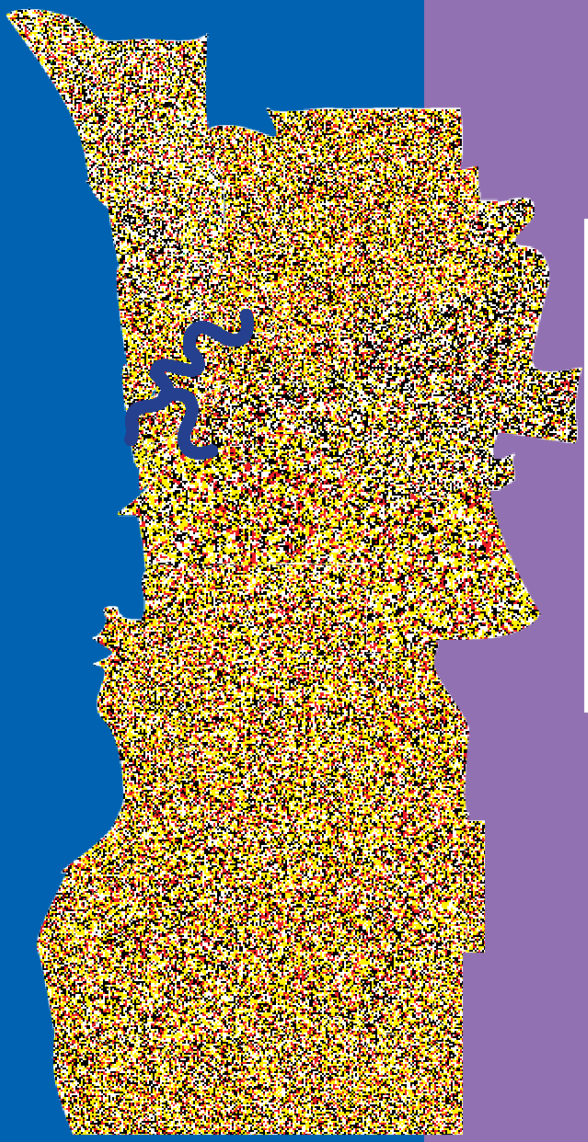
WASTE AUTHORITY

Strategic Waste Infrastructure Planning Project

Waste and Recycling Infrastructure Plan for the Perth Metropolitan and Peel Regions Investigation Report

June 2014



WASTE AUTHORITY
WA...TOO GOOD TO WASTE

Foreword

The Waste Authority committed to developing a Waste and Recycling Infrastructure Plan for the Perth metropolitan and Peel regions (WRIP) identified in the *Western Australian Waste Strategy: Creating the Right Environment* released in March 2012.

Planning for the future waste management needs of the Perth metropolitan and Peel regions of Western Australia has been a complex task requiring a multidisciplinary approach. In order to undertake that task, the Minister for Environment established the Strategic Waste Infrastructure Planning Working Group (SWIPWG) to assist with the development of the WRIP.

As members of the Waste Authority, we co-chaired the SWIPWG, which comprised representatives from industry, local government, regional local government and the State Government.

Members were appointed for their knowledge and experience in infrastructure and urban planning, infrastructure development, technology, governance law and waste management issues.

Since it first met in February 2013, the SWIPWG has considered the current barriers to strategic waste infrastructure planning and the achievement of the targets set out in the Waste Strategy for the diversion of waste from landfill. It has identified various planning, governance and technology options that could overcome these barriers with the aim of meeting the waste infrastructure needs of the Perth and Peel regions when they grow to the expected populations of 3.5 million by mid century.

The SWIPWG has benefitted from the comments of a wide range of others on the foundation research, data and recommendations. This has been achieved through both public and targeted consultation sessions for key stakeholders, including industry, waste professionals, local and State Government.

This report summarising the various options considered by the SWIPWG and setting out SWIPWG's findings was prepared for consideration by the Waste Authority. The Waste Authority supports most of the findings.

On behalf of the Waste Authority, we acknowledge and are grateful for the excellent work done by the departmental officers and would like to thank the members of the SWIPWG for the time, effort and valuable input they have contributed to this very important project. We would also like to thank all those who have provided the many constructive and valuable comments through the workshops, information session and the project website.

Neil Foley

Co-Chair, SWIPWG

Glen McLeod

Co-Chair, SWIPWG

STRATEGIC WASTE INFRASTRUCTURE PLANNING WORKING GROUP

Established under the
Waste Avoidance and Resource Recovery Act 2007

TERMS OF REFERENCE

Overview

Section 18 of the Waste *Avoidance and Resource Recovery Act 2007* provides for the Waste Authority, with the approval of the Minister, to establish committees to assist the Authority in the performance of its functions.

The role of the Strategic Waste Infrastructure Planning Working Group is to provide advice to the Waste Authority as to the future potential governance and funding arrangements for waste management in Western Australia.

The Working Group's initial focus will be the Perth metropolitan and Peel regions and the waste infrastructure planning needs for all solid waste streams, including municipal solid waste, commercial and industrial, and construction and demolition waste (while considering other forms of waste).

To accommodate the waste infrastructure planning required for the whole State, there will be a phased approach as follows:

- Phase 1 Perth metropolitan and Peel region – based on the Western Australian Planning Commission (WAPC) Central Metropolitan and Outer Metropolitan Sub-regional Strategies (Direction 2031)
- Phase 2 Pilbara region (WAPC Draft Pilbara Planning and Infrastructure Framework 2011)
- Phase 3 Kimberley and Remote Communities (WAPC is currently developing the Kimberley Planning Framework)
- Phase 4 Southwest and Great Southern
- Phase 5 Midwest, Gascoyne, Wheatbelt and Goldfields

The work of the National Waste Policy Regional and Remote Australia Working Group, the Local Government Services in Indigenous Communities Planning Committee and the findings of the Metropolitan Local Government Review Panel are to be considered by the Working Group in addressing these phases.

The membership of the Working Group is as follows:

- Waste Authority (2) – co-Chairs
- Department of Environment and Conservation (1)
- Department of Planning (1)
- Water Corporation (1)
- Western Australian Local Government Association (1)
- Waste Management Association of Australia (WA) (1)
- Chamber of Commerce and Industry (1)
- Forum of Regional Councils (1)

Terms of Reference

The role of the Strategic Waste Infrastructure Planning Working Group is to provide advice to the Waste Authority, and specifically to:

1. determine existing waste infrastructure capacity and pressures to inform future waste infrastructure requirements
2. consider opportunities and constraints for waste and recycling infrastructure including opportunities for co-location and any potential for industrial ecology
3. develop a plan for future waste infrastructure – including potential locations, taking into account environmental and planning constraints – for integration into the Western Australian planning framework
4. provide advice on the ongoing planning coordination mechanism for waste and recycling infrastructure into the Western Australian planning framework
5. provide advice on whether changes are required to current governance arrangements to enable Western Australian to meet the targets set out in the Western Australian Waste Strategy
6. provide advice on whether current funding models are capable of meeting the significant infrastructure investment challenges necessary to meet the targets in the Waste Strategy

In delivering the terms of reference, the Working Group may consider the following tasks:

a. evaluate the capacity of existing waste and recycling infrastructure, including landfills
b. review feasible categories of technologies and assess their suitability for Western Australia
c. determine likely waste and recycling infrastructure needs, including landfill sites, to 2031
d. develop an understanding of the environmental and planning opportunities and constraints for waste and recycling infrastructure, including landfills
e. make recommendations on how these opportunities and constraints can be increased or minimised respectively
f. develop a Waste and Recycling Infrastructure Plan for the Perth Metropolitan and Peel Region
g. liaise with the Western Australian Planning Commission to integrate the Waste and Recycling Infrastructure Plan for the Perth Metropolitan and Peel Region into the Western Australian planning framework
h. examine the strategic, legislative, institutional and investment settings that influence the performance of waste management functions
i. prepare a report on the adequacy of current governance arrangements and funding models required to meet the targets in the Waste Strategy

Strategic Waste Infrastructure Planning Working Group

Position Statement – Waste and Recycling Infrastructure Plan for the Perth Metropolitan and Peel Regions

March 2014

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1 Background

The *Western Australian Waste Strategy: "Creating the Right Environment"* was released by the Waste Authority in March 2012. The Strategy aims to engage the Western Australian community over the next decade in moving to a low-waste society by providing the required knowledge, infrastructure and incentives to change behaviour.

In the Waste Strategy, among other major initiatives, the Waste Authority committed to developing a ***Waste and Recycling Infrastructure Plan for the Perth Metropolitan and Peel Region****. A* Strategic Waste Infrastructure Planning Working Group (SWIPWG) was established to assist with the development of the Plan.

The aim of the Plan is to determine the waste management infrastructure required to meet the needs of the Perth and Peel '3.5 million population city' and to assist in achieving the targets of the Waste Strategy. The Plan will also set out the planning, governance and funding instruments required to establish the infrastructure required.

The SWIPWG has overseen the preparation of an investigation report, which will inform future decisions regarding the development of the plan. The ***Waste and Recycling Infrastructure Plan for the Perth Metropolitan and Peel Region – Investigation Report*** has four interrelated parts, which have been combined to form the main report:

Planning and Approvals
The purpose of this section is to provide information and recommendations on:

- The land use planning system in WA, as it relates to waste facilities;
- Environmental and planning opportunities and constraints for waste facilities in the Perth metropolitan and Peel regions, and how these may be increased or minimised respectively; and
- Existing land use planning mechanisms which may be used to integrate waste management issues into the WA planning framework, and assist in securing and protecting sites for waste facilities.

Facilities and Sites
The purpose of this section is to provide information and recommendations on:

- The existing capacity of waste facilities in the Perth metropolitan and Peel regions, and likely waste infrastructure needs for 2015, 2020 and the 3.5 million population city (about mid-century); and
- Potential and preferred sites for development of new waste facilities, including opportunities for co-location, waste precincts, and industrial ecology.

Technology
The purpose of this section is to provide information and recommendations on suitable waste management facilities and technologies for the Perth metropolitan and Peel regions, and assess their potential contribution to achieving the targets of the Waste Strategy.

Governance and Funding
The purpose of this section is to provide information and recommendations on:

- The settings that influence waste management in the Perth metropolitan and Peel regions;
- Potential changes to current governance arrangements which may be required to meet the infrastructure needs of the region and contribute to achieving the Waste Strategy targets; and
- Potential changes to current funding arrangements which may be required to deliver the required infrastructure and contribute towards achieving the Waste Strategy targets.

This Position Statement sets out the particular points of view of the SWIPWG with regard to the findings of the Waste Recycling Infrastructure Plan for the Perth Metropolitan and Peel Region – Investigation Report.

2 Planning and Approvals

The SWIPWG identified that it is important for the Waste Authority and the Department of Environment Regulation (DER) to continuously engage with Western Australian Planning Commission (WAPC) and the Department of Planning (DoP) enabling greater integration of waste management and planning activities with the land use planning process in WA. It is anticipated that defining waste and waste facilities in the Model Scheme Text (MST) and recognising waste facilities as distinct land uses would significantly help towards achieving improved planning for waste facilities.

The SWIPWG is supportive of the development of a WAPC State Planning Policy for waste facilities.

All SWIPWG members acknowledged that measures should be developed to provide long term protection for sites that have been identified as important for future waste infrastructure needs. Most members of SWIPWG support the reservation of strategic sites for public purposes in the Perth Metropolitan and Peel Region Schemes as the best mechanism to provide for the long term protection, and where necessary, public acquisition of private land for new and existing strategic waste facilities to ensure that there are sufficient well located and accessible sites for the future. However, the development of waste facilities should not be restricted solely to these sites. There should be no restriction on the private or public sector constructing waste facilities on other sites, where the appropriate approvals have been obtained. It was enunciated that this form of securing and protecting sites should apply to the 'top end' waste management facilities, i.e. larger facilities with regional significance. Other planning instruments, as discussed above, would support the establishment of facilities with less local impact.

3 Facilities and Sites

The use of funds from the WARR Account for the public acquisition of strategic waste facility sites is supported by the SWIPWG. However, the SWIPWG notes that as landfill diversion rates in the Perth and Peel regions increase, the funds raised through the WARR levy may potentially decrease. It therefore maybe necessary to increase the landfill levy, or increase the proportion of the levy hypothecated to waste management activities in order to provide adequate funding for the acquisition of waste facility sites. This issue should be taken into account in the forthcoming review of the WARR Act.

The SWIPWG supports the development of waste facilities within waste precincts or co-location sites. The appropriate facilities sited at a precinct or co-located site, which are well planned, designed, located and operated will have a number of benefits, including site security and the ability for facilities to share a buffer. However, these sites should be flexible in location, configuration and accessibility to enable the development of different facility types. Some facilities are more appropriate for development in precincts than others. For example, drop off facilities require public access and are better positioned near residential areas, and not necessarily within industrial areas.

The SWIPWG considers that the potential suitable sites for strategic waste facilities identified in a preliminary assessment process should be further explored. It supports the continued cooperation with the Water Corporation to explore the possibility of co-location of waste facilities with waste water treatment plants.

4 Technology

The SWIPWG is reluctant to make comments on specific infrastructure types at this stage. As a general principle the SWIPWG expresses the view that facility providers are better placed than government to make technology choices. The SWIPWG's view is that government should define the required outcomes and allow industry to decide on the most efficient means of achieving those outcomes.

5 Governance and Funding

The SWIPWG noted that each of the governance models formulated has strengths and weaknesses and that there is merit in taking the opportunity to combine some of the governance models to improve the outcomes. The SWIPWG has the general view that the most appropriate role for the state government is to set the regulatory and policy conditions under which the waste management sector would operate; to facilitate business opportunities and market development; and to lead strategic waste infrastructure planning. The SWIPWG does not see a role for the state government in owning or operating waste facilities.

When taking into consideration the WALGA model, it was noted that it only addresses Municipal Solid Waste (MSW), and therefore is not a holistic solution and would require additional measures to facilitate the diversion of Commercial & Industrial (C&I) and Construction & Demolition (C&D) wastes from landfill. The SWIPWG has a preference for a model that incorporates all three waste streams. The availability of reliable sources of MSW is viewed as critical for the viability of waste facilities that can also process waste from the other streams, particularly C&I waste. The ability for sizable quantities of MSW to be made available to the market in a coordinated manner was seen by most members to be desirable. This may require some ongoing coordination of local governments, a role currently provided by regional councils.

The SWIPWG does not support a high level of government intervention as indicated in both of the Waste Corporation Ownership models, whereby the state government would control the waste stream and dictate collection and processing outcomes. This is seen as unnecessary and undesirable.

The SWIPWG does not support the Waste Planning Authority (WPA) model due to the fact it focuses on planning only, and does not consider policy development. The SWIPWG considers that this is not an integrated approach to waste management. This model is unlikely to be able to facilitate the achievement of the Waste Strategy targets. The overall view was that policy and planning need to be integrated.

The Waste Planning & Policy Authority (WPPA) model allows the state government to influence the collection and processing outcomes and to implement measures that will assist it to achieve the Waste Strategy targets. In addition, it also allows for improved strategic planning for waste infrastructure. Overall the model is supported by the SWIPWG as this model provides a role for the state in the development of regulation and policy, and facilitation of better practice, in addition to its role in strategy infrastructure planning.

As with the above models, the Waste Planning Policy & Procurement (WPPPA) model allows the state government to influence the collection and processing outcomes and implement measures that will assist it to achieve the Waste Strategy targets. However, the SWIPWG feels that this model is more favourable as it also facilitates making suitable sites available for waste infrastructure development purposes, which is likely to encourage additional investment. The SWIPWG supports the fact that it integrates planning for infrastructure with complementary policy development processes. The SWIPWG notes the importance of procuring and protecting sites and making them available to the market through long term leases. While there was general support for the potential for the State Government to plan and own strategic waste precincts, there was not support for the Government to own or operate facilities developed on those sites. Most members

expressed a general preference for the WPPPA governance model. Members noted that the role of regional local governments and local governments would remain unchanged under this model. Members of the SWIPWG consider that this model is compatible with and could be implemented in conjunction with the model for local and regional local governments as set out in 'WALGA's vision for waste management in the metropolitan region.

Some members, particularly those representing the waste industry, believe that consideration should be given to the future of regional councils. Local government amalgamation will enhance both the volumes of waste that each local government authority can offer, and the skills and experience needed in order to effectively tender for contracts on their own behalf. The view was expressed that the most efficient and competitive outcome would be for industry to directly tender for the contracts on offer from these new local governments.

