that connects stations on the Joondalup, Fremantle, Thornlie, Armadale, Forrestfield, Midland and East Wanneroo Rail Link, forming a complete circle around the Central sub-region. It will provide easier access to major activity centres such as Stirling and Murdoch activity centres, specialist hospital and university centres.

All non-Stage 1 METRONET public transport proposals are subject to further investigation and will be refined as part of a future review of the frameworks.

Four key passenger rail proposals are included in METRONET Stage 1 and are proposed to form part of a potential Circle Line in the Central sub-region with anticipated timing in Table 12:

1. **The Forrestfield-Airport Link** project when completed (approximately 2020) will provide new rail services and improved bus networks for the eastern suburbs, foothills and surrounding community to the Perth CBD and the full Transperth bus and train network. The project will provide for a 20-minute rail journey from Forrestfield to the Perth CBD and includes three new stations: Redcliffe, Airport Central and Forrestfield. The Airport Central Station will service the relocation and



Produced by GeoSpatial Research and Modelling, Department of Planning, Lands and Heritage, on behalf of the Western Australian Planning Commission

\\Nts-per\magsprojects\State_MultiRegion\SubRegional_StructurePlans\WorkingAreas\Central\CSRSP_Plan07_PublicTransport.mxd

Base information supplied by Western Australian Land Information Authority SLIP 944-2017-1

PLAN 7: Public transport

consolidation of the domestic and international terminals, due to occur in the early 2020s. A significant portion of the new rail line will be in underground tunnels from Bayswater to Forrestfield and the Redcliffe and Airport Central stations will also be below ground.

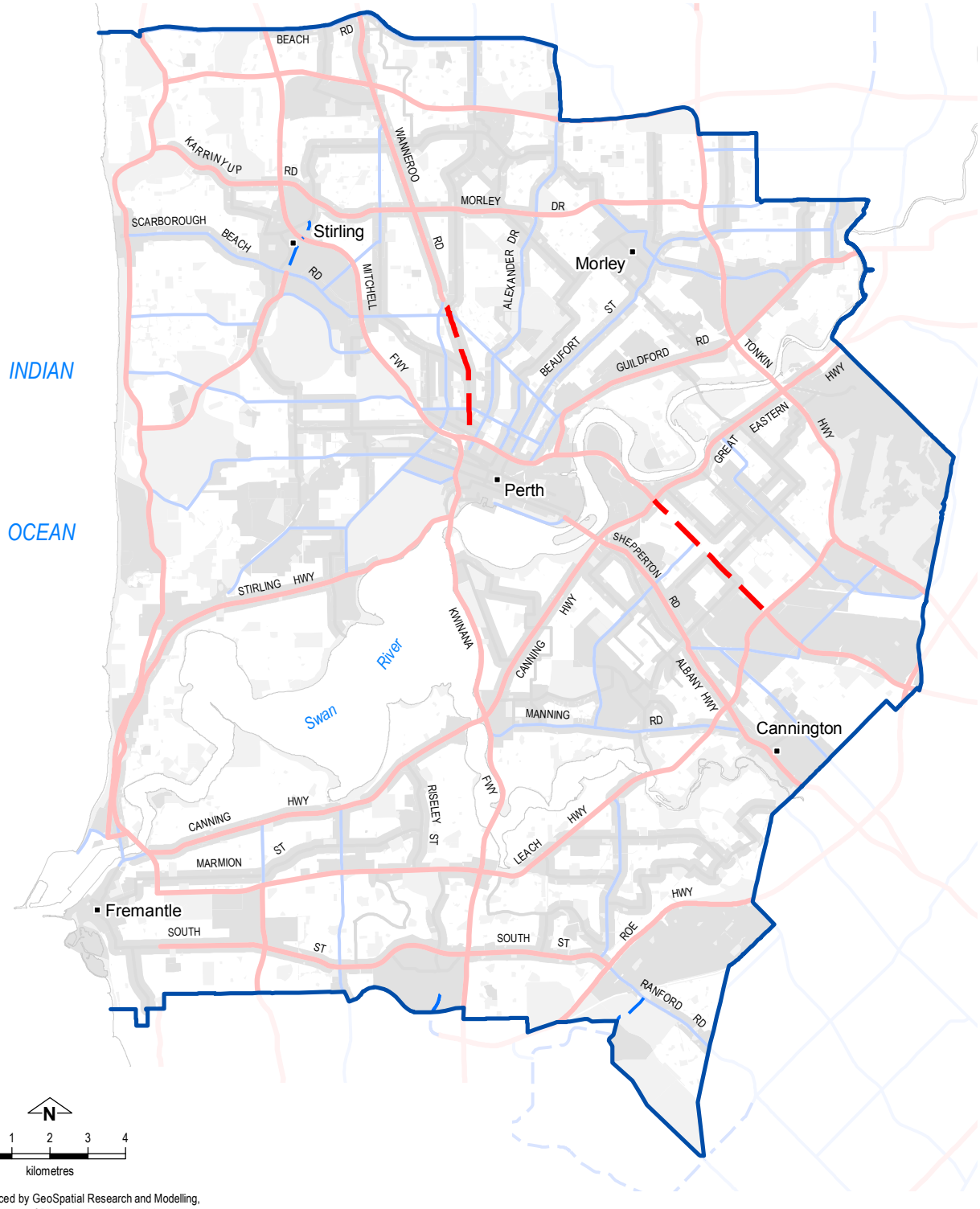
2. Extension of the **Thornlie passenger railway** to Cockburn Central with two new stations proposed at Nicholson Road and Ranford Road.
3. A new rail line **extending from the Midland rail line** to the **Ellenbrook town centre** with additional stations including at Morley, Malaga and Ellenbrook.
4. Extending the Midland rail line to a new station at **Bellevue** and **relocating the Midland** rail and bus integrated station eastwards (Cale Street) to be in proximity to the Midland public hospital and main retail precinct.

Further investigation is required for developing high-frequency public transit routes to link activity centres east and west of the city centre; and for completing a proposed future Circle Line that connects the Joondalup, East Wanneroo/ Ellenbrook, Midland, Armadale, Mandurah and Fremantle rail lines – including extending the Forrestfield-Airport rail line to connect to Thornlie rail line and connecting the Thornlie rail line to Fremantle.

Roads

Three primary distributor reservations are proposed in the Central sub-region as shown in Plan 8 and Table 12 and include Orrong Road, Charles Street and Ellen Stirling Boulevard.

In addition, the Jandakot Airport Eastern Link Road, between Ranford Road and Jandakot Airport, is proposed to create a new road reservation in Canning Vale in response to the endorsed *Jandakot Airport Master Plan* (2014). It will provide improved access to the Jandakot Airport, service the proposed Canning Vale Sports Precinct, the future bus station/park and ride facility, Canning Vale Waste Disposal Facility site, and provide a link to the residential development to the south.



Produced by GeoSpatial Research and Modelling,
Department of Planning, Lands and Heritage,
on behalf of the
Western Australian Planning Commission
Copyright © February 2018

\\Nts-per\magsprojects\State_MultiRegion\
SubRegional_StructurePlans\WorkingAreas\Central\
CSRSP_Plan08_RegionalRoads.mxd

Base information supplied by
Western Australian Land Information Authority
SLIP 944-2017-1

Legend

Primary distributor	Integrator arterial
Existing (MRS/PRS reservation)	Existing (MRS reservation)
Proposed	Proposed

PLAN 8: Regional roads

Freight and aviation

Existing general and civil aviation facilities may not be adequate to meet the needs of the Perth and Peel regions by the time the population reaches 3.5 million people or more. Accordingly, planning studies to identify suitable locations for future general aviation and civil aviation airports, together with possible measures for new are currently being undertaken.

Population growth to 3.5 million people will bring about a significant increase in ship movements and related increases in freight handling and storage, road and rail transportation. By 2050, the volume of freight movement on the regional road and rail networks will increase substantially and in particular, it is envisaged that the proportion of freight on rail will increase. Future port facilities will be subject to further planning by the Westport Taskforce. Additional container port facilities will be required to service the growing needs of the State. Research has identified a coastal area within Cockburn Sound, Kwinana, as the most suitable location for the development of additional container port facilities.

The 2050 network of key freight and aviation infrastructure is shown in Plan 9 and proposed timing in Table 12.