The SWIPWG does not support either the Voluntary Metropolitan Waste Management Group (VMWMG) or Statutory Metropolitan Waste Management Group SMWMG models as they do not adequately deal with the three waste streams as they are predominantly focussed on MSW. The consensus view is that the approaches are not holistic enough to achieve the waste management goals.

The SWIPWG considers that any governance model should provide for the State's regulatory function and waste policy/planning functions to be clearly separated, preferably in separate agencies.

The SWIPWG does not support any additional steps in the approval process for waste facilities.

While the above positions were generally supported by most members of the SWIPWG, not all positions were universally supported by all members.

6 Conclusion

The SWIPWG generally supported the work completed to date on the Strategic Waste Infrastructure Planning Project, and supported the findings as written in the consultation paper of April 2014.

Executive summary

Background

In March 2012, the Waste Authority released the *Western Australian Waste Strategy: Creating the Right Environment* (the Waste Strategy). The Waste Strategy aims to engage the Western Australian community over the next decade in moving to a low-waste society by providing the required knowledge, infrastructure and incentives to change behaviour (Waste Authority, 2012).

The Waste Strategy identifies measures to improve waste management outcomes across Western Australia and identifies landfill diversion targets for the years 2015 and 2020.

In recognition of the need to better plan for the future waste management needs of the Perth metropolitan and Peel regions and to facilitate the achievement of the Waste Strategy landfill diversion targets, Strategic Objective 1 of the Waste Strategy initiated a long-term strategic infrastructure planning process that would 'enable access to suitably located land with buffers' sufficient to cater for the region's future needs. To implement this objective, the Waste Authority committed to developing a *Waste and Recycling Infrastructure Plan* (WRIP) for the Perth metropolitan and Peel regions.

This report represents the first step in the development of the WRIP. It contains a collation of the background information relevant to the preparation of a comprehensive waste infrastructure plan and implementation of faciliating mechanisms.

Current and future waste infrastructure needs

A key component of this project was to assess the current and future waste and recycling infrastructure needs of the Perth metropolitan and Peel regions.

The population of the Perth metropolitan and Peel regions is projected to increase from an estimated 1.93 million in 2012/13 to around 2.20 million by 2019/20. The population of these regions could reach 3.5 million around the middle of the century. Assuming that the per capita generation rate remains static, it is projected that the total waste generation in the Perth metropolitan and Peel regions will be 5.5 million tonnes in 2014/15, increasing to around 6 million tonnes in 2020/21. When the population of Perth and Peel reaches 3.5 million people, waste generation could be over 9 million tonnes per year.The consequent increase in total waste generation will increase pressure on the capacity of existing waste management infrastructure and create a need for new waste infrastructure to meet future demand.

Achieving the waste diversion targets in the Waste Strategy will need a significant increase in recycling and recovery of waste, from a projected overall Perth and Peel landfill diversion rate of around 39% in 2011/12 to 56% in 2014/15 and 71% in 2019/20.

The infrastructure ownership and governance arrangements for waste management in the region are disparate. For a number of reasons, the current governance arrangements for waste management in the Perth and Peel regions are not conducive to achieving the economies of scale

necessary to facilitate the financing of the large-scale waste processing infrastructure that will be needed to meet the State's waste diversion targets.

Finding 1

The current waste and recycling infrastructure capacity is not sufficient to process the projected amounts of waste necessary to meet the waste diversion targets in the Waste Strategy.

It is unlikely that the infrastructure needed to meet the waste diversion targets would be established in the short to medium term under the current governance arrangements.

Waste infrastructure and the planning system

Relatively minor engagement with the WA land-use planning system could improve planning for waste facilities and make waste management a more prominent issue in land-use planning activities in WA.

Under the *Planning and Development Act 2005* local governments are required to have local planning schemes (LPSs) that set out the way land is to be used and developed. LPSs must be prepared in accordance with the 'template' provided in the Model Scheme Text (MST), unless otherwise agreed by the Minister.

Currently, there are no definitions for waste or waste facilities in the MST, which means there is no commonly agreed terminology related to waste in land-use planning in WA, at a state or local government level. The lack of guidance in the MST means local governments do not have a clear framework for decision making on development applications for waste facilities, which makes finding and gaining approval for suitable sites for waste facilities more difficult for proponents.

Defining waste and waste facilities in the MST would be a formal recognition of waste management activities as unique land uses with their own particular characteristics. It would enable local governments to better consider waste facilities when developing or amending a LPS and determining development applications, and would contribute to a more consistent approach to waste management activities in LPSs in Perth and Peel. It would also be useful for State Government land-use planning activities and provide decision-makers with clear, consistent terminology for use in planning decisions related to waste facilities.

State planning policies (SPP) guide land-use planning at local and state level, and are implemented through planning activities such as strategic plans, region and local planning schemes, management strategies, guidelines, and day-to-day decision making on planning matters by the WAPC, local governments, Development Assessment Panels and the State Administrative Tribunal.

A state planning policy for waste facilities, with accompanying guidelines would provide state and local government decision-makers and waste facility proponents with a clear and consistent framework for the preparation, assessment, and determination of planning schemes and applications for planning approval for waste facilities, and guidance on their location, siting and design. It could contribute to a more consistent approach to waste management activities in local and State Government land-use planning.

The Waste Authority could assist the Department of Planning (DoP) and the Western Australian Planning Commission (WAPC) in the preparation of a Waste Facilities SPP, in a similar way that the Swan-Canning Rivers SPP (No. 2.10) was prepared in conjunction with the Swan River Trust and the Development Contributions for Infrastructure SPP (No. 3.6) was prepared in liaison with the Urban Development Institute of Australia (WA).

Under the three region planning schemes operating in WA (Perth Metropolitan, Peel and Greater Bunbury region schemes), land may be reserved for public purposes, to protect a resource or to provide infrastructure, either existing or that required in the future. Once reserved, development control rests solely with the WAPC.

Securing strategic sites for waste management activities by reserving them under the region planning schemes would mean these sites could generally only be used for waste management activities unless an interim or temporary use was approved, and would thus help ensure that adequate land for waste facilities was available when and where it is needed for development of waste facilities. If the land was privately owned, owners could continue to occupy and use the land for the current purposes. This would apply if an existing waste management facility was reserved. If land was reserved for a future facility, the private owner could continue to occupy the land until it was required for the waste facility or it was sold to the WAPC (in which case it may be possible for lease-back).

Reservation would provide long-term security for waste facilities, although the land uses around them may change over time, and help reduce land-use conflicts, the encroachment of waste facilities by sensitive land uses and competition with other 'higher value' land uses. Long-term certainty about the location and operation of waste facility sites will better enable long-term planning and investment decisions to be made. Such strategic sites could be leased to various waste facility operators in accordance with a management plan for the site. This approach would not prevent operators from purchasing their own sites.

Finding 2

Waste management activities could be better integrated into the State's planning system using existing mechanisms. In particular, defining waste facilities in the Model Scheme Text, development of a state planning policy for waste facilities and reserving strategic sites for waste management purposes under the Western Australian Planning Commision's region planning schemes could remove significant barriers to establishment of waste processing infrastructure.

Use of landfill levy funds to secure waste sites

If existing and new waste facility sites are secured through reservation for 'public purposes' under a region planning scheme, then the WAPC may legally acquire them.

For reserved existing waste facility sites, State Government acquisition may not be necessary, provided the current owner is managing the site in a way which is consistent with the government's intentions for the site. This would have to be considered on a case-by-case basis. However, contingency funds must be in place in case the state is required to purchase the site (e.g. if the

owner decides to sell it), or pay compensation to the owner (e.g. if the owner is limited in the use or development of the site because of the reservation).

In the Perth metropolitan region, funds for the acquisition of reserved land by the WAPC for public purposes comes from the Metropolitan Region Improvement Fund (MRIF). However, the WAPC generally has considerable commitments for the expenditure of the MRIF. It is usual practice for agencies reserving sites for operational purposes, such as schools and waste water treatment plants, to utilise alternative funding to purchase reserved sites.

The Waste Avoidance and Resource Recovery Levy (WARR Levy) could be an alternative source of funds for acquisition of waste facility sites and for paying compensation to land owners if required. This would be consistent with Strategic Objective 1 of the Waste Strategy.

Finding 3

The WARR Account could provide a source of funding for the acquisition of waste facility strategic sites reserved for public purposes use under the region planning schemes, and compensation of site owners, subject to adequate WARR Levy funds being available for this purpose. Acquired strategic sites would be made available on a leasehold basis to waste manaegemnt operators to ensure long-term security for sites.

Types of infrastructure needed

A broad review of various categories of technology was conducted as part of this project. Generally, facilities that process mixed waste, such as waste-to-energy facilities or mechanical biological treatment facilities, can divert substantial amounts of waste from landfill. As such, they are likely to be important for achieving the waste diversion targets. However, these sophisticated technologies are much more expensive to build, and in some cases to operate, than facilities that process source-separated materials. Further, the outputs from processing source-separated recyclable material tend to be of higher quality, resulting in it having a higher market value.

Waste collection, processing and disposal across the Perth metropolitan and Peel regions were modelled for several different waste technology scenarios. This modelling confirmed that some capacity for recovering resources, whether materials or energy, from mixed waste will be necessary to meet the waste diversion targets in the Waste Strategy. However, it also confirmed that it will be important to maximise the source separation of recyclable materials, especially organics, to minimise the capital costs of the whole system.

Finding 4

Some kind of mixed putrescible waste processing will be required to meet the waste diversion targets. In addition, maximising source separation of recyclables will be important for minimising the capital cost of the processing infrastructure.

Waste precincts

Land available for development of waste facilities in Perth and Peel is limited and should be used as efficiently as possible. Grouping compatible waste facilities together through the use of waste

precincts could have many potential benefits, including; land use efficiency, flexibility, coordination and staging, buffer efficiency and protection, transport efficiency, business/employment opportunities, consistency with WAPC and Department of Planning objectives and long-term security/stability.

Potential disadvantages or limitations to waste precincts may include; community perceptions and acceptance, traffic congestion, management and administration, finding and securing sites, local amenity and attracting and sustaining businesses.

It is likely that the future land requirements for waste facilities in Perth and Peel will be met by a combination of precincts, co-location sites and stand-alone facilities. New sites for the development of new waste facilities will be required. In addition, redevelopment of existing waste facility sites, co-location of new facilities at existing waste facility sites and upgrading of existing facilities may be used, particularly in more highly restricted or developed areas where new sites may be more difficult to identify and obtain. The opportunity exists for any strategic sites reserved and acquired to be planned and managed as precincts or co-location sites with all necessary buffers being included with the sites.

Finding 5

The grouping of waste facilities in precincts or co-location sites can have many potential benefits. This type of industrial development is broadly supported by the WAPC and Department of Planning.

Waste facility precincts and co-location sites should be well planned, designed and operated, and should incorporate required buffers to maximise advantages and minimise potential disadvantages.

Potential locations for waste facilities

As a starting point for the identification of sites for future development of waste facilities, a preliminary assessment of a number of areas in Perth and Peel was undertaken to determine their potential suitability for ***enclosed waste processing facilities***. The preliminary assessment process is intended to be a broad 'first pass' assessment of potential waste facility locations. It was not intended to identify individual lots/blocks of land that were suitable for specific facilities.

A total of 93 areas in Perth and Peel were assessed. These areas included; All existing areas zoned industrial under the Metropolitan Region Scheme and Peel Region Scheme (40 areas), all areas identified as potential industrial areas in the WAPC's *Economic and Employment Lands Strategy* (38 areas) and several sites owned and nominated by the Water Corporation as potentially suitable for co-location with waste facilities (15 areas).

It is not intended that the development of all new waste facilities be restricted to locations identified through the preliminary assessment process, or that existing waste facilities which fall outside the assessed areas should be moved or cease operations. It is intended that both existing and new waste facilities work together to create a waste management network in the Perth metropolitan and Peel regions.

The preliminary assessment process is also not intended to replace the normal planning and approvals processes for development of waste facilities.

Each of the 93 industrial, potential industrial and Water Corporation nominated areas was assessed using planning and technical criteria, and each area was assigned an 'Area Category':

- **Area Category A:** Area is potentially suitable for a range of waste facilities, with a presumptive buffer separation distance from sensitive land uses of up to 500m.
- **Area Category B:** Area is potentially suitable for a more limited range of waste facilities (only suited to facilities with a presumptive buffer separation distance of 200m or less).
- **N/S** = Not likely to be suitable for development of most waste facilities (i.e. areas with no potential for a 200m or 500m buffers to sensitive land uses, or where waste facilities are not a permitted land use within the local planning scheme). May be suitable for small scale facilities that do not require buffers to sensitive land uses (or buffers of less than 200m) but they are not suitable for development of waste precincts, co-location sites.

Of the 93 areas assessed through the preliminary assessment process, 57 were determined to be Area Category A, 17 were Area Category B and 19 were Area Category N/S.

Finding 6

A broad 'first pass' preliminary assessment of 93 industrial, potential industrial and Water Corporation nominated areas in the Perth metropolitan and Peel regions found that 57 areas were potentially suitable for the development of industrial-type waste facilities.

These potentially suitable areas should be used as a basis for further investigation and identification of sites for the development of waste precincts / co-location sites in Perth and Peel.

Governance

A key task in planning for the future waste and recycling infrastructure needs of Perth and Peel is to identify the barriers to strategic waste infrastructure planning within the existing waste management governance system and to identify opportunities to remove or overcome these.

A number of alternative governance models were considered to underpin the WRIP. In developing the governance models, a key consideration was the potential varied roles for the State Government in relation to waste management generally and specifically in relation to infrastructure planning. To examine the potential impact of changing the role of the State Government in each of the models, models were developed to cover the spectrum of State Government intervention or control. The models developed explored various potential roles for the State Government. The models described and discussed were as follows:

1. Business-as-usual, i.e. the current governance arrangements.

2. The "WALGA model", with the State Government co-ordinating MSW management via a strengthened Waste Authority and the implementation of a statutory waste management plan and complementary regional plans.

3. The "Waste Corporation" model, with the State Government owning all the waste in the region and, either owning and operating waste facilities or contracting out processing to facilities either owned by local government or the private sector.

4. The Waste Planning Authority (WPA) model, with the State Government planning for the future waste management needs of the region, but not owning any facilities. Variations on this model that were considered were the Waste Planning and Policy Authority (WPPA) model (with the State also developing and implementing policy aimed at improving diversion) and the Waste Planning, Policy and Procurement (WPPPA) model (with the State Government also procuring strategic sites to be leased to the private sector and regional local governments for waste and recycling infrastructure development)

5. The Voluntary Metropolitan Waste Management Group (VMWMG) model with the State Government co-ordinating waste streams via a Voluntary Metropolitan Waste Management Group. A variation on this model that was considered was the Statutory Metropolitan Waste Management Group (SMWMG) model.

6. The Full Commercial Access (FCA) model with the State Government solely setting and implementing environmental and health standards and allowing market forces to determine how waste in the region is collected and processed.

The strengths and weaknesses of each model were assessed against the current governance model. Stakeholder views on the governance models were sought in public and targeted consultation sessions. In addition the performance of each governance model was considered against each of the following criteria:

- Alignment with State Government policy priorities
- Financial impact on government
- Financial impact on participants in waste sector
- Ability to improve efficiency of waste management
- Ability to facilitate better planning for waste infrastructure
- Trade practices considerations and Australian Competition and Consumer Commission (ACCC) oversight
- Ease of implementation.

The analysis revealed that the models that involve an increased level of control and intervention from the State Government appear to be more likely to provide more certainty for the regions to meet the Waste Strategy targets. These models, however, are likely to cost more to implement and are likely to be met with some opposition from stakeholders. The models where the State Government has a low level of intervention are likely to be less expensive to implement and are likely to be met by less opposition from stakeholders. However, it would appear that these models are less likely to result in the Waste Strategy targets being achieved.

From this analysis, and after considering the Strategic Waste Infrastructure Planning Working Group's (SWIPWG) recommendations, it is concluded that the most appropriate role for the State Government in relation to waste management and waste and recycling infrastructure planning is to:

- Set and enforce regulation related to the environmental impact of waste facilities and waste management practices more generally
- Develop and implement waste management policy that encourages diversion from landfill
- Develop and implement a Waste and Recycling Infrastructure Plan for the Perth metropolitan and Peel regions (WRIP) that identifies suitable strategic sites for infrastructure purposes and enables the region to meet its Waste Strategy targets
- Secure strategic sites for waste infrastructure purposes within the planning system, procure these, where necessary, and make these available to infrastructure providers/operators on long- term leases. Where public acquisition is not necessary, sites could be secured via appropriate local scheme planning controls, noting that operators will not be prevented from purchasing their own sites.

These features were compatible with those proposed under the WPPPA governance model.

The SWIPWG supported the WPPPA being a referral agency and providing advice to the Environmental Protection Authority and the WAPC on the compatibility of any proposed waste treatment with the WRIP when development proposals were submitted for assessment.

The SWIPWG did not see a role for the State Government in relation to owning and operating waste facilities.

Finding 7

The SWIPWG expressed a general preference for the establishment of a separate Waste Planning, Policy and Procurement Authority, which could, where necessary, manage State land for waste plan for waste precincts, but which would not control MSW services nor own/operate waste facilities, but which could co-ordinate waste flows.

The SWIPWG considered that it is important that any such Authority is separate from the environmental regulation agency.

Examples of future waste management systems

A number of "Example" waste management systems were devised, developed and modelled (there being a multitude of permutations, only a few could be modelled). The examples include what waste facilities would be required to meet the waste diversion targets and where these facilities might be sited.

It was found that, if certain existing waste facility sites were developed as waste precincts and their use maximised, then the need for new sites was quite low. To achieve the most efficient use of sites and expensive infrastructure, waste should not be restricted in terms of where it can be sent by artificial local government boundaries.

Depending on the type of mixed waste processing established, the total capital cost of waste and recycling infrastructure needed to meet the 2020 diversion target is roughly between $1 billion and $2.7 billion. If the same diversion targets are applied to 2050, the capital expenditure increases to between $1.5 billion and $4.3 billion.

The total land requirement (including existing facilities) is estimated to be between somewhere 50ha and 265ha by 2020, and between 54ha and 523ha by 2050. This is a relatively small amount compared to land reserved and acquired for other public purposes in the Perth metropolitan, Peel and Greater Bunbury region schemes.

Securing sites, approvals and investment funding can take a considerable length of time. In addition, building and commissioning sophisticated mixed waste processing plants can take several years. It is likely to be very difficult to establish the processing infrastructure needed to meet the waste diversion targets for 2020.

Further, the pressures on industrial land are likely to increase in the medium term. Therefore, it is important that planning and securing of sites occurs now to meet the waste management needs of Perth and Peel by 2050.

Finding 8

Establishing sufficient waste processing capacity within the Perth metropolitan and Peel regions to process the waste generated within those regions and to meet the waste diversion targets is possible, and can be achieved with multiple technology and siting choices. However, this is likely to be difficult to achieve by 2020.

The State Government and the waste industry should commence actively planning for and implement measures necessary to establish the waste and recycling infrastructure needed for 2050 to ensure sufficient sites and capital are secured.

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1 Introduction

The Perth metropolitan and Peel regions of Western Australia (see Figure 1) are growing rapidly. The estimated 2012/13 population of 1.93 million is projected to reach to 2.20 million by 2020 and 3.5 million by around the middle of the century (Western Australian Planning Commission, 2012). It is estimated that the waste generated in Perth and Peel in 2012/13 will be 5.26 million tonnes. This is projected to increase to 5.99 million tonnes in 2019/20 and over 9 million tonnes per year once the population reaches 3.5 million.

This expected growth poses significant waste management challenges. A range of measures are needed to deal with the increased volume of waste in a manner that is economically, socially and environmentally sustainable.

At present the planning system in Western Australia is not being fully utilised to address strategic planning of waste and recycling infrastructure. There is currently no coordinated approach to waste infrastructure planning for the region. This presents challenges to siting the new facilities that will be required to meet the future needs of the regions. It also means that existing facilities are vulnerable to encroachment by incompatible land uses.

There has been a general trend towards the use of alternative waste management technologies (AWT) to treat residual waste that would have otherwise been sent to landfill, for further use. This presents an opportunity to ensure that the planning system can cater for and support the proliferation of these new types of facilities and technologies that improve waste management outcomes and reduce the impacts of waste disposal.

There is also broad recognition that integrated approaches to managing waste are likely to improve outcomes and improve efficiencies. Improved planning can provide opportunities to optimise the logistic costs associated with waste management by ensuring that facilities are appropriately sited relative to waste sources, and are well connected within the transport network and a network of complementary waste management facilities.

A key task in planning for the future waste and recycling infrastructure needs of Perth and Peel is to identify the barriers to strategic waste infrastructure planning within the existing planning and waste management governance systems, and to identify opportunities to remove or overcome these. The ability of any changed arrangements to facilitate the proliferation of technologies that will improve waste management outcomes in the region should be considered during this process.

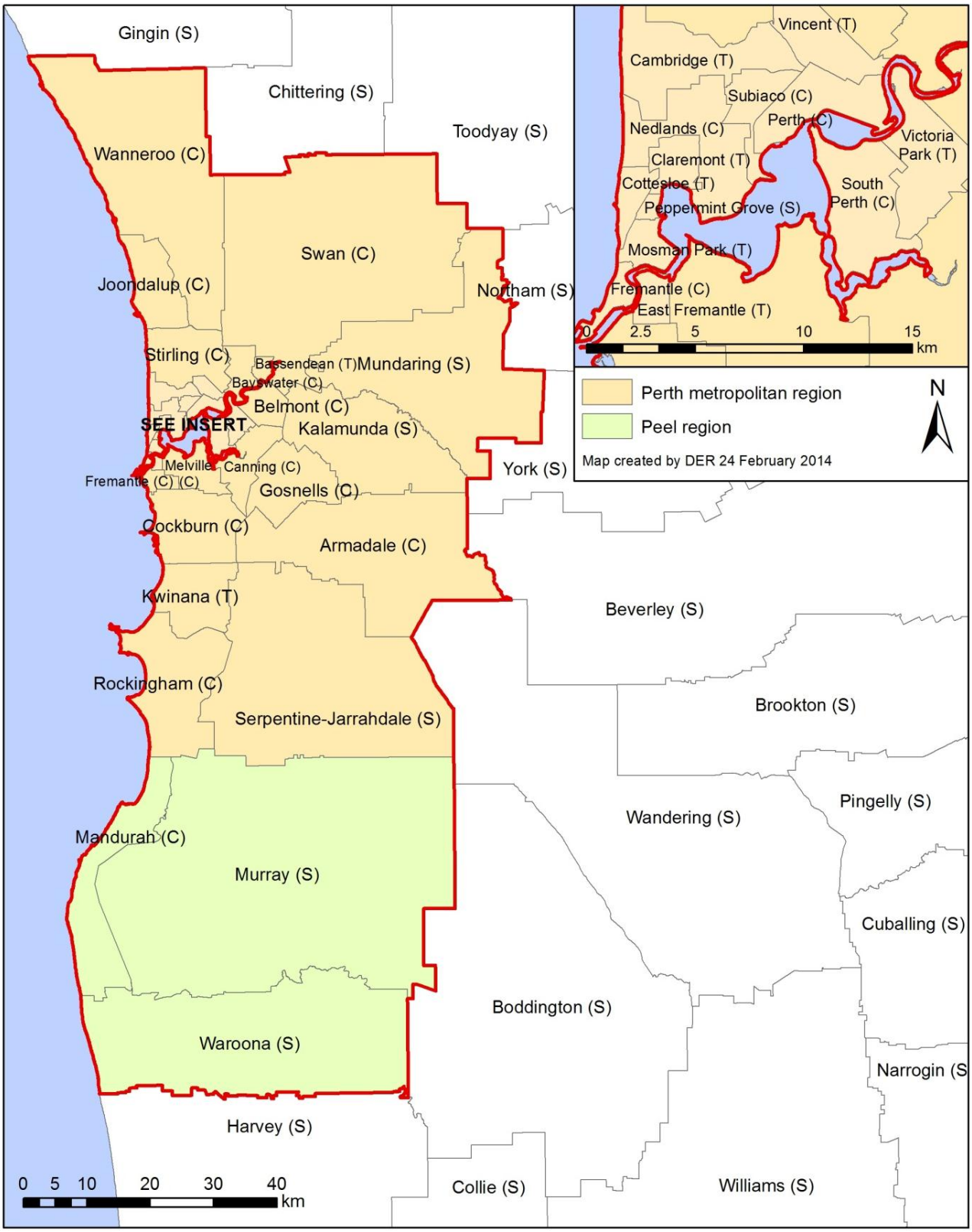

Figure 1: Perth metropolitan and Peel regions

1.1 Waste and Recycling Infrastructure Plan for the Perth Metropolitan and Peel Regions

In March 2012, the Waste Authority released the *Western Australian Waste Strategy: "Creating the Right Environment"* (the Waste Strategy). The Waste Strategy aims to engage the Western Australian community over the next decade in moving to a low-waste society by providing the required knowledge, infrastructure and incentives to change behaviour (Waste Authority, 2012).

The Waste Strategy identifies measures to improve waste management outcomes across Western Australia and identifies landfill diversion targets for the years 2015 and 2020. These targets are set out in Table 1.

Table 1: Landfill diversion targets as set out in the Waste Strategy

Waste stream	Geographic scope	2009/10 baseline	30 June 2015 target	30 June 2020 target
Municipal solid waste	Perth metropolitan region	36% recovery	50% diversion	65% diversion
Municipal solid waste	Major regional centres (including Peel)	15% recovery	30% diversion	50% diversion
Construction and demolition waste	State-wide	29% recovery	60% diversion	75% diversion
Commercial and industrial waste	State-wide	46% recovery	55% diversion	70% diversion

The provision of effective waste management is an important service to the community, which preserves both health and environment values and can have considerable economic benefits. Planning for Western Australia's waste infrastructure requirements supports the development of well-functioning communities.

In recognition of the need to better plan for the future waste management needs of the Perth metropolitan and Peel regions and to facilitate the achievement of the Waste Strategy landfill diversion targets, Strategic Objective 1 of the Waste Strategy initiated a long-term strategic infrastructure planning process that would *'enable access to suitably located land with buffers'* sufficient to cater for the region's future needs.

To implement this objective, the Waste Authority committed to developing a *Waste and Recycling Infrastructure Plan* (WRIP) for the Perth metropolitan and Peel regions.

The Waste Strategy landfill diversion targets do not currently go beyond 2020. However, for the purposes of the WRIP it is important to look beyond this timeframe, to when the population of the Perth metropolitan and Peel regions is 3.5 million people. The WRIP aims to plan for future waste requirements in a way that is consistent with the principles and targets of the Waste Strategy, as well as the strategies and policies of the Western Australian Planning Commission (WAPC). The

draft *State Planning Strategy* (Western Australian Planning Commission, 2012), *Directions 2031 and Beyond* (Western Australian Planning Commission, 2010) and the sub-regional structure plans, which are currently under development, are all based around the '3.5 million city'.

1.1.1 Aim

The aim of the WRIP is to determine the waste management infrastructure required to meet the Waste Strategy targets and the needs of the Perth and Peel '3.5 million city', and set out the planning, governance and funding instruments required to establish this infrastructure.

1.1.2 Objectives

The WRIP has three main objectives:

1. To improve planning for waste infrastructure
    - Identify the future infrastructure needs of the Perth metropolitan and Peel regions
    - Explore processes to identify and secure sites for the development of future waste infrastructure, and secure existing infrastructure sites of strategic value, to ensure suitably located land with buffers is available for waste management activities in the long term
    - Identify mechanisms that will enable waste infrastructure planning to be considered in a strategic and consistent way at all levels (state, regional and local) across the Perth metropolitan and Peel regions
    - Ensure that waste infrastructure is developed and sited to avoid or reduce adverse environmental impacts.
2. To contribute to the delivery of the Waste Strategy
    - Support the development of waste technologies that treat waste in a way which is consistent with the principles of the waste hierarchy noting that it is likely that range of technologies will be required to treat the full spectrum of waste generated
    - Explore the planning, funding, governance and technology opportunities and constraints for the development of resource recovery infrastructure in Perth and Peel.
3. To facilitate the development of an efficient, integrated and sustainable waste management system
    - Define the roles, responsibilities and relationships between various organisations in relation to providing waste management infrastructure in Perth and Peel
    - Identify governance, funding, planning and technology options that support a waste industry which is flexible, fosters innovation, encourages development of markets for waste-derived products, and is economically, socially and environmentally sustainable.

1.1.3 Consistency with the Waste Hierarchy

The waste hierarchy is set out in Section 5 of the *Waste Avoidance and Resource Recovery Act 2007* (WARR Act) and replicated in Figure 2. The hierarchy ranks waste management options in

order of their general environmental desirability, from waste avoidance as the most preferred option to disposal as the least preferred option. In 2011/12, 61% of the waste generated in Western Australia was disposed of to landfill (Hyder Consulting, 2013).

The Waste Authority's position statement *Communication on the Waste Hierarchy* (2013), explains the waste hierarchy and how it will be applied by the Waste Authority in its decision making to support the delivery of the Waste Strategy. The Waste Authority notes that the hierarchy should be used alongside other tools, including economic, social and environmental assessment, when making decisions about waste management options.

Consistency with the waste hierarchy has been a key consideration in the development of the WRIP, and the principles of the waste hierarchy have informed the draft WRIP's findings.

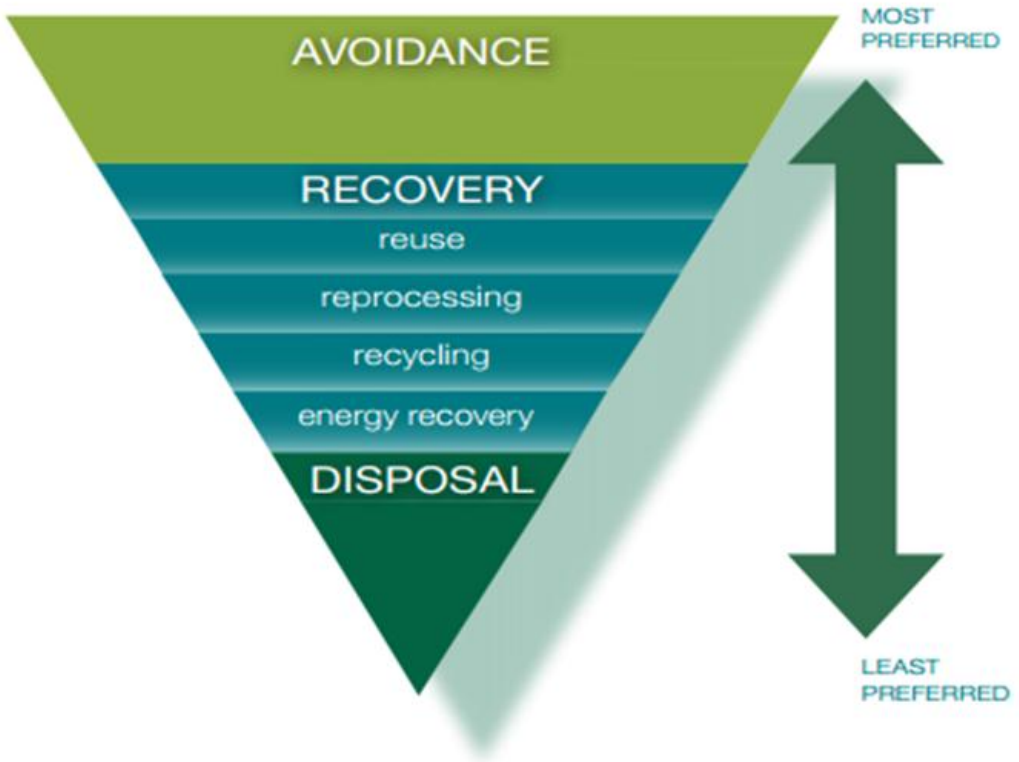

Figure 2: Waste hierarchy (Waste Authority, 2013)

2 Waste Management in Perth and Peel

This section outlines the current waste management situation in the Perth metropolitan and Peel regions – the facilities, governance arrangements and funding mechanisms already in place, the rate at which waste is generated and recycled, and the population growth anticipated in these regions. Also described is how waste management activities currently interact with the land use planning system in WA, and the context of planning for waste facilities.