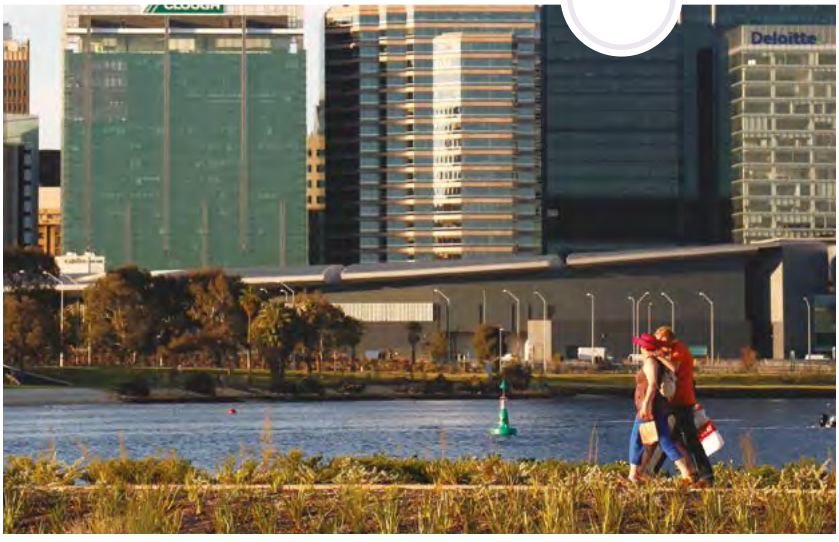
A number of enhancements will be made to the metropolitan freight rail network to accommodate the more than fourfold increase in international containers expected by mid-century. In the Central sub-region this includes duplicating the single-track sections at the Forrestfield and Kewdale intermodal precincts and removing a level crossing at Nicholson Road in Canning Vale.

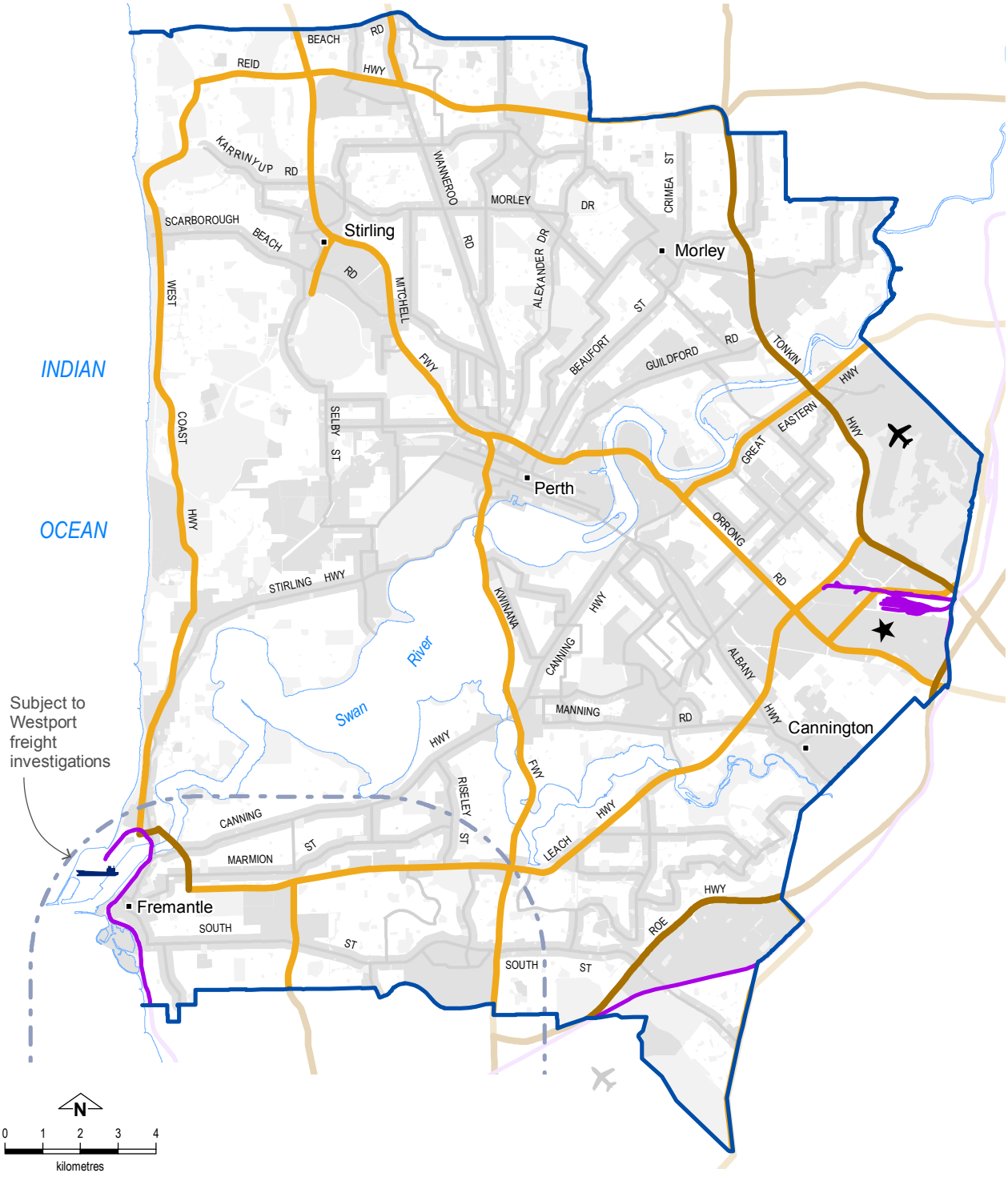
The classification of networks in the area marked as 'Subject to Westport freight investigations' in Plan 9 is currently subject to review as part of the *Westport: Port and Environs Strategy*.

Active transport

As the city grows, there will be more emphasis on providing high-quality, safe and comfortable pedestrian and cycling infrastructure, especially around activity centres. In addition, there will be more travel choices available to encourage increased use of public transport, walking and cycling. Many new off-road shared paths have been planned as part of the bicycle network and bike boulevards will provide a safer way for cyclists to travel on the roads through some of Perth's older suburbs.

There will be additional river crossings and end-of-trip facilities at all major activity centres. The proposed network aims to connect more cyclists to activity centres and train stations and to increase recreational cycling. The increasing use of electric bikes will take more cyclists longer distances, faster, for less effort.





Produced by GeoSpatial Research and Modelling,
Department of Planning, Lands and Heritage,
on behalf of the
Western Australian Planning Commission
Copyright © February 2018

\\Nts-per\magsprojects\State_MultiRegion\
SubRegional_StructurePlans\WorkingAreas\Central\
CSRSP_Plan09_FreightAndAviation.mxd

Base information supplied by
Western Australian Land Information Authority
SLIP 944-2017-1

Legend

- Airport
- Port
- Intermodal freight terminal
- Freight rail

Freight roads

- Primary
- Secondary

PLAN 9: Freight and aviation

More detailed arrangements for integrating a comprehensive pedestrian and cycling network throughout urban areas, including connections to rail stations, will be determined through district and local structure plans and in consultation with local government.

The cycling network for a city of 3.5 million proposes the following enhancements to increase the use of active transport:

- An extension to the current 172 kilometres of metropolitan off-road commuter cycle paths to over 850 km, to cater for approximately half a million bicycle trips each day (Table 12).
- Active transport bridges: new active transport (cycling and pedestrian) and green (active and public transport) bridges to improve connectivity across rivers and lakes, reducing walking and cycling times. These include the: Three Points Bridge, connecting Chidley Point, Point Walter and Point Resolution; three bridges crossing the Swan River between Heirisson Island and Maylands; and three bridges over the Canning River between Salter Point and Waterford.

5.3.3 Service infrastructure

The urban consolidation proposed will require upgrades and additions to the network of essential service infrastructure (Plan 10).

The framework seeks to maximise the use of, and add value to, existing infrastructure. Alignment between the development industry and servicing authorities will be necessary to ensure that the release of land for housing and employment purposes is commensurate with anticipated population growth. The delivery of infrastructure will be staged and coordinated with the supply of urban and industrial land, to improve coordinated service delivery and ensure the timely and cost-effective supply of serviced land.

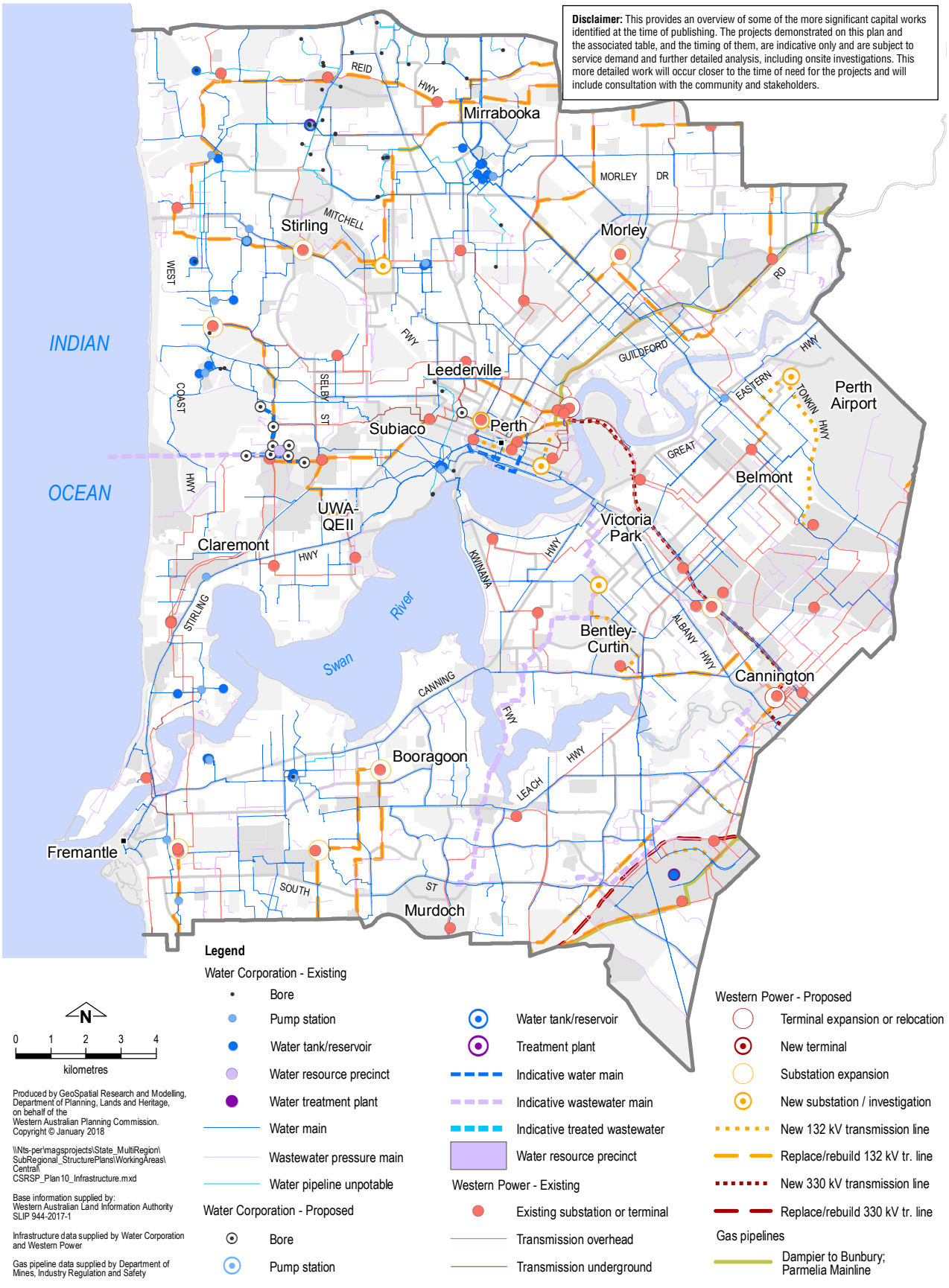
Improved technology may provide servicing efficiencies which may impact on demand for, and the need to supply, future infrastructure. It will also be necessary to identify and /or protect sites for regional service infrastructure provision. The existing and the timing of proposed service infrastructure are shown in Plan 11 and Table 12.

Water

The sub-region's aquifers support many regionally important wetlands and bushlands and these and other groundwater resources provide a critical source of water. Water sources serve a critical function for supplying private self-supply, public scheme water supply and water for environment, including wetlands and ecosystems. Urban landscaping, wetlands and lakes all contribute to the outdoor lifestyle enjoyed by the community and visitors and are important to the sub-region's economic, environmental biodiversity and social well-being.

Some of the groundwater supplied to the public water supply scheme is abstracted within the Central sub-region. Groundwater resources are under increasing pressure from a drying climate and increasing demand. Water availability is likely to decline in the future due to reducing rainfall. Localised water level declines and increased salinity are being experienced in some areas. The Department of Water and Environmental Regulation is developing a water supply strategy for the Perth-Peel region to identify demand gaps and viable alternative supply options.

Conceptual water supply planning within the Central sub-region includes a number of proposed upgrades and supporting infrastructure to maintain the level of service and to accommodate identified



PLAN 10: Service infrastructure - water and power

capacity. The Water Corporation's existing and proposed water supply infrastructure includes several key water sources including surface water, groundwater and desalinated seawater in addition to water resource precincts (wastewater treatment plants). Water is transferred from sources to treatment and storage facilities by trunk mains that traverse the sub-region.

Power

Electricity is distributed to the sub-region by Western Power through a network of 132 kV and 330 kV bulk transmission power lines that connect to the local power distribution network via transition terminals and sub-stations.

New sub-stations are proposed with associated line routes proposed linking these sub-stations into the network. Additionally, significant upgrades to the electricity network are proposed throughout the sub-region and the need for, timing and delivery of these services will require further investigation through more detailed planning.

Traditional electricity infrastructure may be complemented by more innovative electricity supply models such as microgrids, embedded renewable energy generation and energy storage systems.

Drainage

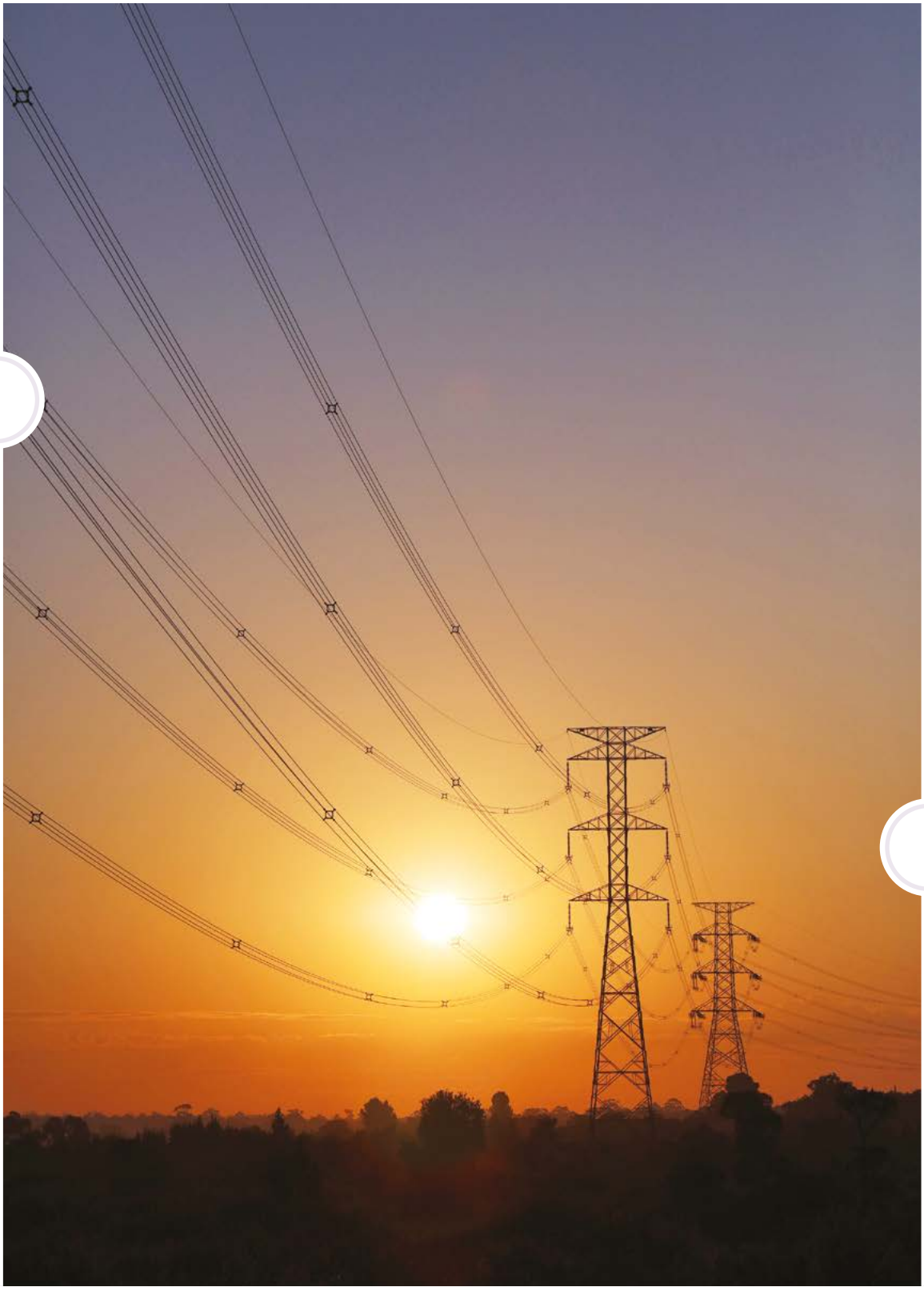
Areas identified for development in the framework will be required to address the management of drainage systems to ensure that ecological and biodiversity functions and water quality of wetlands and river systems are maintained, that people and property are protected from flooding and inundation, and that amenity of public open space is enhanced. Existing drainage systems are to be modified to incorporate best practice for water-sensitive design and nutrient management. Subsequent levels of planning for drainage in the sub-region will be guided by the regional water management strategy prepared to support the framework.