2.1 Waste Generation in Perth and Peel

2.1.1 Population Growth in Perth and Peel

In this report the Western Australian Planning Commission (WAPC) *Western Australia Tomorrow – Population Report No. 8* (Western Australian Planning Commission, 2012) "Band C" population projections have been used to estimate the current and future population of the Perth metropolitan and Peel regions. *Population Report No. 8* gives a range of projections, from low growth rate (Band A) to high growth rate (Band E). However, Band C is used here as it is the closest WAPC population projection to the most recent Estimated Residential Population data released by the Australian Bureau of Statistics (ABS).

The Department of Planning has divided the Perth metropolitan and Peel regions into seven sub-regions for planning purposes. These sub-regions vary in population size and are projected to grow at different rates (Figure 3).

The population of the Perth metropolitan and Peel regions is projected to increase from an estimated 1.93 million in 2012/13 to around 2.20 million by 2019/20 (Western Australian Planning Commission, 2012). If these growth trends continue, it is extrapolated that the population could reach 3.5 million in around 2043 (Hyder Consulting, 2012). These trends are shown in Figure 3, in which solid lines indicate *Population Report No. 8* Band C projections for various sub-regions and dashed lines indicate an extrapolation of the Band C 2006-2026 growth.

The growth in population is not projected to be evenly spread across the Perth metropolitan and Peel regions, with higher rates of growth predicted in some local government areas, and slower growth in others (Figure 3).

There is a general trend of lower population growth in the Metro-Inner and Metro-Middle sub-regions and outer Peel local governments, and higher growth in outer metropolitan local governments, particularly to the north and south of the city centre. The City of Wanneroo is projected to have the highest population growth between 2012/13 and 2019/20, with an increase of over 53,000 residents.

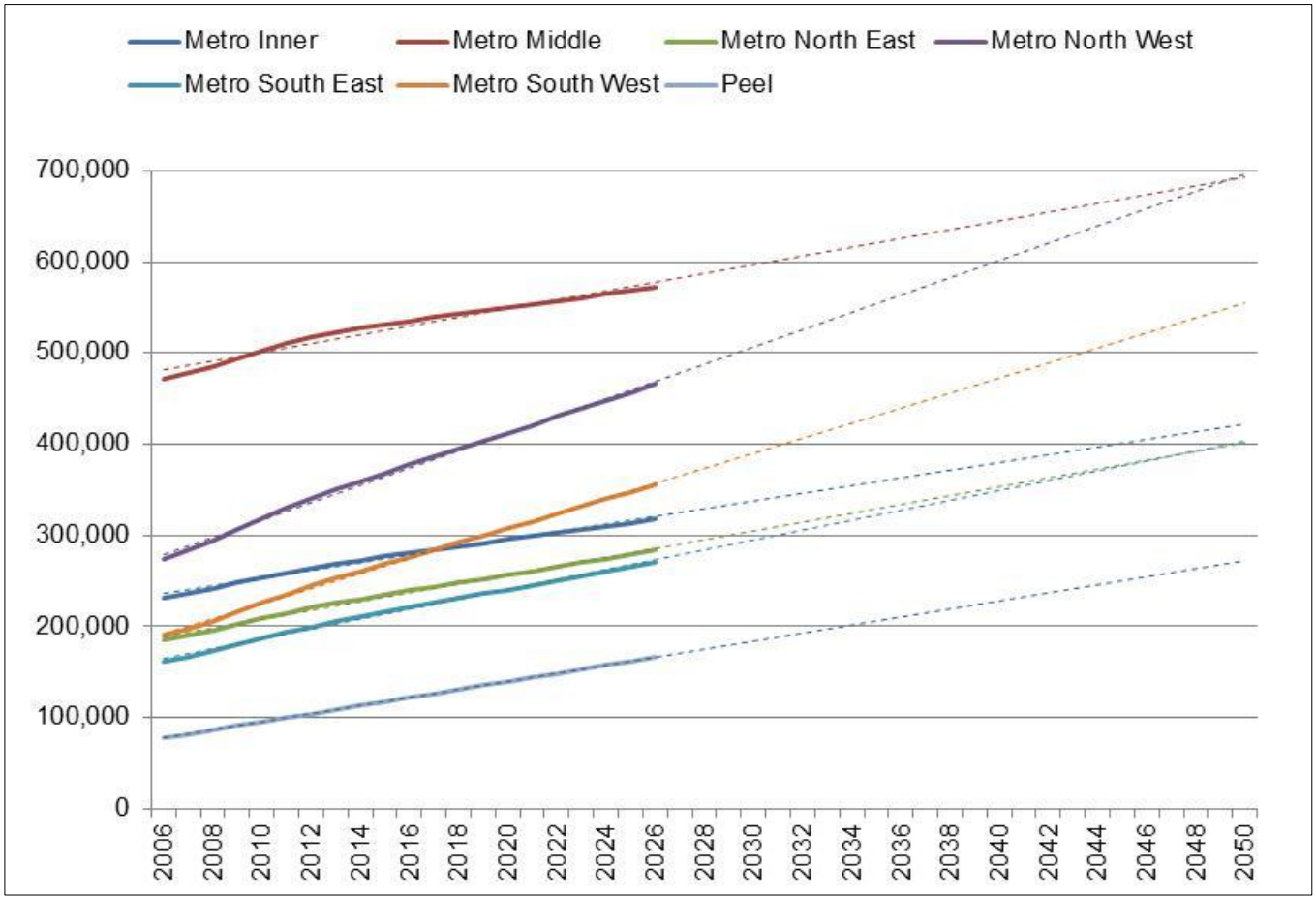

Figure 3: Population projections for the Perth metropolitan and Peel regions from 2006 to 2050 by planning region.

Future population growth will be accommodated by a combination of urban infill and the creation of new urban areas (Western Australian Planning Commission, 2012). Population growth, and the expansion of both residential and non-residential development, will lead to an increase in the amount of waste generated. This, in turn, will increase pressure on/exceed the capacity of existing waste management infrastructure. It is also likely to increase waste transport distances (with associated economic, social and environmental costs), as landfills and other waste infrastructure is forced further from the city. There will also be increased traffic congestion as the population density grows.

2.1.2 Current Waste Generation Rates

Landfill, recycling and population data for the Perth metropolitan region have been used to determine an annual per capita rate of waste generation. For the purposes of this report, the 2010/11 and 2011/12 data were averaged to determine this generation rate, as this is considered the most complete and accurate data available (see Appendix 1). The average total waste generation per capita for 2010/11 and 2011/12 is 2.72 tonnes for the Perth metropolitan region (see Table 2).

Table 2: Average waste generation (recycling and landfill) in the Perth metropolitan region 2010/11-2011/12

	Waste recycled (tonnes per capita)	Waste to landfill (tonnes per capita)	Total waste generation (tonnes per capita)
MSW	0.25	0.40	0.65
C&I	0.26	0.46	0.72
C&D	0.55	0.79	1.35
Total	1.07	1.65	2.72

The latest period for which consistent waste generation data are publicly available across Australia is 2010/11. Figure 4 presents a comparison of waste generation per capita, and recovery rates, by State / Territory from the report (Blue Environment, 2014), commissioned by the Australian Government.

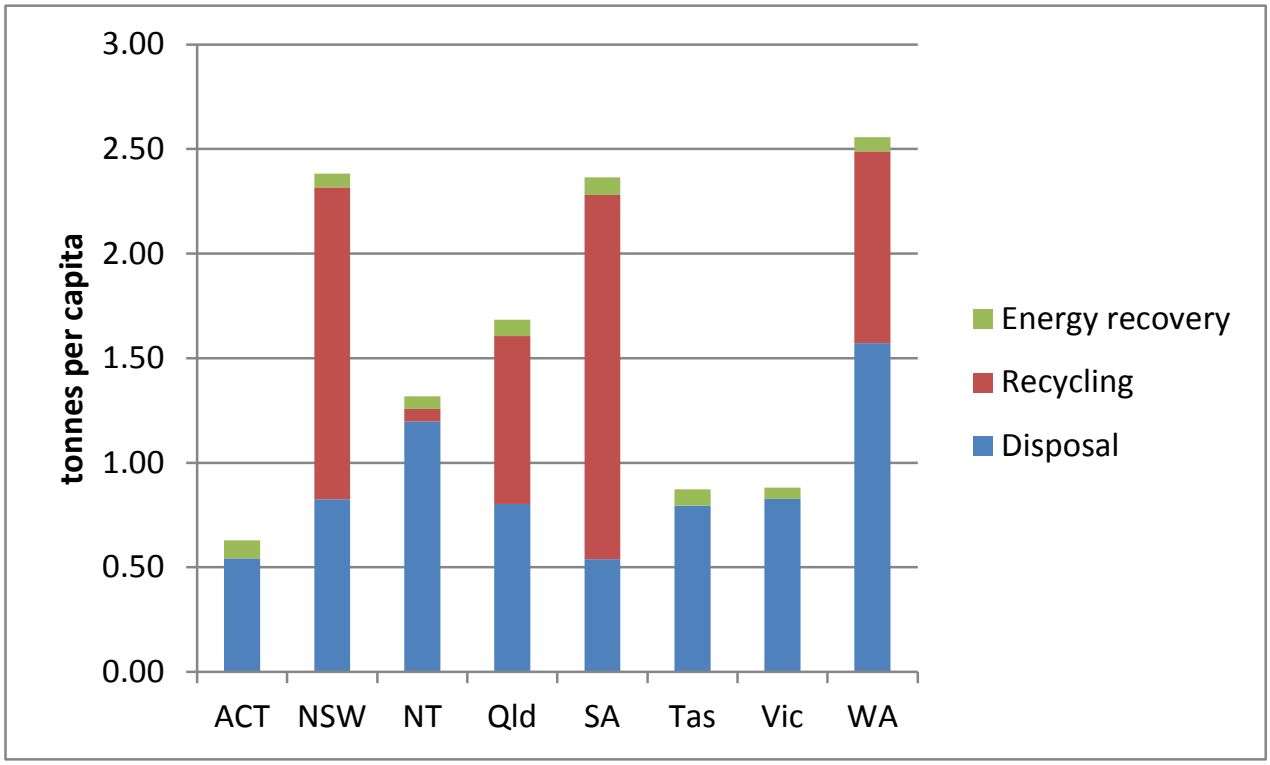

Figure 4: Comparison of waste generated and recycling by Australian State/Territory 2010/11

(Blue Environment, 2014)

2.1.3 Projected Waste Generation

The average waste generation rate per capita for the Perth metropolitan region for 2010/11 and 2011/12 (Table 2, Appendix 1) has been used to estimate future waste generation for Perth and Peel. These estimations are based on several assumptions. It is assumed that

- the per capita waste generation is the same in Peel as in the Perth metropolitan region
- the rate of waste generation per capita will remain consistent

- the Perth and Peel population will grow as per WAPC's *Population Report No. 8* Band C projections to 2026 and extrapolations of these projections from 2027 to 2050.

It is estimated that in 2012/13 total waste generation in the Perth metropolitan and Peel regions will be 5.26 million tonnes, increasing to 5.5 million tonnes in 2014/15 and around 6 million tonnes in 2020/21. When the population of Perth and Peel reaches 3.5 million people, waste generation could be over 9 million tonnes per year (Figure 5).

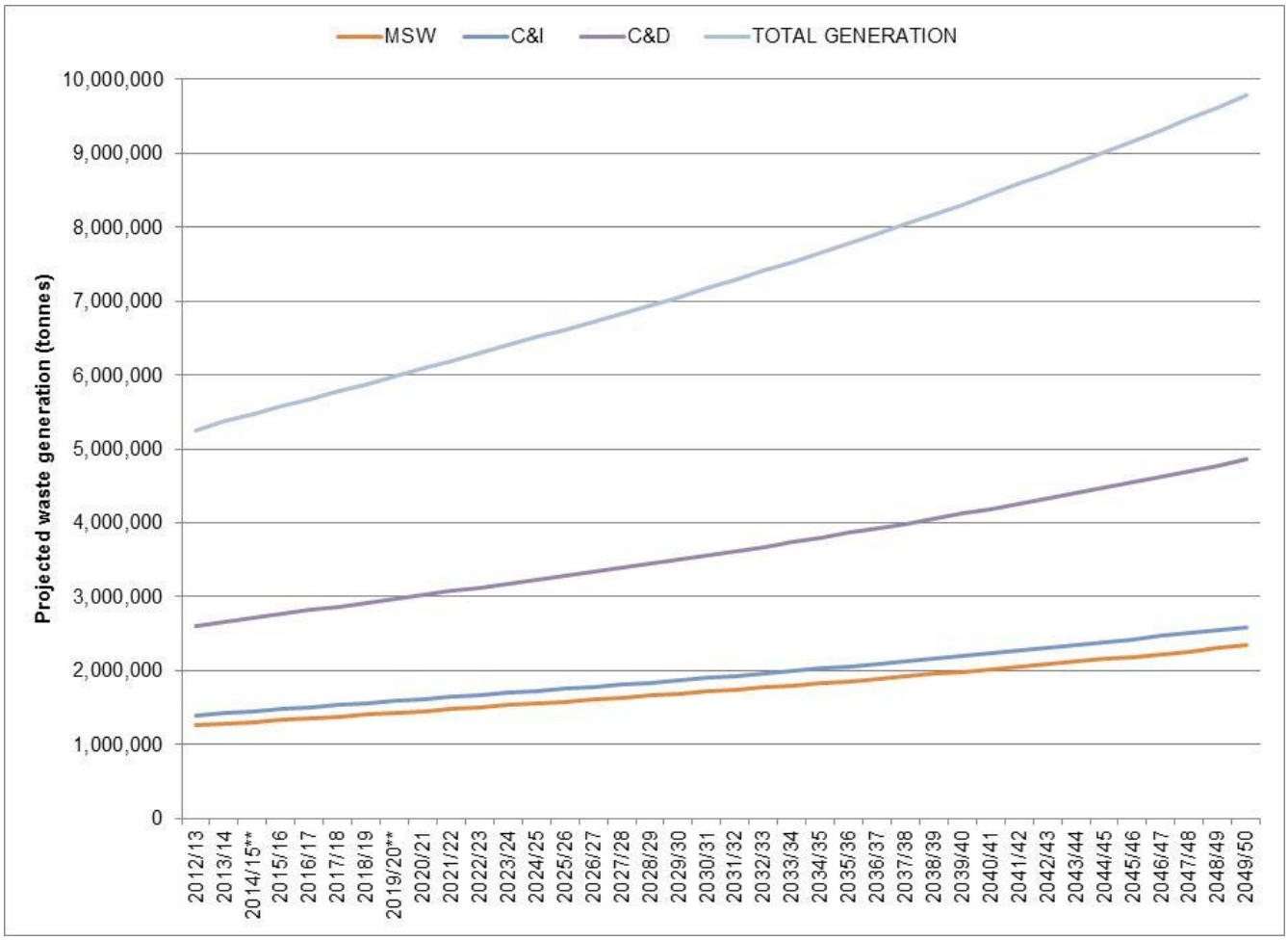

Figure 5: Estimated waste generation by waste stream, Perth and Peel, 2012/13 to 2049/50

Achieving the waste diversion targets in the Waste Strategy will mean a significant increase in recycling and recovery of waste, from a projected overall Perth and Peel landfill diversion rate of around 39% in 2011/12 to 56% in 2014/15 and 71% in 2020/21 (Figure 6).