Gas and telecommunications

Gas and telecommunications infrastructure will be progressively supplied to the growth areas of the sub-region as development proceeds. Planning decisions regarding telecommunications infrastructure will continue to be guided by *State Planning Policy 5.2 Telecommunications Infrastructure*.

Waste

Consolidation of existing waste facility sites and co-location of waste facilities with other compatible industries and infrastructure can potentially meet most short-to-medium term waste infrastructure needs in the Perth and Peel Regions. The Western Australian Waste Strategy, 'Creating the Right Environment', identifies long-term waste and recycling infrastructure planning as a key strategic response to the challenges facing waste management in Western Australia. A range of investigations is currently being undertaken.



IMPLEMENTATION

The **Central Sub-regional Planning Framework** will guide local planning to **achieve optimal urban consolidation** over the long term

The framework will be incorporated into *State Planning Policy 1 State Planning Framework* and will provide a long-term strategic plan for the sub-region.

The framework identifies sufficient land for housing and employment to accommodate anticipated population growth, incorporating land use and infrastructure proposals to 2050 and broad principles to guide the future development of the sub-region. It will remain responsive to evolving community expectations while balancing compliance with the broad principles of urban consolidation and protection of environmental values within the sub-region.

6.1 Implementation mechanisms and actions

The framework is a strategic planning document and therefore does not change the existing zonings or reservations that have effect under statutory region and local planning schemes. Changes to zoning can only occur after an amendment to the relevant statutory region and local planning schemes. The framework is the first step in the ongoing process of refining and detailing planning proposals for an area. This refinement will continue through the MRS/PRS, local planning schemes, structure planning, subdivision and/or development.

The framework's foundation is a consolidated urban form with an integrated land use and movement network that maximises the use of existing infrastructure and avoids and protects regionally-significant environmental attributes where appropriate. It provides a high-level strategic context to guide future development and address key challenges for the sub-region.

The implementation of the framework will require close collaboration and integration across State government agencies, local government and the private sector.

Specific implementation actions and the responsible authority for each are outlined in Table 3. In addition, detailed work programs will need to be established by relevant authorities to ensure the preparation or review of supporting planning instruments are aligned with the principles and objectives of the framework.

TABLE 3: Implementation actions

Urban consolidation element objectives	Strategic direction/priority[10]	
Housing, character and heritage		
Provide **well-designed higher-density housing** that considers local context, siting, form, amenity and the natural environment, with diverse dwelling types to meet the needs of the changing demographics. Ensure that new **attractive character and heritage values** within suburbs are retained and minimise changes to the existing urban fabric.	Targeting **urban consolidation precincts** (including urban corridors, station precincts, industrial and activity centres) for higher density residential and employment development, where appropriate given consideration of the locality characteristics and amenities	
Employment		
Support urban and economic development of the **activity centre** network as places that attract people to live and work by optimising land use and transport linkages between centres; protecting identified employment land from residential encroachment and avoiding contiguous linear or ribbon development of commercial activities beyond activity centres. Promote the current and proposed supply of **industrial centres** as key employment nodes and prevent incompatible residential encroachment on these areas.	Promote growth in diversity and density of employment and residential development, where appropriate, in the **employment network** of activity centres and industrial centres	
	Encourage the ongoing preparation of local **economic development strategies** aligned with the framework	
	Protect employment land from uses inconsistent with the employment objective by planning for ultimate development with limited interim uses	
	Protect strategic industries and land classified for this purpose, together with their buffers, from the encroachment of non-strategic and/or incompatible land uses	
	Improve employment self-sufficiency to reach target	
Green network		
Preserve and enhance the **green network** of parks, rivers, sport and recreation areas, facilities for active open space, conservation and biodiversity areas, and areas with a high level of tree canopy coverage, considered important for the health and wellbeing of the community. Avoid, protect and mitigate **environmental values** and promote development that contributes to maintaining air quality and minimises risks of inundation from sea-level rise, flooding or storm surge events and that minimises the risks of bushfire damage.	Integrate the green network principles to inform initiatives and **green network strategies** that allow for ongoing assessment, improvement and management of green assets	
	Recognise and conserve **biodiversity values**, where possible when identifying opportunities for future development	
	Promote enhancements to the **design and maintenance** of existing urban green spaces to reduce the impacts of increasing temperatures and increased use	

Notes:

1. Initiatives other than those specified in the Table 3 may be required.
2. Table 3 refers to State and local government actions only.

[10] Strategic directions/priorities are uncommitted projects and a range of issues will require further consideration over time, including further detailed planning, timing and funding. The provision of funding will be a future decision of the State and relevant local governments. The table refers to State and local government actions only and initiatives other than those specified in the table may be required.

	Actions[11]	By whom
	Local planning strategy/scheme amendments	WAPC Department of Planning, Lands and Heritage Local government
	State Planning Policy 4.2 Activity Centres in Perth and Peel Local planning strategy/scheme amendments Local Economic Development Strategy Structure planning	WAPC Department of Planning, Lands and Heritage Local government
	Urban Forest Strategy/biodiversity strategies Local planning strategy/scheme amendments Structure planning	WAPC Department of Planning, Lands and Heritage Local government

[11] The type of structure plan required i.e. district, local or activity centre will depend upon the statutory framework and be subject to further discussion with the Department of Planning, Lands and Heritage and relevant local government.

TABLE 3: Implementation actions (continued)

Urban consolidation element objectives	Strategic direction/priority [10]	
Public transport		
Ensure existing and planned **high-quality**, **high-frequency public transit corridors** connecting quality residential land uses with station precincts, activity and industrial centres. Focus higher-density residential development along high-frequency public transit corridors and around station precincts.	Define criteria for **place-making parameters** and **transport functions** of urban corridors to provide guidance to local governments on how to transition existing major metropolitan arterial roads into urban corridors of high-density, high-amenity, multi-modal streets	
Infrastructure		
Ensure more efficient use of existing and planned service and social **infrastructure** to achieve a more sustainable urban environment. Protect **existing and proposed major transport routes and freight** operations from incompatible urban encroachment to promote a system where land use developments and transport infrastructure are mutually compatible. To ensure the **timely, efficient and cost-effective delivery** of electricity, water, wastewater and other service infrastructure that is aligned with the staging of development and encourages the shared use of infrastructure corridors by the various service providers.	Identify land within the sub-region for **sport and recreation**, regional-level health facilities, education and cemeteries	
	Undertake ongoing **monitoring** of the movement network, refine plans as appropriate and implement transportation upgrades to and construction of road, rail, public transport and active transport infrastructure, as appropriate	
	Optimise use of **existing infrastructure**, with urban infill and employment opportunities utilising the principles of urban consolidation	
	Facilitate shared infrastructure corridors to reduce land requirements	
	Complete an infrastructure capacity report to accompany urban infill strategies	
	Optimise use of existing infrastructure, with urban infill and employment opportunities utilising the principles of urban consolidation	

Notes:

1. Initiatives other than those specified in the Table 3 may be required.
2. Table 3 refers to State and local government actions only.

[10] Strategic directions/priorities are uncommitted projects and a range of issues will require further consideration over time, including further detailed planning, timing and funding. The provision of funding will be a future decision of the State and relevant local governments. The table refers to State and local government actions only and initiatives other than those specified in the table may be required.

	Actions [11]	By whom
	Guidance paper/policy/demonstration projects	WAPC Department of Planning, Lands and Heritage Department of Transport Public Transport Authority
	Social infrastructure strategy Structure plan	WAPC Department of Planning, Lands and Heritage Local government
	Region scheme amendments	WAPC Department of Planning, Lands and Heritage
	Ongoing monitoring and upgrade/ construction as required	Department of Transport Main Roads Western Australia Public Transport Authority Local government
	Region scheme amendments	WAPC Department of Planning, Lands and Heritage
	State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning Local planning strategy/scheme amendment	Local government
	Monitoring and provisioning through the Infrastructure Coordination Framework	WAPC Infrastructure Coordinating Committee
	Structure plan Local planning strategy/scheme amendment	WAPC Local government Department of Planning, Lands and Heritage
	Region scheme amendment	WAPC Service authorities Department of Transport
	Structure planning Region scheme amendment Local planning strategy/scheme amendment	WAPC Local government

[11] The type of structure plan required i.e. district, local or activity centre will depend upon the statutory framework and be subject to further discussion with the Department of Planning, Lands and Heritage and relevant local government.

6.2 Staging and sequencing

Timing for the delivery of proposals listed in the framework will be guided by a number of factors including market forces, development pressures and demand, landowner intentions and the capacity of servicing agencies and local governments within the sub-region. Developers and local government will need to liaise with relevant authorities at more-detailed planning stages in relation to these infrastructure requirements.

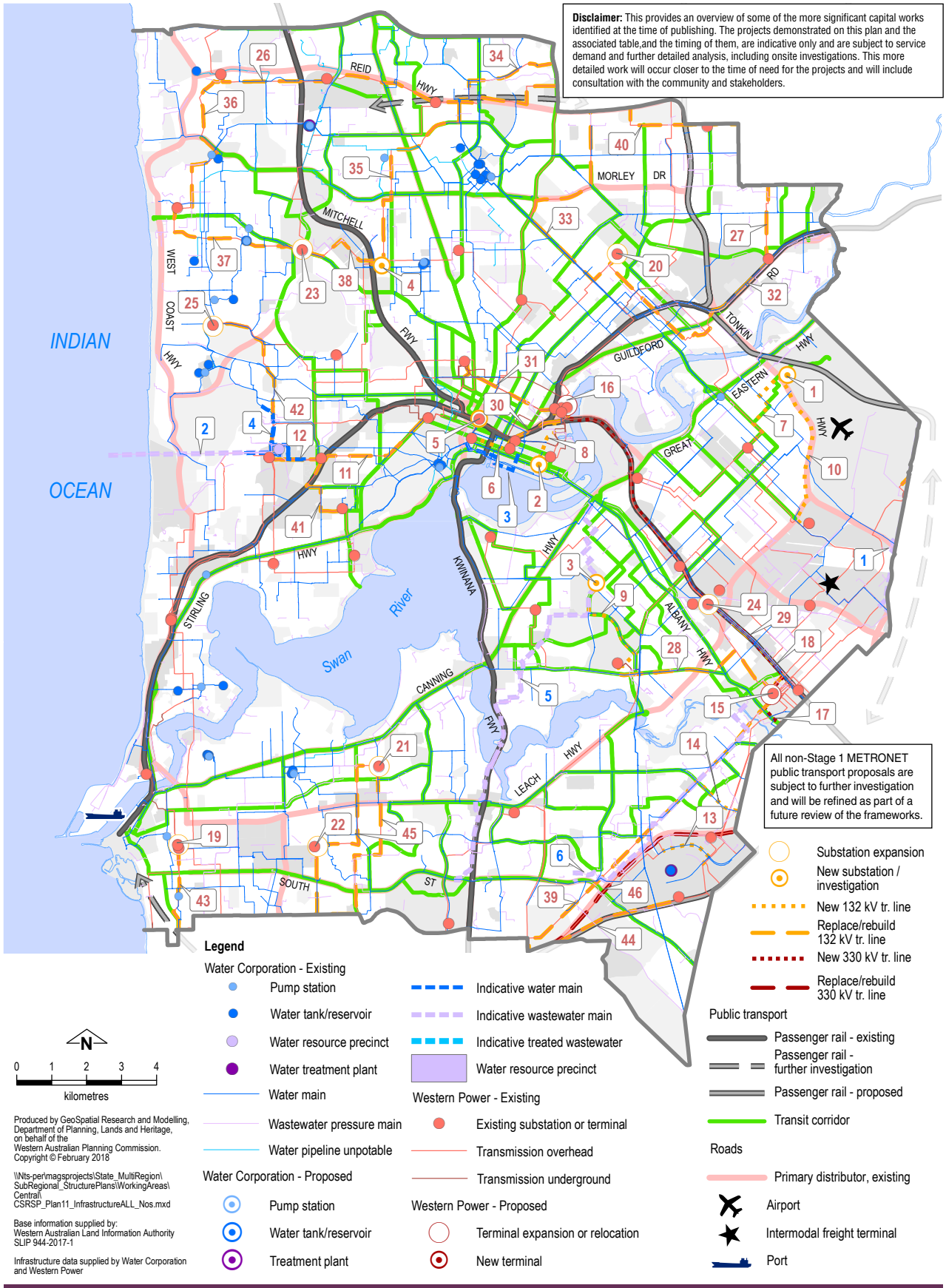
Ongoing monitoring of land supply and infrastructure provision in the context of *Perth and Peel@3.5million*, including review of the anticipated timing for the delivery of infrastructure (Plan 11 and Table 12) will ensure that the land use and infrastructure data remains current and responsive to urban and employment land consumption. This will assist in the identification of infrastructure supply opportunities which provide the basis for improved demand forecasting and network optimisation. This will facilitate greater responsiveness and adaptability to changing population, demographic and social trends, with a focus on the development and application of new technologies and innovation. It is expected that local planning strategies will be consistent with these timeframes.

In addition to the specific implementation actions in Table 3, the delivery of the framework will require the development of an infill strategy which will provide the basis of a staging program to deliver development in the first instance for the Central sub-region, rolling out to the outer sub-regions thereafter.

The framework will inform the preparation, review or amendment of the local planning strategies and schemes of each local government within the Central sub-region. This will require a refinement of local strategies and schemes to explicitly address the urban consolidation precincts set out in the framework for each local government area.

The identification, by exception only, of additional or alternative urban consolidation areas outside of those precincts (i.e. activity centre, station precincts, urban corridors, industrial centres etc.) identified in the framework but consistent with urban consolidation principles (Table 1), areas and staging, should take into consideration:

- the nature and significance of the characteristics of a locality
- whether the economic development of the area is supported, with a focus on the provision of employment opportunities for the projected population within the sub-region
- employment and residential densities (where appropriate) in activity and industrial centres
- accessibility to public transport and amenities
- that servicing can be provided economically over the lifespan of the development
- the relevant measures or suitable implementation mechanisms that could be adopted to implement and activate the urban consolidation precincts.



PLAN 11: Infrastructure staging

Note: Infrastructure item reference numbers correspond to infrastructure proposals in Table 12 (page 84).

6.3 Role of local government

Each local government has local planning strategies that contain the strategic plan and policy context of a local planning scheme. These planning documents set out the general aims, intentions and desired outcomes (social, economic and environmental) for long-term growth and change within the locality and shall be integrated and aligned with WAPC policies.

The framework will inform the preparation, review or amendment of the local planning strategies and schemes of each local government within the Central sub-region. This will require a refinement of local strategies to explicitly address the urban consolidation precincts set out in the framework for each local government area, where appropriate.