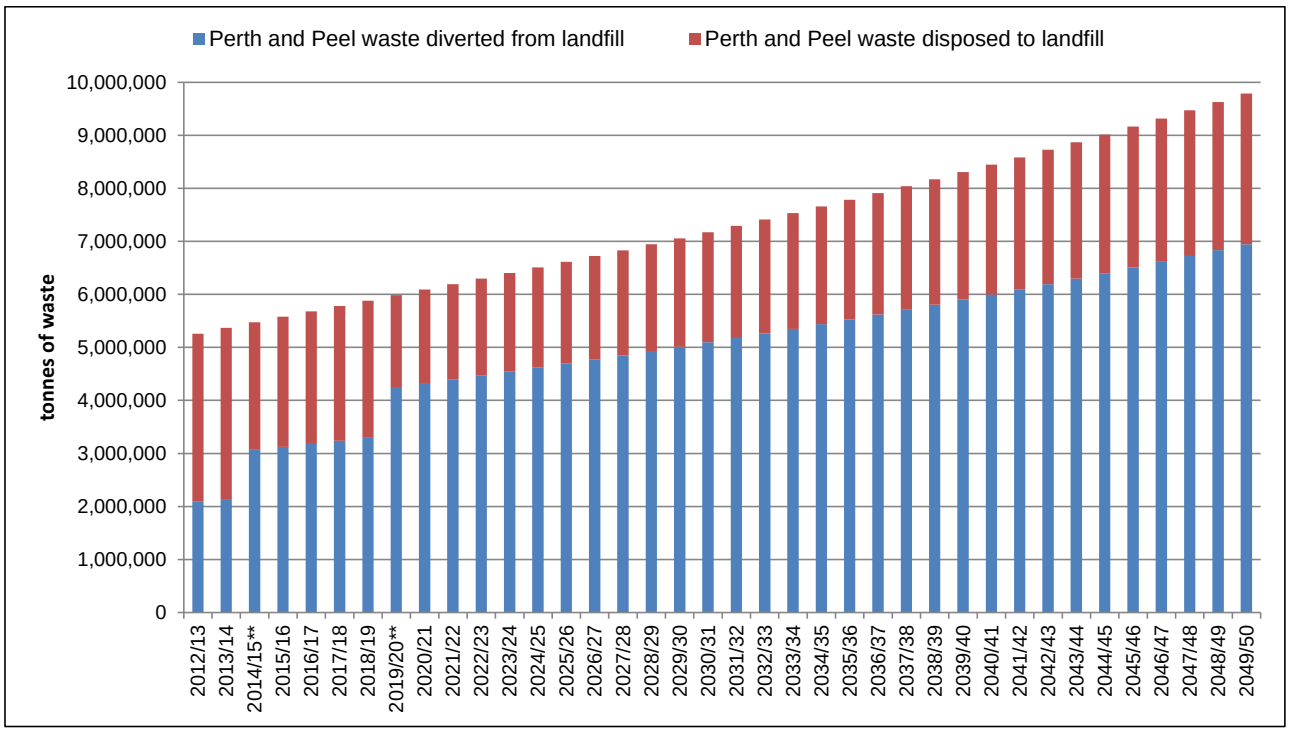

Figure 6: Projected waste generation by disposal (landfill or diversion from landfill) assuming Waste Strategy landfill diversion targets are achieved (* indicates Waste Strategy landfill diversion target years)

2.1.4 Waste Streams and Sources

The focus of the Waste Strategy is the management of municipal solid waste (MSW), commercial and industrial (C&I) waste and construction and demolition (C&D) waste. Therefore, for the purposes of the WRIP:

> ***Waste*** *means solid waste from municipal, commercial and industrial, or construction and demolition sources.*
>
> ***Waste facility*** *means a premises used for the storage, treatment, processing, sorting, recycling or disposal of solid waste from municipal, commercial and industrial, or construction and demolition sources.*

This does **not** include types of waste which may require specialised treatment and disposal, or the facilities where this waste is treated, such as:

- ***Sewage:*** Sewage is managed by the WA Water Corporation. It is treated and discharged through waste water treatment plants into the ocean
- ***Liquid waste:*** Depending on the type of waste, this may be treated and discharged through waste water treatment plants into the ocean, or may be recycled (e.g. liquid organic waste may be processed to create compost)
- ***Clinical waste:*** This includes wastes that have the potential to cause disease, sharps injury or public offence, including sharps, human tissue waste, laboratory waste and animal waste resulting from medical or veterinary research or treatment. Some types may be disposed of in landfills, but high risk waste must be incinerated

- ***Hazardous waste:*** Depending on the waste type, hazardous waste may be disposed of in a Class IV secure landfill or Class V intractable landfill. WA has one Class IV landfill at Red Hill (owned by the Eastern Metropolitan Regional Council), and one Class V landfill Mount Walton, 480km northeast of Perth. The Waste Authority also funds the Household Hazardous Waste Program, which collects and recycles or disposes of relatively small quantities of hazardous waste from domestic sources

- ***Radioactive waste:*** Managed by the federal Department of Resources, Energy and Tourism under the *Radioactive Waste Management Act 2012*. Radioactive waste is held at various facilities around Australia, though there are none in WA.

Waste is often divided into three categories or 'streams' based on its source. Although the types of waste found in each stream may be similar, the waste may be processed differently according to its source. These source streams are:

- ***Municipal solid waste (MSW):*** Solid waste generated from domestic (household) premises and local government activities

- ***Commercial and industrial (C&I) waste:*** Solid waste generated by the business sector, state and federal government entities, schools and tertiary institutions

- ***Construction and demolition (C&D) waste:*** Solid waste from residential, civil and commercial construction and demolition activities.

The following sections give some general information about some of the most common types of MSW, C&I and C&D waste produced in Perth and Peel, their main source(s), and the route through which they are generally recycled or disposed of.

2.1.4.1 Municipal Solid Waste

Municipal solid waste (MSW) is the solid waste generated from domestic (household) premises and local government activities. Under the Waste Avoidance and Resource Recovery Act 2007 (WARR Act), local governments (or groups of local governments forming regional local governments) have jurisdiction over 'local government waste', which includes all waste from residential sources (excluding sewage).

All local governments provide waste services for their residents, or contract organisations to provide these services, as well as manage the waste generated by their activities (e.g. green waste from parks and gardens maintenance, waste generated at local government facilities).

All local governments in the Perth metropolitan and Peel regions provide kerbside collection services to their residents. Most commonly, this takes the form of the 'two-bin' collection system, where residents have a yellow topped bin for co-mingled recyclable materials (e.g. glass bottles, aluminium cans, steel cans, paper, plastic) and a dark bin for all other "general" waste. Of the 33 local governments in Perth and Peel, 27 have a two-bin waste collection system. Five local governments have a three-bin waste collection service (which includes an additional bin for source-separated green waste or paper/cardboard waste), and one local government has a one-bin service. The material collected through the co-mingled recycling collection service is processed at a Materials Recovery Facility (MRF), where it is sorted into different material categories before being shipped to a recycler. The mixed general garbage collected in the dark bin is either disposed directly to landfill or processed through an Alternative Waste Technology (AWT) plant

(often referred to as a Resource Recovery Facility or RRF). In Perth, there are currently two AWT plants operating, with another undergoing commissioning.

Local governments also provide residents with occasional verge-side collections of large waste items, which may be recycled or disposed of to landfill. Thirty-one local governments in Perth and Peel provide verge-side green waste collection services and 32 collect verge-side hard waste. The greenwaste is typically composted, while the majority of hard waste collected through vergeside collections is disposed to landfill.

Local governments also operate drop-off facilities, where residents and businesses can 'self-haul' waste and recyclable/re-useable materials to a set location. Depending on what it is, this material may be re-used (for example, sold in a 'tip shop'), recycled or disposed to landfill.

2.1.4.2 Commercial and Industrial Waste

C&I waste is generated by the business sector and government entities, such as offices, shops, light industry, hospitals, schools and tertiary institutions.

C&I waste is generally collected from the premises using containerised collection services. Many private contractors, as well as some local governments, provide C&I waste collection services. The nature and volume of waste generated by different business types varies considerably. As a result, the range of collection services also varies considerably; co-mingled recycling, single-material recycling or completely mixed waste. As with MSW, C&I waste may be recycled or disposed to putrescible landfill (i.e. landfills that accept biodegradable waste).

Small businesses, especially mobile businesses such as landscapers, often utilise drop-off facilities to dispose of small quantities of C&I waste.

2.1.4.3 Construction and Demolition Waste

C&D waste is the solid waste resulting from residential, civil and commercial construction and demolition activities. These activities, and thus the generation of C&D waste, fluctuate considerably with economic activity and market demand. C&D waste may be recycled (either as source-separated waste or mixed waste), disposed to inert landfill or disposed to putrescible landfill (depending on the level of contamination with putrescible materials).

C&D waste is generally bulky and heavy to transport, meaning recycling rates are affected by transport costs (i.e. the cost of fuel, distance between sites of generation and recycling).

2.2 Waste and Recycling Facilities in Perth and Peel

The major waste disposal and recycling/recovery facilities in the Perth metropolitan and Peel regions are described in this section. Waste facilities may be prescribed premises (as described in Schedule 1 of the *Environmental Protection Regulations 1987*) as well as unlicensed facilities. The types of facilities found in Perth and Peel are listed below.

- Landfills – for inert and putrescible waste
- AWT facilities - Each of the AWT plants in Perth fall in the sub-category of mechanical biological treatment (MBT). These are sometimes called Resource Recovery Facilities (RRF)

- MRFs - Perth only has ‘clean’ MRFs, i.e. processing mixed, source-separated recyclable material, such as glass, plastic, aluminium, steel cans, paper and cardboard
- Composting facilities (mixed organic and/or green waste) – most composting facilities use open windrows
- C&D material processors
- Recyclers (including facilities which sort, dismantle, decontaminate and/or aggregate recyclable materials) – Perth has facilities that accept e-waste, scrap metal, paper, glass, timber and plastic
- Transfer stations (putrescible, inert, or mixed inert/recyclable)
- Drop-off facilities

Figure 7 gives a simplified illustration of the flow of waste between facilities in the Perth metropolitan and Peel regions, from source to final disposal or recycling end point. It is not intended to show every possible disposal or recycling route that waste may take, but instead give a basic idea of how the waste management facilities discussed in this section interrelate. The relationship between waste management facilities can be complex, and waste may take many different pathways.

There are waste disposal and recycling/recovery facilities located in each of the planning sub-regions in the Perth metropolitan and Peel regions. However, they are not evenly distributed, with a greater number of facilities in the outer metropolitan area (Figure 8 to Figure 11).

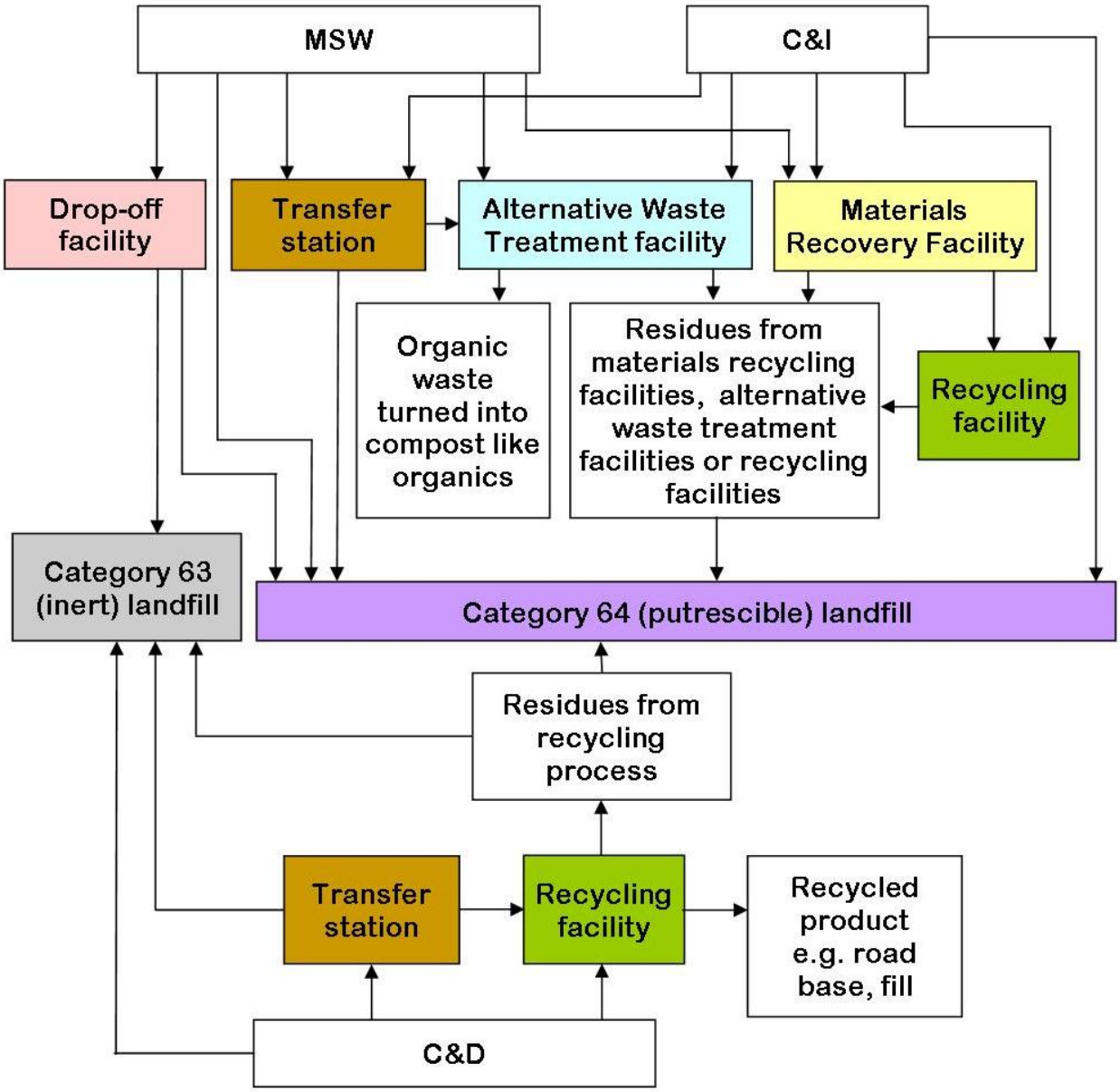

Figure 7: Simplified interrelationship between waste management facilities Perth and Peel

2.2.1 Landfills

2.2.1.1 Putrescible Landfills (Class II or III)

Putrescible landfills are licensed to accept waste under Category 64 or 89, Schedule 1 of the *Environmental Protection Regulations 1987* and are the main disposal option for MSW and C&I waste.

Putrescible waste generated in Perth and Peel is disposed of at 10 landfill sites (Table 29, Figure 8). Four of these are outside Perth and Peel, and also receive waste from the Wheatbelt and Southwest regions. A new putrescible landfill is currently under construction at a site approximately 30km north of the Boddington Refuse Disposal Site, which will accept putrescible waste generated in Perth and Peel.

The number of residents in Perth's Metro-Inner and Metro-Middle sub-regions is projected to increase from 791,100 in 2012/13 to 844,800 by 2019/20. These sub-regions have no putrescible

landfills; so, the waste generated here must be transported to other areas. It is anticipated that the transportation of waste, both within the city and to disposal sites outside the city, will become an increasingly important issue.

Waste transport in relatively densely populated areas can have both environmental and social impacts (e.g. greenhouse gas emissions by trucks, increased traffic congestion, noise, accidents). Transport of waste over long distances is also inefficient as it increases costs and collection times. Transport distances may be reduced by the strategic siting of transfer stations, MRFs and/or AWT facilities.

2.2.1.2 Inert Landfills (Class I)

Inert landfills are licensed under Category 63, Schedule 1 of the *Environment Protection Regulations 1987*, and are the main disposal route for C&D waste. Seventeen inert landfill sites receive waste from Perth and Peel, three of which are outside these regions (Table 30, Figure 8).

2.2.1.3 Secure and Intractable Landfills

As well as inert (Category 63 / Class I) and putrescible (Category 64 / Class II and III) landfills, there are two further categories, for more specialised types of waste. These are <u>not</u> included in this project:

- **Secure landfills** (Class IV) licensed under Category 65, Schedule 1, *Environment Protection Regulations 1987*. They accept solid waste that cannot be accepted by Class I, II or III landfills (e.g. contaminated soils, hazardous waste encapsulated in concrete). The Eastern Metropolitan Regional Council manages the only Class IV landfill in Perth and Peel at the Red Hill Waste Management Facility (Figure 8)

- **Intractable landfills** (Class V) licensed under Category 66, Schedule 1, *Environment Protection Regulations 1987*. The toxicity or chemical or physical characteristics of intractable waste make it difficult to dispose of or treat safely e.g. industrial sludge, significantly contaminated soil. The Mount Walton East Intractable Waste Disposal Facility, 480km northeast of Perth, is WA's only Class V disposal site.