There are a number of measures, statutory mechanisms or provisions available to local government to enable urban consolidation to be realised. These measures include local planning policies, scheme provisions, incentives, density bonuses, up-coding, split-coding, special control or development areas, and minimum densities. These mechanisms must be considered based on the individual requirements of the urban consolidation precincts, existing adjacent development, and the position of the local government and the community, in conjunction with State/WAPC policies.

6.4 Infrastructure coordination

Fundamental to the delivery of land for development within the sub-region is the need for the coordinated and planned provision of infrastructure. Improvements to the coordination of infrastructure delivery are reflected by the recently developed Infrastructure Coordination Framework (ICF) administered through the WAPC's Infrastructure Coordinating Committee (ICC).

The ICF has been developed to assist the ICC to bring about greater alignment of strategic land use and infrastructure plans. This mechanism will encourage collaboration among infrastructure agencies and result in greater coordination outcomes including asset colocation opportunities, synergies, and economies of scale.

6.5 Monitoring and review

The framework will be reviewed after three years to ensure that it remains responsive to changes, challenges and community expectations, as the sub-region develops.

The delivery of additional infill housing opportunities associated with METRONET may lead to the need to revise infill targets and/or the staging of greenfield development through the review process.

Monitoring and reporting on progress towards delivering the framework will inform government, industry and the wider community. It will be integral to the practice of evidence-based policy interventions that can respond to the challenges of a rapidly-changing and growing city.

The ongoing monitoring of land supply and infrastructure provision, including review of the anticipated timing for the delivery of infrastructure (Plan 9 and Table 12), will ensure that land use and infrastructure data remains current and responsive to urban and employment land consumption.

Identification of infrastructure supply opportunities which provide the basis for improved demand forecasting and network optimisation will facilitate greater responsiveness and adaptability to changing population and, demographic and social trends, with a focus on the development and application of new technologies and innovation.

Concurrent with these initiatives, the State Government has committed to establishing Infrastructure WA to focus on strategic infrastructure planning, which will provide advice to Government in the form of a 20 year infrastructure strategy that will set out infrastructure priorities that will guide State Government decision-making.

GLOSSARY AND APPENDICES

Glossary

Activity centres: are community focal hubs. They comprise uses such as commercial, retail, higher-density housing, entertainment, tourism, civic/community, higher education and medical services. Activity centres vary in size and diversity and are designed to be well-serviced by public transport.

Affordable housing: refers to dwellings that households on low-to-moderate incomes can afford, while meeting other essential living costs. Affordable housing includes public housing, not-for-profit housing and other subsidised housing under the National Rental Affordability Scheme, together with private rental and home ownership options for those immediately outside the subsidised social housing system.

Affordable living: recognises that direct rental or mortgage payments are not the only costs that households incur. Other expenses include the consumption of water, gas and electricity, property fees and taxes, the cost of transport (to work, education and shopping) and the price of food.

Agglomeration: is the phenomenon whereby businesses become more productive through proximity to other businesses. This occurs in a number of ways, for example when a small number of shops or restaurants cluster in a neighbourhood, or when businesses in similar industries cluster together such as with the information technology industry in Silicon Valley. Agglomeration economies come from the local density and diversity of businesses, workers and residents and exist whenever people become more productive through proximity to others.

Basic raw materials: are material that consists of sand (including silica sand), clay, hard rock limestone (including metallurgical limestone), gravel and other construction and road-building materials.

Bush Forever: is the State Government's strategic plan to protect sites of regionally-significant bushland within the Swan Coastal Plain portion of the Perth metropolitan region.

Dwelling: is a self-contained suite of rooms, including cooking and bathing facilities, intended for long-term residential use. Units (whether self-contained or not) within buildings offering institutional care (such as hospitals) or temporary accommodation (such as motels, hostels and holiday apartments) are not defined as dwellings.

Employment density: is the total employment of a selected geography divided by the total size of the selected geography (gross land area in hectares).

Employment self-sufficiency: is the ratio (expressed as a percentage) of the total labour force (local residents who are employed or seeking employment) of a defined area relative to the total number of jobs available in that area. A percentage above 100 indicates a region has more jobs locally than resident workers.

Green network: consists of public and private open spaces. The green network includes Bush Forever sites, national and regional parks, district and local parks, sports fields, school grounds, community facilities, golf courses, foreshores and beachfront areas connected by streetscapes, trails, cycle paths and pedestrian footpaths.

High Frequency Transit Corridor: where public transport services are available at a frequency of five minutes in peak times and 15 minutes out of peak times.

High Priority Transit Corridor: where high frequency public transport is facilitated through the use of traffic signalling priority, queue jumps at traffic lights or dedicated lanes.

Industrial: is land identified for industrial use, to provide for manufacturing industry, the storage and distribution of goods and associated uses.

Infill or urban infill: is the redevelopment of existing urban areas at a higher density than currently exists.

Infrastructure Coordination Framework: a dynamic spatial and reporting tool assisting the Infrastructure Coordinating Committee to facilitate greater alignment of strategic land use and infrastructure plans through a revised Infrastructure Planning Cycle for Government.

Knowledge-based economy: is any economy based on creating, evaluating and trading knowledge. It describes a trend in advanced economies towards a greater dependence on knowledge, information and high skill levels.

Labour force: is the total number of local residents who are participating in the labour force (i.e. those employed plus those seeking work).

Liveability: encompasses the many characteristics that make a place desirable for people to live.

Linear/ribbon development: is the contiguous development along a main road.

Local planning schemes: are statutory planning schemes developed by local governments to regulate land use planning at a local scale. Land uses within a local planning scheme are required to be consistent with broad land uses assigned under the relevant region scheme.

Natural resources: are naturally-occurring elements such as water, solar, wind and wave energy, wood, coal and other minerals and fertile land.

New urban areas (greenfield areas): undeveloped land that has been identified for future urban use as an Urban Expansion or Urban Investigation area.

Population-driven employment: is employment associated with a growing residential population.

Quality of life: is used to describe the general wellbeing of individuals and societies.

Region Planning Schemes: are the statutory regional planning schemes for the Perth and Peel regions *(Metropolitan Region Scheme and Peel Region Scheme)* and are the principal statutory mechanisms for the implementation of strategic land use and infrastructure proposals. These schemes provide for the acquisition of land (and waterways) where reserved for public purposes including regional open space, public uses and infrastructure.

Residential density targets: were established in *Directions 2031 and Beyond* and require new areas and structure plans under review to adhere to a target of 15 dwelling units per gross hectare of Urban zoned land, therefore excluding land comprised within all other zones and reserves under the applicable region scheme. Also refer to residential site density.

Residential site density: a residential density target needs to be translated into residential site density of 26 dwellings per residential site hectare. This is defined as the number of dwellings on land that is zoned residential under local planning schemes or structure plans, and excludes all non-urban regional reservations in the region schemes and non-residential zones in local planning schemes such as local road reserves, local reserves for sport and recreation, primary schools, commercial/ activity centres and offices. Also refer to residential density targets.

Sense of place: is a component of 'cultural identity'; sense of place is a personal response to environmental, social and economic surroundings that an individual experiences in daily life. It can be the individual's or communities' perception and feeling of belonging for a home, local area, region, state or country.

Spatial plan: land use and infrastructure plan for Perth and Peel (Figure 5).

Strategic economy and employment: is associated with the production and transfer of goods, services and knowledge predominantly to serve markets beyond the immediate location or catchment. Also known as 'traded clusters', as distinct from 'local clusters', which comprise industries that serve local population and business driven demand.

Structure plan: a plan for the coordination of future subdivision and zoning of an area of land.

Sustainability: is meeting the needs of current and future generations through the integration of environmental protection, social advancement and economic prosperity.

Total dwellings: occupied and unoccupied dwellings.

Transit-oriented development: is an urban development around public transport stations that increases use of public transport. The aim is to locate moderate-to-high intensity commercial, mixed-use, community and residential development close to train stations and/or transit corridors to encourage public transport use over private vehicles.

Urban: land identified for urban use (Urban or Urban Deferred zoned land in the *Metropolitan Region Scheme*), such as residential and associated activity and bulky goods/light industry employment centres, recreation and open space.

Urban consolidation: includes infill and greenfield development through increased densities and/ or the logical extension or 'rounding off' of existing urban and industrial areas to more-effectively utilise existing social, service and transport infrastructure.