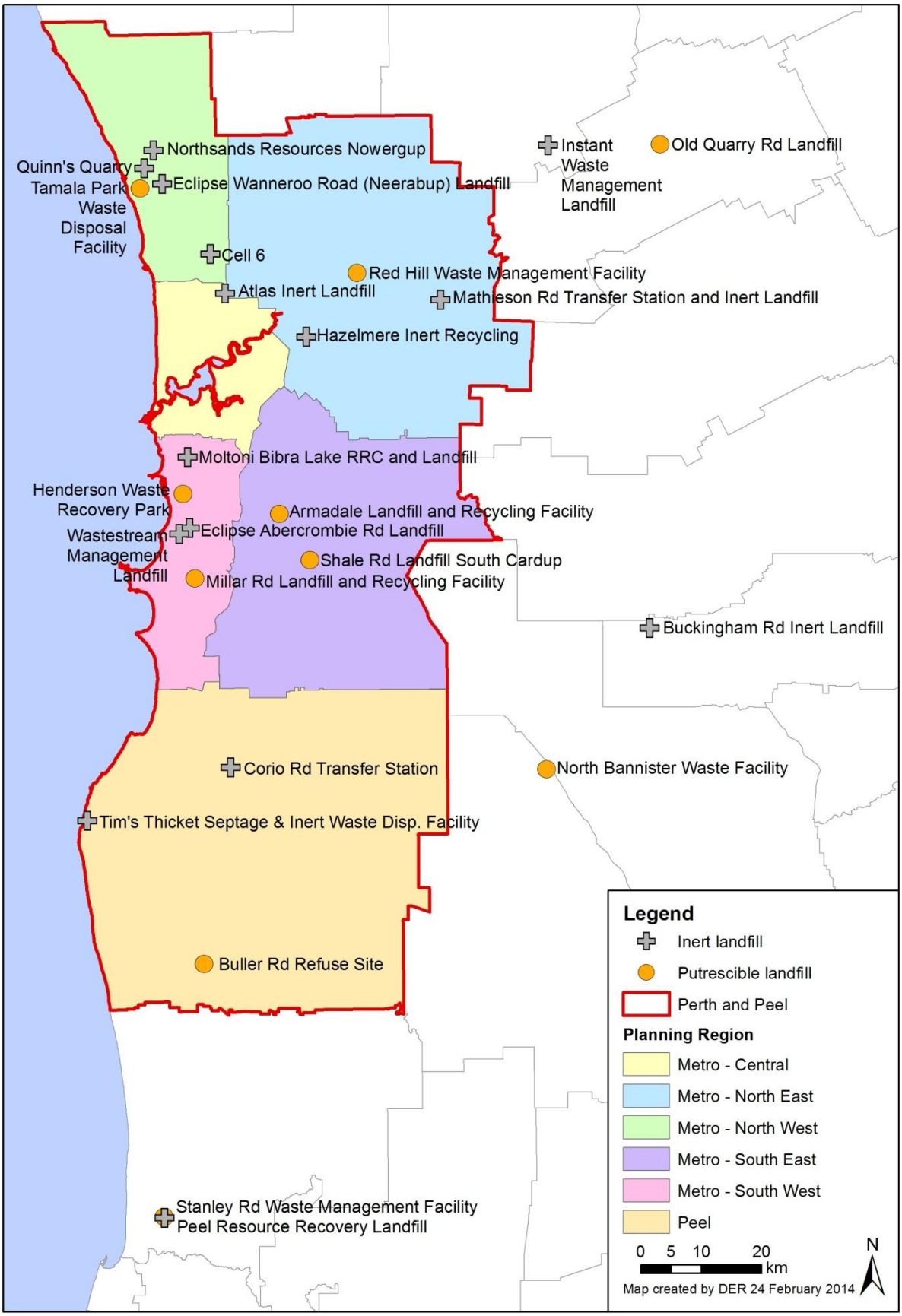

Figure 8: Putrescible and inert landfills that receive waste from the Perth metropolitan and Peel regions

2.2.2 Transfer Stations and Drop-Off Facilities

2.2.2.1 Transfer Stations

For the purposes of this report, a transfer station is defined as an aggregation point for bulk quantities of waste prior to recycling or disposal.

Strategically located transfer stations are important, because they enable collection vehicles to travel shorter distances and empty full loads regularly. The waste or recyclable materials may be sorted, baled or compacted at the transfer station. Trucks with a larger capacity are used to transport aggregated quantities to recycling or disposal points.

There are different types of transfer stations in the Perth metropolitan and Peel regions, accepting different types of waste and recyclable materials; putrescible transfer stations and inert transfer stations. The type of waste received by inert transfer stations may vary widely, depending on the facility licence.

Putrescible transfer stations receive and aggregate bulk quantities of putrescible waste (mainly from MSW and/or C&I waste streams) for transport to AWT facilities or landfills. There are seven licensed putrescible solid waste transfer stations in Perth and Peel.

Not all putrescible waste goes through a transfer station before it is disposed of to landfill. The relationship between transfer stations and landfills is not simply based on geographical proximity or transport efficiency, but also on commercial arrangements between waste generators, collectors and landfill operators.

Inert transfer stations receive and aggregate bulk quantities of inert waste for transport to recyclers or landfills. Waste received by inert transfer stations is generally sourced from the C&I or C&D waste streams. There are at least 20 inert/recyclables transfer stations in the Perth metropolitan and Peel regions (Table 31 and Figure 9).

2.2.2.2 Drop-Off Facilities

For the purposes of this report, ‘drop-off facilities’ are the facilities operated by local governments and regional local governments that allow residents to deliver small loads/volumes of waste, recyclable or reusable materials (from domestic or small-scale commercial sources).

While drop-off facilities are commonly called ‘transfer stations’ by local governments and regional councils, in this report the term transfer station refers to large-scale waste aggregation facilities used by waste collection vehicles (see section 2.2.2.1).

There are 20 drop-off facilities in the Perth metropolitan and Peel regions (Figure 10). Most are located at local government landfills or transfer stations. Almost all of these drop-off facilities accept all types of MSW and recyclables; although, some accept only certain types of waste.

Recyclable materials collected at drop-off facilities are transported to MRFs or recyclers, depending on the degree of separation. The waste collected at drop-off facilities is aggregated and transported to transfer stations, AWT facilities or landfills.

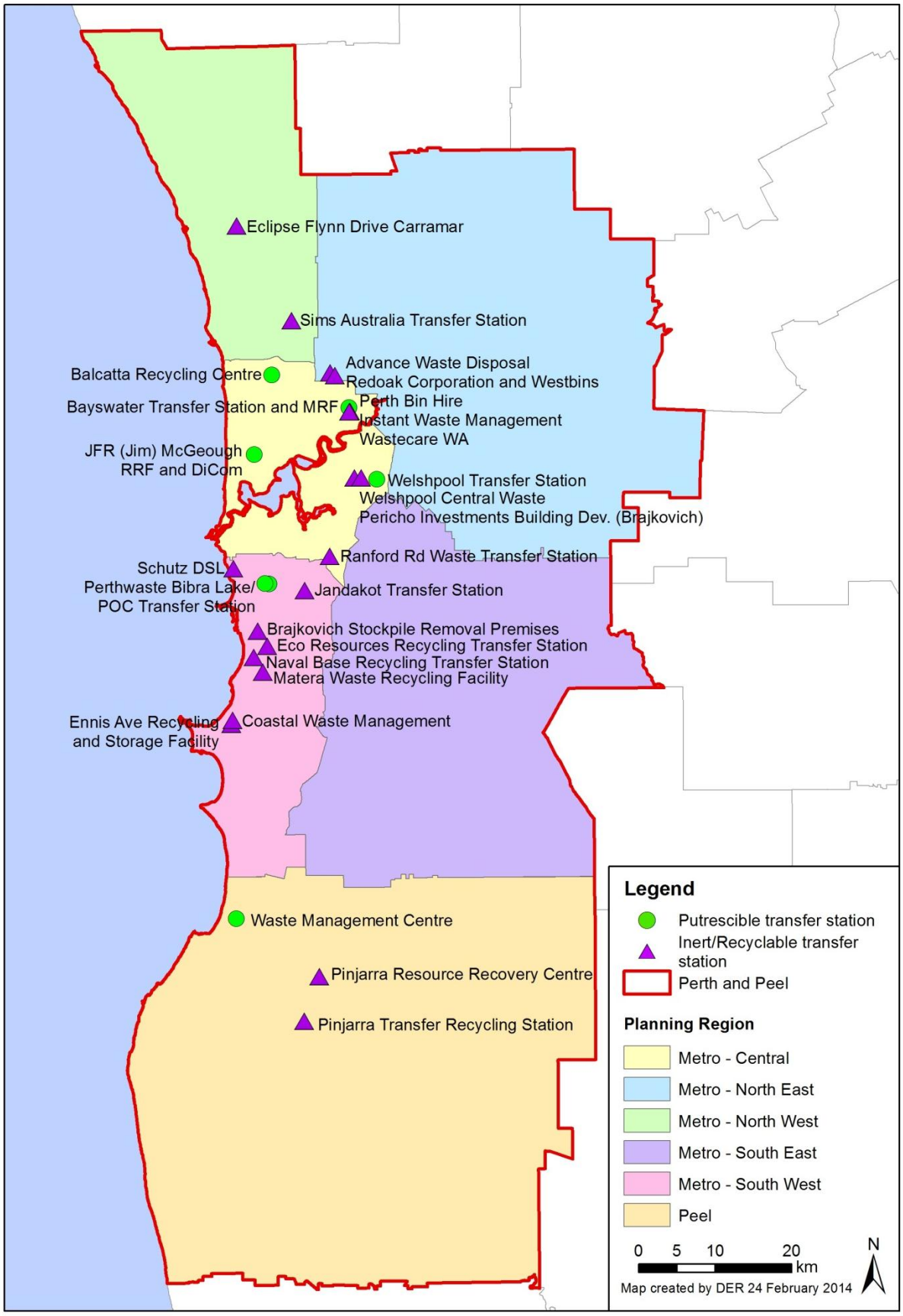

Figure 9: Putrescible and inert/recyclable transfer stations in the Perth metropolitan and Peel regions

2.2.3 Recycling/Reprocessing Facilities

2.2.3.1 Materials Recovery Facilities

A materials recovery facility (MRF) is a facility for sorting and pre-processing materials from the waste stream for resource recovery. MRFs may be 'clean' (source-separated recyclables are sorted into different material types for recycling) or 'dirty (mixed waste is sorted to separate recyclable and non-recyclable waste). Both types of MRFs produce non-recyclable residue, which is disposed to putrescible landfill.

There are seven 'clean' MRFs processing C&I and MSW waste generated in the Perth metropolitan and Peel regions (including one outside the regions, in the City of Bunbury) (Table 32, Figure 10). There are no 'dirty' MRFs currently operating in Perth and Peel.

MSW collected for recycling (e.g. mixed recyclables disposed of by householders in 'yellow topped' bins) is generally sent to MRFs for sorting prior to recycling. MSW collected for recycling is generally co-mingled (i.e. all types of recyclable materials mixed together e.g. glass, plastic, cardboard) and is sorted into different material types at MRFs for further processing at other facilities.

C&I waste collected for recycling may be taken to MRFs for sorting or directly to a specialist recycler (see section 2.2.3.3), depending on the waste material and how it is collected (i.e. co-mingled or source-separated).

2.2.3.2 Alternative Waste Technology

Alternative waste technology (AWT) is generally any waste processing technology designed to recover resources from the mixed waste stream. Mixed solid waste may be treated using mechanical, biological (aerobic or anaerobic) or thermal processes and converted into energy or useful by-products (e.g. compost). After processing there is usually some residual waste that must still be disposed of to landfill.

Waste treatment facilities that incorporate AWT to recover resources from waste are sometimes referred to as resource recovery facilities (RRFs). There are three AWT facilities in the Perth metropolitan and Peel regions (Table 33, Figure 10), two operating and one undergoing commissioning. Each of the current facilities use mechanical and biological treatment (MBT) processes to produce compost-like outputs (CLO) from mixed solid waste. Additionally, the DiCom facility at the JFR (Jim) McGeough RRF will produce bio-gas, which will be used as an energy source for the facility.

Although each AWT facility uses different technology and processes, the general method for producing CLO from mixed waste is similar at each facility. Mechanical processes are used to screen out recyclables and/or large or dangerous non-organic items. Then, aerobic (requires oxygen) and/or anaerobic (absence of oxygen) processes are used to convert organic waste to CLO. The remaining residual waste is sent to landfill.

AWT also includes thermal waste processing, often called "waste-to-energy" (W2E). There are currently no thermal waste treatment plants operational in Perth or Peel; although, there are two proposals to construct a waste-to-energy plant in Kwinana.

The Eastern Metropolitan Regional Council (EMRC) and Rivers Regional Council (RRC) are currently in the preliminary planning stages for new AWT facilities in Perth and Peel.

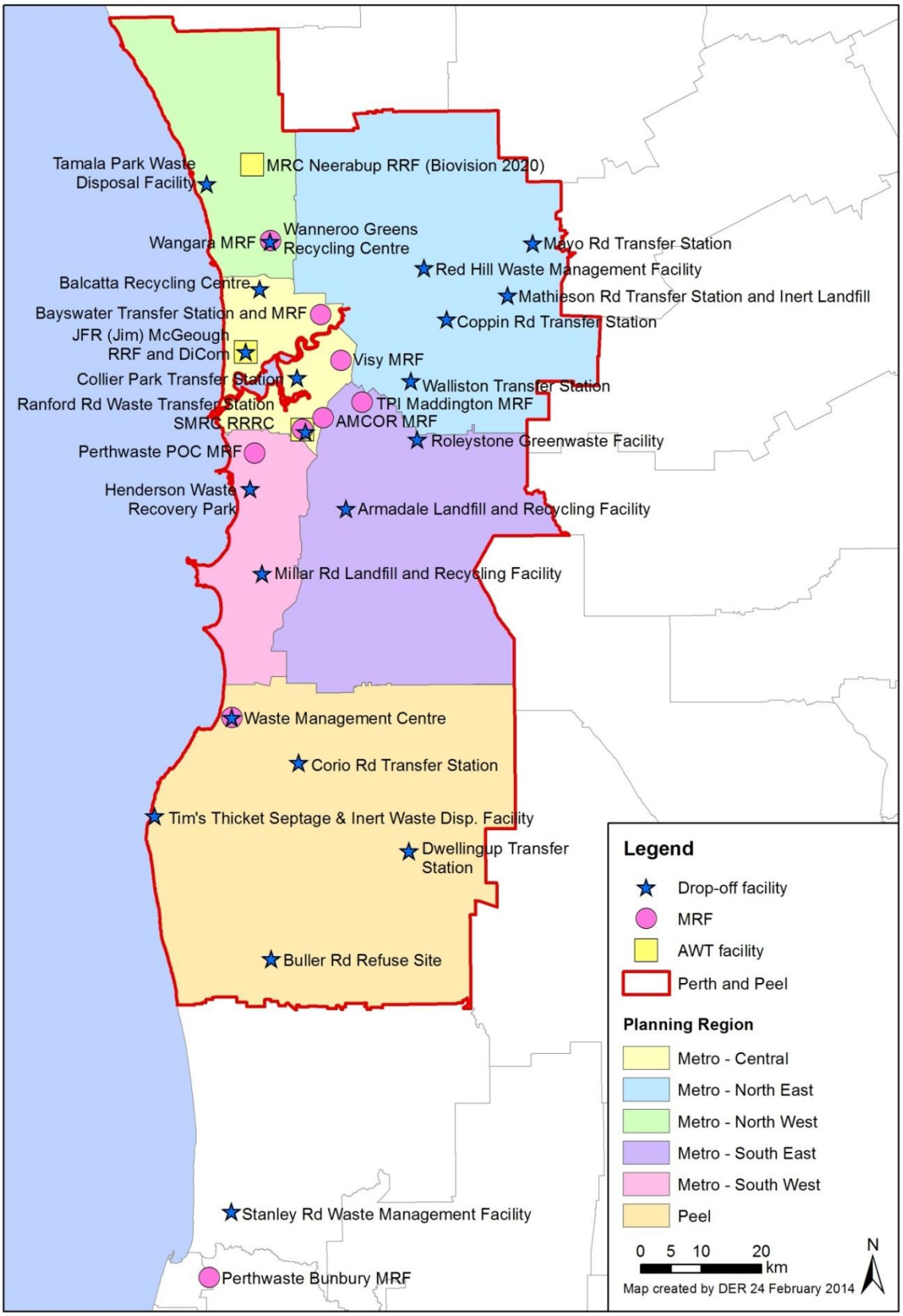

Figure 10: Drop-off facilities, material recovery facilities (MRFs) and alternative waste treatment (AWT) facilities in the Perth metropolitan and Peel regions

2.2.3.3 Recycling Facilities

In 2011/12, all C&D materials (asphalt, bricks, concrete and sand, soil, clean fill and rubble) and organic waste collected for recycling in the Perth metropolitan and Peel regions was recycled within WA (Hyder Consulting, 2013). Very little of the other materials collected for recycling are processed in WA to a point where they can be used as a manufacturing feedstock or product.

Therefore, for the purposes of this project, the definition of a 'recycling facility' is expanded to include the waste treatment facilities that accept source-separated materials and in which contamination is removed and material is sorted, processed, aggregated and/or baled ready for export interstate or overseas for recycling. It also includes facilities that accept recyclable materials that have been sorted at a MRF and process that material to a higher-value product.

A range of materials are recycled (or processed in preparation for recycling) in the Perth metropolitan and Peel regions, including C&D materials, glass, timber, mattresses, plastics, e-waste, tyres, scrap metal, paper/cardboard, organic materials (green waste, food scraps) and packaging (cardboard, glass, steel, aluminium).

***Construction and Demolition Materials Recycling*:** In 2011/12, C&D materials (asphalt, bricks, concrete and sand, soil, clean fill and rubble) made up 91% of the C&D waste recycled in Perth and Peel. The remaining 9% was metals (8%) and organics (1%) (Hyder Consulting, 2012).

There are four major C&D materials recycling facilities in the Perth metropolitan and Peel regions (see Figure 11). The recycling process for C&D materials generally involves sorting, screening and crushing it to produce construction and landscaping products (e.g. road base, aggregate, drainage material, clean fill and sand), all of which are reused in WA. There are also other smaller-scale facilities that transport, salvage, sort and aggregate all types of C&D waste (i.e. asphalt, concrete, bricks, rubble, steel, glass, timber and reusable items such as doors, windows, bricks and tiles).

***Metal Recycling*:** Currently, there is no major metal recycler located in WA. Metal collected for recycling is exported interstate or overseas. Therefore, metal recycling facilities in WA consist mainly of sorting, shredding and aggregation processes. There are many companies collecting metal for recycling in the Perth metropolitan and Peel regions. Most metal collected for recycling is exported through two companies.

***Organic Waste Recycling*:** Organic waste may include any material of animal or vegetable origin (e.g. food waste, garden trimmings, timber, sawdust, bark, straw/animal bedding, manure, paper/cardboard, and oils from grease traps) (Recycled Organics Unit, 2007). The main organic materials recycled in Perth and Peel are listed below.

- Timber: The Hazelmere Recycling Centre managed by Eastern Metropolitan Regional Council is the major timber recycling facility in Perth and Peel (Figure 11). The centre accepts untreated timbers which are sorted, ground and screened to produce bedding for the poultry industry, particle board, compost, wood chips and mulch. There are also smaller-scale businesses that salvage and reuse timber (e.g. reclaiming timber for floor boards and decking, reuse of wooden pallets).

- Green waste: Green waste (garden waste) may be shredded to create mulch, or composted. Some regional councils and local governments produce mulch from the green waste collected through verge-side collections, drop-off facilities, and parks and gardens

maintenance. Commercial recyclers also produce mulch and compost products from green waste.

- Food waste: The process used to recycle food waste (and mixed food and green waste) into compost or compost products (e.g. soil conditioner, potting mix) depends on the method of collection. Where it is mixed in with other types of waste, it may be separated and recycled through an AWT to produce compost-like organics (CLO). Source-separated organic waste is less contaminated and easier to recycle, and compost is most commonly produced through aerobic windrow composting.

Most organic waste comes from the MSW and C&I waste streams, with only a small proportion coming from the C&D waste stream. In 2011/12, all organic waste collected for recycling in WA was recycled within the state (Hyder Consulting, 2013). Organic waste recycling facilities in Perth and Peel operate at a range of scales, accept a range of different organic waste types and treat it in a variety of ways, including AWT (MBT) facilities, green waste shredding/mulching facilities, open composting facilities and enclosed composting facilities (Figure 11).

***Paper/Cardboard Recycling*:** Paper and cardboard (e.g. white office paper, packaging, news print, liquid paperboard) is sorted and aggregated (e.g. at the Visy MRF in Figure 10) before being transported interstate/overseas for reprocessing.

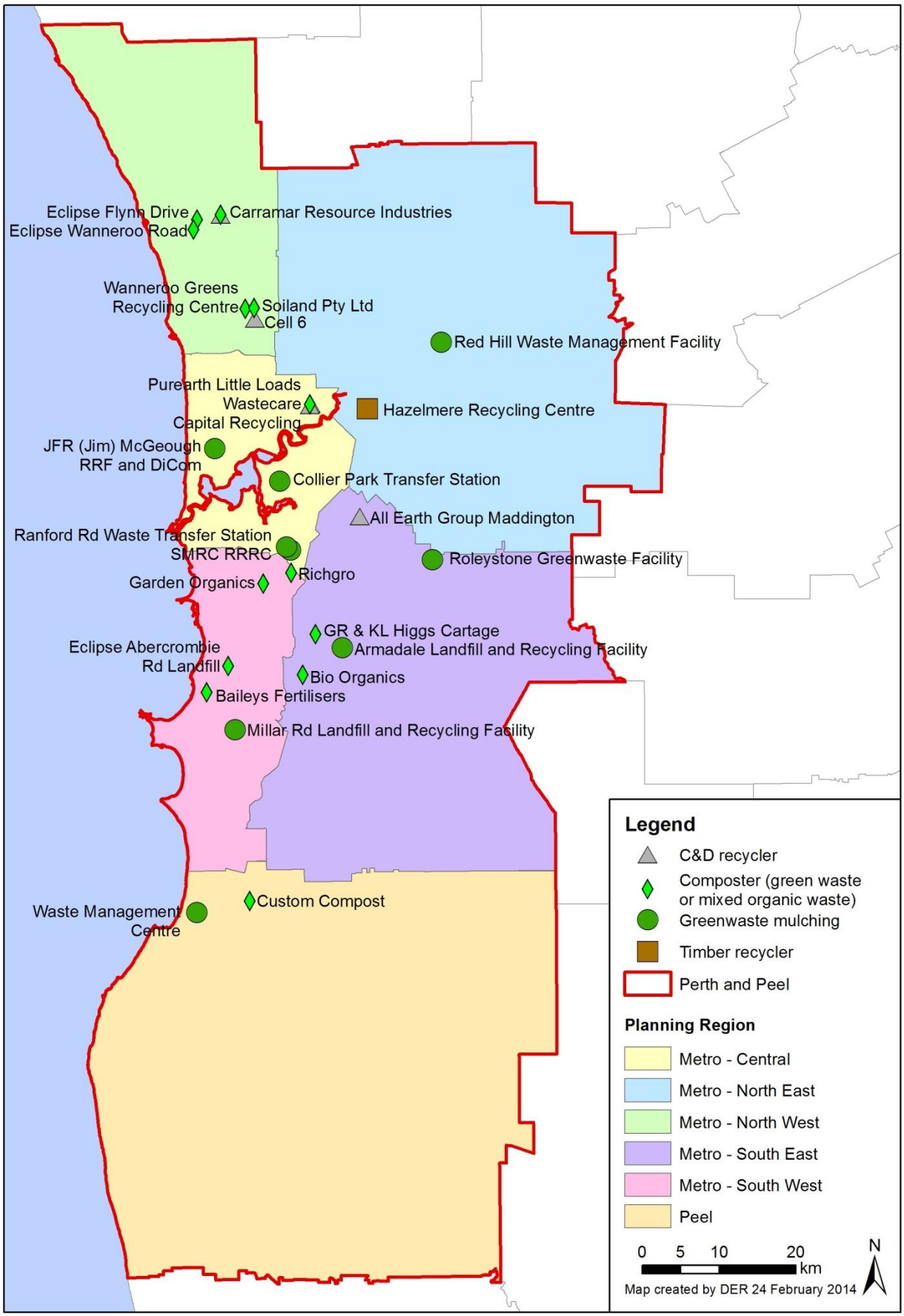

Figure 11: Major construction and demolition materials recyclers, timber recyclers and organic waste recyclers in the Perth metropolitan and Peel regions

2.3 Legislative and policy framework for waste management in Perth and Peel

Waste generated in Perth and Peel is managed under various laws and policies. These provide the context for the development of measures to improve waste management outcomes in the region.

A summary of the key pieces of legislation and policies is provided in Table 3 and Table 4.

Table 3: Key legislation affecting waste management in Perth and Peel

Legislation	Relevance
Waste Avoidance and Resource Recovery Act 2007 (WARR Act)	The WARR Act is the principal mechanism for regulating waste in Western Australia, which: • provides for local government waste services • establishes the Waste Authority to advise the Minister on matters relating to waste • establishes the Waste Avoidance and Resource Recovery Account (WARR Account) • provides powers to make regulations for waste development • requires the development of a Western Australian Waste Strategy.
Waste Avoidance and Resource Recovery Levy Act 2007 (WARR Levy Act)	The WARR Levy Act provides for a landfill levy to be applied to waste received at metropolitan landfills and metropolitan waste received at landfills outside the metropolitan area.
Waste Avoidance and Resource Recovery Levy Regulations 2008 (Levy Regulations)	The Levy Regulations set out the conditions for the application of the levy.
Waste Avoidance and Resource Recovery Regulations 2008 (WARR Regulations)	The WARR Regulations set conditions around local government collection of waste and conditions for those entities required to pay the landfill levy.
Environmental Protection Act 1986 (EP Act)	The EP Act provides for the prevention, control and abatement of pollution and environmental harm, for the conservation, preservation, protection, enhancement and management of the environment and for matters incidental to or connected with the foregoing. If a waste facility is likely to have a significant impact on the environment it may be referred to the Environment Protection Authority for a decision on whether or not it requires assessment under Part IV of the *EP Act*. Waste facilities that fall under the definition of prescribed premises are licensed under Part V of the EP Act.
Environmental Protection Regulations 1987 (EP Regulations)	Defines categories of prescribed premises.
Metropolitan Region Scheme (MRS), Peel Region Scheme (PRS)	Subsiduary legislation that controls land use and development and empowers the WAPC to reserve and acquire land for public purposes

In addition to legislation, there are a number of important policy documents that affect the waste industry, generally, and the establishment of waste infrastructure in particular.

Table 4: Policies affecting waste management in Perth and Peel

Document	Relevance
Western Australian Waste Strategy: "Creating the Right Environment" (Waste Strategy)	The Waste Strategy sets landfill diversion targets for the state and identifies measures to assist in achieving these.
Communication on the Waste Hierarchy	The position statement explains the waste hierarchy and how the Waste Authority will apply the hierarchy in its decision making in delivering the Waste Strategy.
Position Statement on Source Separation of Waste	This position statement confirms the Waste Authority's support for source separation of waste as an important way of contributing to the objectives and targets established set out in the Waste Strategy.
Position Statement on Recycled Organics	This position statement sets out the Waste Authority's commitment to diverting organic waste from landfill and its preference for using organic materials for beneficial purposes when appropriate.
Waste to Energy Position Statement (thermal treatment)	This position statement sets out the Waste Authority's views on application of waste-to-energy technologies in the context of the waste hierarchy.
State Planning Strategy (draft for public comment)	The draft State Planning Strategy, released by the Western Australian Planning Commission in 2012, recognises provision of waste management infrastructure and services as an essential service and seeks to ensure WA's waste streams are managed as a resource.
Economic and Employment Lands Strategy: non-heavy industrial	Released by the Western Australian Planning Commission in 2012, this strategy identifies locations for future industrial development in Perth and Peel, which affect the planning and development of waste facilities.
Guidance for the Assessment of Environmental Factors (in accordance with the Environmental Protection Act 1986) Separation Distances Between Industrial and Sensitive Land Uses No. 3 June 2005	Provides guidance to proponents of waste facilities and to decision-making authorities on appropriate separation distances between waste facilities and sensitive land uses.

2.4 Land use Planning Legislation and Policies in WA

In Western Australia land use planning is influenced by many different pieces of legislation, programs and policies - at commonwealth, state and local government level.

2.4.1 Commonwealth Government

2.4.1.1 COAG National Reform Agenda

All state governments and the Commonwealth Government are part of the Council of Australian Governments (COAG). One role of COAG has been to develop a national planning reform agenda to support infrastructure development and approvals processes. As part of this national planning reform agenda, WA has an obligation to progress towards an integrated land use planning and infrastructure coordination framework.

The Western Australian Planning Commission (WAPC) and Department of Planning (DoP) are the main bodies that aim to deliver the objectives of the national reform agenda in Western Australia.

To ensure the national reform agenda is implemented, the Commonwealth Government will link future infrastructure funding to it. States will have to demonstrate that their capital city strategic planning systems meet the *National Objective and Criteria for Future Strategic Planning of Capital Cities*. Planning for waste management infrastructure is relevant to many of these criteria, as well as to the policies and programs developed by the WAPC.

2.4.1.2 Strategic Assessment of Perth Metropolitan and Peel Regions

The *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) enables the Commonwealth Government to manage matters of national environmental significance (MNES). These include; world heritage sites, national heritage places, wetlands of international importance ('Ramsar' wetlands), nationally threatened species and ecological communities, migratory species, commonwealth marine areas, the Great Barrier Reef Marine Park and nuclear actions.

Any person who proposes to take an action that will have, or is likely to have, a significant impact on an MNES must refer that action to the commonwealth Minister for the Environment for a decision on whether assessment and approval is required under the EPBC Act. In addition to relevant state and local government approval processes for developments, the EPBC Act provides for project-by-project assessments.

The Strategic Assessment of the Perth metropolitan and Peel regions, which began in 2011, will assess and address the impacts of future urban, industrial and infrastructure development and basic raw material extraction in Perth and Peel on MNES. The aim of this process is to reduce the need for project-by-project assessments under the EPBC Act and create a more strategic and regionally consistent response to MNES.

The Strategic Assessment is being led by the Department of the Premier and Cabinet (DPC) in partnership with the commonwealth Department of the Environment. At a state level, the DPC is working closely with the Departments of Planning, Environment Regulation, Water, Mines and Petroleum and the Office of the Environmental Protection Authority.

The Strategic Assessment process will include:

- a *Plan for the Protection of Matters of National Environmental Significance in the Perth and Peel Regions of WA* (MNES Plan), to be based on and implemented in conjunction with the WAPC's *Directions 2031 and beyond* and the sub-regional structure plans for Perth and Peel currently being developed by the DoP for the WAPC. The MNES Plan will describe how relevant MNES, which may be affected by the development proposed in *Directions 2013 and beyond* and the sub-regional structure plans, are being addressed through avoidance, mitigation or offset measures

- an Impact Assessment Report, which includes a profile for each matter of national environmental significance affected by the MNES Plan.

The Commonwealth Minister for the Environment will consider the MNES Plan and Impact Assessment Report. If satisfied that MNES have been adequately addressed, the Minister may endorse the MNES Plan and the taking of actions in accordance with the endorsed MNES Plan. This endorsement will streamline the approvals process for new developments, and provide more certainty for proponents and state and local governments, because actions undertaken in accordance with the endorsed MNES Plan would not need further approval under the EPBC Act.

To streamline environmental assessment processes it was identified that the provision of strategic advice from the EPA under section 16(e) of the EP Act was the most appropriate mechanism for consideration of state environmental issues in parallel with the national environmental issues considered as part of the Strategic Assessment of Perth and Peel.

The section 16(e) advice will provide guidance to the WA Minister for Environment for future decision making on state environmental matters within the Perth and Peel regions. Further, the section 16(e) advice is intended to provide clarity to government, stakeholders and the community on acceptable outcomes for state environmental matters that are not also covered by the EPBC Act.

The Strategic Assessment will assist with planning for areas that may be suitable for future development of Perth and Peel. Developments that do not conform to the MNES Plan and section 16(e) advice will need to seek approvals on a project-by-project basis. For more information see www.dpc.wa.gov.au and www.environment.gov.au.