Urban corridors: the focus for higher-density residential development. Where appropriate, located along high frequency transit corridors and promoted as attractive places to live by optimising their proximity to public transport while ensuring minimal impact on the surrounding urban fabric and the operational efficiency of the regional transport network

Water resource precinct: is an infrastructure site identified by the Water Corporation for the provision of water and wastewater related services.

Appendix 1 – Employment

TABLE 4: Activity centres in the Central Sub-region

Hierarchy classification	Activity centres in the Central sub-region			
Capital city	Perth (includes East Perth, Northbridge and West Perth)			
Strategic metropolitan centre	Cannington	Fremantle	Morley	Stirling
Specialised centre	Curtin/Bentley	Murdoch	Perth Airport	UWA–QEII
Secondary centre	Belmont Booragoon	Claremont Karrinyup	Leederville Mirrabooka	Subiaco Victoria Park
District centre	Ashfield Bassendean Bentley Bull Creek Burswood (Peninsula) Canning Bridge Cottesloe Dianella Dog Swamp	East Victoria Park Fitzgerald Street Floreat Glendalough Inglewood Kardinya Livingston Main Street (Tuart Hill) Maylands	Melville Mount Hawthorn Mount Lawley/ Highgate Noranda North Fremantle Northlands Oats Street Petra Street Riseley Street	Riverton Scarborough South Perth Southlands Stirling Central Wembley/Jolimont West Leederville

TABLE 5: Employment self-sufficiency 2011–50

Indicator	2011	2021	2031	2050	Total change	Total % change
Population	782,970	903,750	1,009,060	1,182,570	**399,600**	50%
Labour force	390,970	439,560	488,960	595,660	**204,690**	52%
Jobs	546,120	635,940	707,820	831,960	**285,840**	52%
Employment self-sufficiency	139.7%	144.7%	144.8%	139.7%	**0**	-

Note:

- Employment self-sufficiency measures the quantity of jobs available in a given area as a proportion of that area's resident labour force (expressed as a percentage). A percentage above 100 indicates that a region has more jobs locally than resident workers (and is therefore a net importer of labour). Note the total change presented for employment self-sufficiency represents a percentage point change from 2011 to 2050.
- The projections in Table 4 are based on the draft framework scenario and adjustments were made to previous employment self-sufficiency estimates in the 2001, 2006 and 2011 Census data, published in *Delivering Directions Annual Report Card 2013*, to account for and redistribute census respondents not indicating where in Western Australia their job is located. This provides a higher estimate of employment and subsequently higher employment self-sufficiency.

TABLE 6: Anticipated job numbers for activity centres

Activity centre	2011	2050	Total additional
Strategic metropolitan centre			
Morley	6,170	9,130	**2,960**
Fremantle	13,150	18,910	**5,760**
Cannington	5,140	7,180	**2,040**
Stirling	7,950	14,340	**6,390**
Secondary centre			
Belmont	2,460	3,510	**1,050**
Booragoon	3,420	4,430	**1,000**
Victoria Park	3,440	6,040	**2,600**
Claremont	2,260	2,710	**450**
Karrinyup	2,000	2,940	**940**
Leederville	3,970	6,610	**2,640**
Mirrabooka	2,490	4,620	**2,140**
Subiaco	15,760	24,050	**8,290**
Specialised centre			
Curtin/Bentley	13,970	23,710	**9,740**
Murdoch	5,740	34,690	**28,950**
UWA - QE11	17,680	24,190	**6,520**
Perth Airport	12,900	20,390	**7,490**
Mount Lawley ECU	900	1,590	**690**

Note: The above table reflects the anticipated job numbers for industrial centres within the sub-region from 2011 to 2050. The job numbers are a projection only, based on the draft framework scenario, and may vary due to a number of factors including, but not limited to, the economy and infrastructure provision.

TABLE 7: Anticipated job numbers for industrial centres

Industrial centre	2011	2031	2050
Canning Vale	15,888	17,177	17,173
Jolimont	836	836	836
Belmont	3,967	4,048	4,047
Kewdale/Welshpool	28,052	28,785	28,775
Willetton	1,438	1,438	1,437
Myaree	3,430	3,430	3,430
Balcatta	9,118	9,214	9,208
North Fremantle	655	721	721
O'Connor	5,440	5,628	5,619
Ashfield	17,601	21,912	21,903
Total	**86,425**	**93,189**	**93,149**

Note: The above table reflects the anticipated job numbers for industrial centres within the sub-region from 2011 to 2050. The job numbers are a projection only, based on the draft framework scenario, and may vary due to a number of factors including, but not limited to, the economy and infrastructure provision.

Appendix 2 – Performance targets as per *State Planning Policy 4.2: Activity Centres for Perth and Peel*

TABLE 8: SPP 4.2 residential density and diversity targets

	Residential density target per gross hectare		Diversity performance target mix of land uses by retail floorspace area	
Activity centre hierarchy	**Minimum**	**Desirable**	**Centre size – shop/ retail floorspace component**	**Mix of land uses floorspace as a proportion of the centre's total floor space***
Perth capital city	N/A	N/A	N/A	N/A
Strategic metropolitan centres	30	45	Above 100,000 m^2 Above 50,000 m^2 Above 20,000 m^2 Above 10,000 m^2 Less than 10,000 m^2	50% 40% 30% 20%
Secondary centres	25	35		
District centres	20	30	N/A	N/A
Neighbourhood centres	15	25	N/A	N/A

* Total floorspace is defined as total shop-retail and mix of land uses floorspace.

Appendix 3 – Consolidated urban form

TABLE 9: Existing and projected dwellings and population 2011-2050

Local government	Existing dwellings	Existing population	Additional dwellings	Additional population	Total dwellings	Total population
Bassendean	6,390	15,180	4,150	9,120	**10,540**	**24,300**
Bayswater	27,850	6,5340	15,750	34,660	**43,600**	**100,000**
Belmont	16,110	37,360	10,410	22,900	**26,520**	**60,260**
Cambridge	10,270	26,730	6,830	15,020	**17,100**	**41,750**
Canning	33,560	90,740	19,530	42,960	**53,090**	**133,700**
Claremont	4,430	9,920	1,300	2,850	**5,730**	**12,770**
Cottesloe	3,520	8,240	970	2,140	**4,490**	**10,380**
East Fremantle	3,090	7,440	890	1,950	**3,980**	**9,390**
Fremantle	13,540	28,650	7,030	15,470	**20,570**	**44,120**
Melville	40,110	102,140	18,480	40,670	**58,590**	**142,810**
Mosman Park	4,000	9,200	1,500	3,300	**5,500**	**12,500**
Nedlands	8,070	22,030	4,320	9,500	**12,390**	**31,530**
Peppermint Grove	850	1630	480	1,050	**1,330**	**2,680**
Perth	10,980	18,320	15,910	35,000	**26,890**	**53,320**
South Perth	19,790	43,620	8,300	18,250	**28,090**	**61,870**
Stirling	89,570	209,040	60,330	132,740	**149,900**	**341,780**
Subiaco	9,150	18,830	6,140	13,520	**1,5290**	**32,350**
Victoria Park	15,770	34,720	19,320	42,510	**35,090**	**77,230**
Vincent	15,420	33,860	11,490	25,270	**26,910**	**59,130**
Total	332,470	782,990	213,130	468,880	**545,600**	**1,251,870**

Note: The information in the above table demonstrates the existing and projected number of dwellings and population for the sub-region in 2011 and 2050, based on the draft framework scenario. The difference represents the anticipated growth in additional dwellings and population for the sub-region.

TABLE 10: Additional urban infill housing targets by local government (dwellings)

Local government	2011-16	2016-21	2021-26	2026-31	Total 2031	Post 2031	Total
Bassendean	700	550	650	530	2,430	1,720	**4,150**
Bayswater	2,790	2,080	2,420	1,940	9,230	6,520	**15,750**
Belmont	1,860	1,410	1,560	1,270	6,100	4,310	**10,410**
Cambridge	1,170	850	1,080	900	4,000	2,830	**6,830**
Canning	3,380	2,520	2,920	2,620	11,440	8,090	**19,530**
Claremont	250	180	180	150	760	540	**1,300**
Cottesloe	200	150	120	100	570	400	**970**
East Fremantle	240	120	80	80	520	370	**890**
Fremantle	1,270	950	1,030	870	4,120	2,910	**7,030**
Melville	3,500	2,510	2,770	2,050	10,830	7,650	**18,480**
Mosman Park	250	190	230	210	880	620	**1,500**
Nedlands	880	860	400	400	2,540	1,780	**4,320**
Peppermint Grove	90	70	70	50	280	200	**480**
Perth	5,220	2,850	680	570	9,320	6,590	**15,910**
South Perth	1,410	1,130	1,240	1,080	4,860	3440	**8,300**
Stirling	10,310	8,060	9,210	7,770	35,350	24,980	**60,330**
Subiaco	1,150	880	850	720	3,600	2,540	**6,140**
Victoria Park	3,850	2,610	2,560	2,300	11,320	8,000	**19,320**
Vincent	1,650	1,410	1,840	1,830	6,730	4,760	**11,490**
Total	40,170	29,380	29,890	25,440	124,880	88,250	**213,130**

Note: The proposed consolidated urban form places a greater emphasis on urban infill dwellings with the introduction of minimum infill dwelling targets. To assist in the preparation of local planning strategies, the above information provides a timing projection, based on the draft framework scenario, for the minimum infill dwelling targets for each respective local government in five-year intervals.

Appendix 4 – Green network

TABLE 11: Land reserved for parks and recreation/regional open space and state forest – region schemes

Sub-region	Parks and recreation/ regional open space (ha)	State forests (ha)	Total reserved (ha)
Central	**5,460**	-	**5,460**
North-West	26,710	16,280	**42,990**
North-East	47,440	32,530	**79,970**
Eastern sector	21,580	65,000	**86,580**
Western sector	10,980	-	**10,960**
Peel sector	33,320	98,880	**132,200**
Total Perth and Peel	**145,490**	**212,690**	**358,180**

Note: The table identifies the amount of land reserved within the Perth Metropolitan and Peel Region Schemes for parks and recreation and State forests in 2016.

Appendix 5 – Infrastructure

TABLE 12: Central sub-region infrastructure staging

Central

Short-term (2015 - 2021)	**Electricity supply**	
	6	New 132kV infrastructure Line Route Hay St to Milligan St
	Public transport	
		Extension of the passenger rail network to Forrestfield via Perth Airport
Medium-term (2022 - 2031)	**Electricity supply**	
	1	New 132kV Infrastructure Substation Belmont Area
	2	New 132kV Infrastructure Substation CBD
	3	New 132kV Infrastructure Substation Kensington
	4	New 132kV Infrastructure Substation Joondanna
	7	New 132kV Infrastructure Line Route Belmont to New Belmont
	8	New 132kV Infrastructure Line Route East Perth to CBD
	9	New 132kV Infrastructure Line Route Kensington to Bentley
	10	New 132kV Infrastructure Line Route Kewdale to New Belmont
	11	New 132kV Infrastructure Line Route Western Terminal to Cook Street
	12	New 132kV Infrastructure Line Route Western Terminal to Shenton Park
	13	New 132kV Infrastructure Line Route Cannington to Riverton Line to Canning Vale to Willetton Line
	14	New 132 kV Infrastructure Line Route Southern Terminal to Byford / Southern River
	15	New 330kV Infrastructure Terminal Cannington
	16	New 330kV Infrastructure Terminal East Perth
	17	New 330kV Infrastructure Line Route Cannington to Kenwick Link
	18	New 330kV Infrastructure Line Route Cannington to East Perth
	19	Upgrade 132kV Infrastructure Substation Edmund Street
	20	Upgrade 132kV Infrastructure Substation Morley
	21	Upgrade 132kV Infrastructure Substation Myaree
	22	Upgrade 132kV Infrastructure Substation O'Connor
	23	Upgrade 132kV Infrastructure Substation Osborne Park
	24	Upgrade 132kV Infrastructure Substation Tate Street
	25	Upgrade 132kV Infrastructure Substation Wembley Downs
	26	Upgrade 132kV Infrastructure Line Route Balcatta to North Beach
	27	Upgrade 132kV Infrastructure Line Route Beechboro to Hadfields
	28	Upgrade 132kV Infrastructure Line Route Bentley to Cannington
	29	Upgrade 132kV Infrastructure Line Route Cannington to Tate Street
	30	Upgrade 132kV Infrastructure Line Route East Perth to Hay Street
	31	Upgrade 132kV Infrastructure Line Route East Perth to North Perth

TABLE 12: Central sub-region infrastructure staging (continued)

Medium-term (2022 - 2031)	**Electricity supply** (Continued)	
	32	Upgrade 132kV Infrastructure Line Route Hadfields to Morley
	33	Upgrade 132kV Infrastructure Line Route Northern Terminal to Morley
	34	Upgrade 132kV Infrastructure Line Route Northern Terminal to Balcatta
	35	Upgrade 132kV Infrastructure Line Route Northern Terminal to Joondanna
	36	Upgrade 132kV Infrastructure Line Route Manning Street to North Beach
	37	Upgrade 132kV Infrastructure Line Route Osborne Park to Manning Street
	38	Upgrade 132kV Infrastructure Line Route Osborne Park to Yokine
	39	Upgrade 132kV Infrastructure Line Route Cannington to Southern Terminals
	40	Upgrade 132kV Infrastructure Line Route Northern Terminal to Beechboro
	41	Upgrade 132kV Infrastructure Line Route Shenton Park to Medical Centre
	42	Upgrade 132kV Infrastructure Line Route Western Terminal to Wembley Downs
	43	Upgrade 132kV Infrastructure Line Route South Fremantle Terminal to Edmund Street
	44	Upgrade 132kV Infrastructure Line Route Southern Terminal to Willetton
	45	Upgrade 132kV Infrastructure Line Route South Fremantle to O'Connor to Myaree to Australian Paper Mills to South Fremantle
	46	Upgrade 330kV Infrastructure Line Route Southern Terminal to Kenwick Link
	Water and wastewater	
	1	Maida Vale Main Sewer (staged)
	2	Subiaco Wastewater Treatment Plant Outfall Duplication
	3	East Perth distribution mains extension
	5	Armagh Street pressure main duplication
	6	Richmond Street pressure main duplication (staged)
	Road networks	
		Reid Highway and Roe Highway (east of Kwinana Freeway) - upgrade to freeway standard
	Public transport	
		Extension of the passenger rail network Thornlie - Cockburn
		Nicholson Road Railway Station
		Ranford Road Railway Station
		Morley to Ellenbrook Rail Line
		Cockburn - Fremantle High Priority Public Transit corridor
		Rockingham - Kwinana - Fremantle High Priority Public Transit corridor
		Glendalough Station to Scarborough Beach High Priority Public Transit Corridor
	Cycling network	
		Expand off-road network within Perth and Peel Regions

TABLE 12: Infrastructure staging (continued)

Long-term (2031 - 2050)	**Electricity supply**	
	5	New 132kV infrastructure substation CBD James Street
	Water and wastewater	
	1	Maida Vale Main Sewer (staged)
	4	Subiaco Groundwater Replenishment Scheme (GWRS)
	6	Richmond Street pressure main duplication (staged)
	Public transport	
		Further Investigation – extension of the passenger rail network to connect Forrestfield-Airport Line with Thornlie line
		Further Investigation – extension of the passenger rail network to connect Thornlie line to Fremantle
		Maylands Bus Bridge
	Cycling network	
		Expand off-road network within Perth and Peel Regions
Beyond 2050	**Public transport**	
		Further Investigation – Circle Line – Joondalup Line – Ellenbrook Line connection
		Canning Bridge to Booragoon Bus Rapid Transit
		Murdoch to Cockburn Coast via Fremantle Bus Rapid Transit

Notes:

1. Infrastructure item reference numbers correspond to infrastructure proposals in Plan 11.
2. The projected timing of transport infrastructure will be subject to population growth rates.

   The relationship between projected timing and population is as follows:

   - 2031 – 2.9 million people
   - 2050 – 3.5 million people
3. Table 12 provides an overview of the more significant capital works identified at the time of publishing. The projects and their timing are indicative and subject to service demand and further detailed analysis.
4. All non-Stage 1 METRONET public transport proposals are subject to further investigation and will be refined as part of a future review of the Frameworks.
5. Traditional electricity infrastructure may be complemented by more innovative electricity supply models such as microgrids, embedded renewable energy generation and energy storage systems.
6. Many items listed are yet to be subject to financial analysis and business case development as part of the annual Budget process.