The Strategic Assessment is unlikely to directly affect the establishment of waste processing infrastructure. Most of these facilities will be located in areas zoned or proposed as "Industrial". As such, they would have already been assessed under the Strategic Assessment.

2.4.2 State Government

The state's overarching planning legislation is the *Planning and Development Act 2005* (Planning and Development Act). The Planning and Development Act provides for an efficient and effective land use planning system in WA, and promotes the sustainable use and development of land. It also outlines the role and functions of the Western Australian Planning Commission (WAPC).

Land use planning identifies where future residential, commercial and industrial development will occur, and the transport systems that are required to support these land uses. This impacts on planning for waste infrastructure by identifying potential sites for infrastructure development and where the demand for waste services will occur.

Figure 12 illustrates the different levels of the land use planning system in WA.

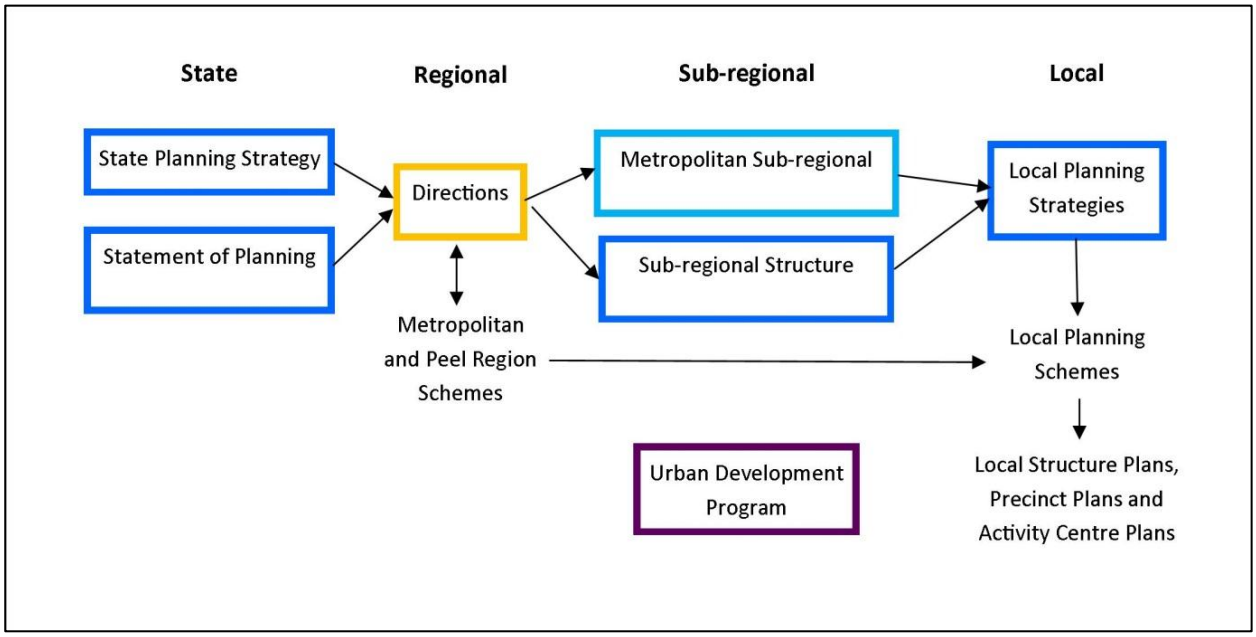

Figure 12: Different levels of planning policies, schemes and strategies in WA (Western Australian Planning Commission, 2010)

The WAPC is the WA statutory authority responsible for urban, rural and regional land use planning, land development matters, and the strategic planning of the state. The Department of Planning provides professional and technical expertise, administrative services, and resources to advise the WAPC and implements its decisions.

The WAPC advises the Minister for Planning on the coordination and promotion of land use, transport planning and sustainable land development and also for the preparation and review of planning strategies and policies.

The WAPC has formed the Infrastructure Coordinating Committee (ICC) to provide advice on planning for the provision of physical and community infrastructure throughout the state and promote inter-agency cooperation in decisions related to urban development.

Under WA planning legislation and policies (some of which are listed below) different types of waste facilities are not specifically addressed, but are covered in a general way under definitions of ‘industry’ or ‘essential services’. The Waste Authority is not represented on the ICC.

2.4.2.1 State Planning Policies

State planning policies are policy documents prepared and adopted by the WAPC under Part 3 of the *Planning and Development Act 2005*. They provide broad planning controls for planning matters that may have local, regional or state relevance. Each state planning policy (SPP) focuses on a land-use planning issue and has objectives in relation to that issue.

State and local government must have 'due regard' to SPPs when preparing or amending local planning schemes and making planning decisions. The State Administrative Tribunal must also take SPPs into account when determining applications for review of planning decisions. To assist with consistent interpretation of SPPs the WAPC may also develop explanatory guidelines and operational policies to be read in conjunction with SPPs.

The *State Planning Framework Policy Variation No. 2* (cited as *State Planning Policy No. 1* or *SPP No. 1*) is the overarching statement of planning policy for WA. *State Planning Policy No. 1* does not introduce new policies, but brings together all existing state and regional plans, policies, strategies and guidelines that apply to land use and development in WA. It sets out the key principles that guide planning decisions.

The key principles of the *State Planning Policy No. 1* are listed below.

- **Environment:** To protect and enhance the key natural and cultural assets of the state and deliver to all West Australians a high quality of life which is based on environmentally sustainable principles.

- **Community:** To respond to social changes and facilitate the creation of vibrant, safe and self-reliant communities.

- **Economy:** To actively assist in the creation of regional wealth, support the development of new industries and encourage economic activity in accordance with sustainable development principles.

- **Infrastructure:** To facilitate strategic development by making provision for efficient and equitable transport and public utilities.

- **Regional Development:** To assist the development of regional WA by taking account of the special assets and accommodating the requirements of each region.

These principles are relevant to waste infrastructure planning. Early consideration of *State Planning Policy No. 1* (and the other SPPs) can assist the waste industry and decision-making authorities in planning for the sustainable future management of waste. Beneath *State Planning Policy No. 1* sits many other SPPs, which are prepared and adopted by the WAPC and designed to facilitate the coordination of planning throughout the state. There are no SPPs directly related to waste infrastructure (see section 3.2), but *State Planning Policy 4.1* is relevant to waste infrastructure planning.

State Planning Policy 4.1 – State Industrial Buffer Policy (gazetted 1997) recognises that some industrial land uses generate emissions (such as noise, dust, or odour) that cannot be contained onsite; so, a buffer is needed to separate the industrial land use from sensitive land uses (Western Australian Planning Commission, 1997). The objective this SPP is to provide state-wide long-term security for industry and essential infrastructure, through protecting it from encroachment and avoiding conflict with sensitive land uses. It also promotes compatible land uses in areas affected by the off-site impacts of industry. The SPP establishes the aims and principles behind buffer areas, and the process of securing them. In 2009, this SPP was amended (Western Australian Planning Commission, 2009) and the draft is currently under review.

Statement of Planning Policy 4.1 includes 'solid waste disposal sites' under the definition of infrastructure, along with facilities such as ports, freight terminals, water/waste water treatment plants, power generation facilities and airports. Other waste facility types are not specifically mentioned.

Similarly, the revised *Statement of Planning Policy 4.1 State Industrial Buffer Policy (Amended)* (Western Australian Planning Commission, 2009) (currently in draft form) lists 'waste disposal sites' as essential infrastructure, and also considers waste facilities under the definition for

'industry' (Table 36). Consideration of adequate buffers is always required whether waste facilities are considered to be industry or essential services (or both).

State planning policies can also address planning issues associated with specific types of developments. Other examples of state planning policies are listed below.

- **SPP 3.2 Aboriginal Settlements:** The objectives of the policy are to provide for the recognition of Aboriginal settlements through local planning schemes and strategies, and collaboratively plan for the orderly and coordinated development of Aboriginal settlements.

- **SPP 2.7 Public Drinking Water Source:** This policy addresses land use and development in public drinking water supply areas, protects public drinking water source areas from incompatible land uses, and ensures that priority is given to the protection drinking water through provisions in the Metropolitan Region Scheme and local planning schemes.

- **SPP 4.3 Poultry Farms:** This policy guides the WAPC and local governments in determining rezoning, subdivision and development applications for land in the vicinity of poultry farms and for the development of poultry farms. The objectives of the SPP are to ensure that new poultry farms are established in suitable locations, minimise the impact of poultry farms on potentially incompatible uses, protect existing poultry farms from encroaching development, and encourage the relocation of poultry farms on land required for residential or rural-residential development.

Also, some SPPs have been prepared in liaison with other bodies. Two examples are given below.

- **SPP 2.10 Swan-Canning Rivers:** This policy was prepared in partnership with the Swan River Trust

- **SPP 3.6 Development contributions for Infrastructure:** This policy was prepared in conjunction with the Urban Development Institute of Australia (WA).

There is currently no state planning policy for waste facilities.

2.4.2.2 State Planning Strategy

In December 2012, the WAPC released the draft *State Planning Strategy* (Western Australian Planning Commission, 2012). Once finalised, the new Strategy will replace the current *State Planning Strategy*, which was adopted in 1997 pursuant to the planning legislation (Western Australian Planning Commission, 1997). This update to the *State Planning Strategy* is one of the actions undertaken to enable WA to meet the COAG criteria for national reform (see section 2.4.1.1).

The *State Planning Strategy* is an overarching document that informs all other state, regional and local planning strategies, policies and approvals. It links to and builds upon other WAPC strategic planning policies and programs, including *Directions 2013 and Beyond*, the Urban Development Program, and *Western Australia Tomorrow* (Western Australian Planning Commission, 2012).

The draft *State Planning Strategy* identifies waste management as both an environmental issue and an important part of physical infrastructure development in WA. The inclusion of waste under the heading of 'physical infrastructure' and the consideration of waste management alongside services such as power, water and transport is an important step. In the past, waste management

has often been seen as only an environmental issue, without recognition of its status as an essential service or the importance of strategic planning for waste management infrastructure.

The 2050 outcomes and aspirations for waste management in the draft *State Planning Strategy* complement the strategic objectives of the Waste Strategy. The draft strategy highlights the importance of a network of strategically located waste management infrastructure, which directly aligns with Strategic Objective 1 of the Waste Strategy.

These complementary aims create opportunities for the Waste Authority and Department of Environment Regulation to work with the Department of Planning and Western Australian Planning Commission to further integrate waste management into the land use planning system in WA.

2.4.2.3 Directions 2031 and Beyond

Directions 2031 and Beyond (Western Australian Planning Commission, 2010) provides a strategic plan for the Perth metropolitan and Peel regions. Like the updated draft *State Planning Strategy*, *Directions 2031 and Beyond* has been developed by WAPC to meet the COAG criteria for national reform. It establishes a vision for future urban growth and encourages a long-term, sustainable approach to the provision of infrastructure.

One of the objectives within the sustainability theme in *Directions 2031 and Beyond* is that Perth should grow within its environmental constraints. Strategies to achieve this include reducing waste generation and encouraging reuse, recycling and resource recovery.

Under *Directions 2031 and Beyond*, the expected population increase in Perth and Peel will be accommodated by a combination of urban infill and the development of new residential, commercial and industrial areas. This will place pressure on existing waste management infrastructure and require the development of new facilities. It will also increase the competition for industrial land inside the metropolitan area. It may also impact on travel times as the inner areas become more densely developed.

2.4.2.4 Sub-regional Structure Plans for Perth and Peel

The DoP, on behalf of the WAPC, is currently developing draft sub-regional structure plans for the Perth metropolitan and Peel regions. There are three sub-regional structure plans, which will cover:

- southern metropolitan sub-region and Peel
- north west metropolitan sub-region
- north east metropolitan sub-region.

The sub-regional structure plans identify the land required to accommodate a population of 3.5 million in Perth and Peel as well as supporting infrastructure. They are currently subject to the Strategic Assessment process (see section 2.4.1.2).

Structure plans are not statutory plans. However, they do inform the amendment of region planning schemes.

2.4.2.5 Region Planning Schemes

Region planning schemes are prepared by the WAPC and approved by the Governor, and subject to disallowance by Parliament. There are three region planning schemes in operation in WA:

- **Metropolitan Region Scheme (MRS)** The MRS covers the 30 local government areas of the Perth metropolitan region and has been in operation since 1963

- **Peel Region Scheme (PRS)** The PRS covers the City of Mandurah, Shires Murray and Waroona, and has been in operation since 2003.

- **Greater Bunbury Regional Scheme (GBRS)** The GBRS covers the City of Bunbury and the Shires of Harvey, Dardanup and Capel, and has been in operation since 2007.

These region planning schemes define how land may be used and developed, dividing it into broad zones and reserves. The local planning schemes developed by each local government must be consistent with the region planning schemes.

Under the region planning schemes land is zoned or reserved for different purposes, and land uses must be broadly consistent with the zoning/reservation. Under the MRS/PRS, the existing waste disposal and recycling facilities in the Perth metropolitan and Peel regions are located in areas with a range of different zonings (including industrial, parks and recreation, rural, urban or state forests, or reserved for public purpose – see Table 37). However, around half the existing waste facilities are in industrial zones.

Waste management activities are not specifically included in the descriptions of MRS/PRS zones. However, if waste facilities are considered to be 'industry' and/or 'essential services' they are generally best suited to be situated within industrial areas. The definition of industrial zoned land is as follows.

> ***Industrial (MRS/PRS) and special industrial (MRS only):*** *Land in which manufacture, processing, warehousing and related activities are undertaken.*

Land may also be reserved for public purposes, to protect a resource or to provide areas for infrastructure. This is designated "Public Purpose", which is defined as follows.

> ***Public purposes:*** *Land for public facilities such as hospitals, high schools, universities, car parks, and prisons and utilities (electricity, water and treatment of waste water); Commonwealth Government; and other special uses.*

In the MRS there is no public purpose (PP) reservation specifically for waste facilities as exists for other public utilities (such as 'PP – Water Authority of WA'). It would be possible for the MRS to be amended to include a "waste management facility" category and, if appropriate to the circumstance, for areas with an industrial zone to be reserved for "(Public Purpose – Waste Management Facility" (PP-WMF).

The PRS has a more general 'PP – public utilities' reservation, but only one waste facility (the City of Mandurah/TPI Tim's Thicket Septage and Inert Waste Disposal Facility) is within this reservation. It is not currently used as a mechanism for securing waste facility sites, and waste facilities are not restricted to development in areas with this reservation.

It is important to note that industrial-type activities are not necessarily restricted to land that has been zoned industrial under a region planning scheme. For example, an area of light industry in the City of Belmont is within an area zoned as urban under the MRS. There are many existing waste facilities which, though industrial in nature, operate in areas zoned parks and recreation, rural, urban or state forests, or reserved for public purpose use (Table 37). Industrial zoned sites

are the most common setting for waste facilities in the Perth metropolitan and Peel regions, with around half located in industrial zones.

2.4.2.6 Economic and Employment Lands Strategy

The *Economic and Employment Lands Strategy: non-heavy industrial* (EELS) (Western Australian Planning Commission, 2012) was developed in response to the anticipated shortfall in industrial land supply in the Perth and Peel. The aim of the EELS is to identify areas potentially suitable for development of general and light industry and to ensure that adequate planning is undertaken to make new industrial land available in the short, medium and long term.

Currently, 13,798ha of the Perth metropolitan and Peel regions is zoned industrial under the region planning schemes. It is predicted that 4,726ha of additional industrial land will be required by 2031. The EELS identifies 37 sites with the potential to be developed for industrial land uses, although each site has its own particular constraints. These sites are distributed across each of the planning regions.

The EELS will be an important part of planning for future waste disposal and recycling infrastructure, as it clearly identifies the potential sites of future industrial land and the potential opportunities, constraints and development timelines for each site.

The EELS lists ‘disposal, recycling’ under activities which are considered to be general industry (see Table 36).

2.4.2.7 Model Scheme Text

The Model Scheme Text (MST) forms Appendix B of the *Town Planning Regulations 1967*. Gazetted in 1999, the MST is a template for local governments for developing or reviewing local planning schemes (see section 2.4.3.1). It provides standard clauses, terms and provisions, with the aim of creating greater consistency in the provisions of local planning schemes, while allowing local governments the flexibility to suit local circumstances.

Local governments are required to comply with the MST except where the Minister approves any variation or exclusion (WAPC 2007).

Schedule 1 of the MST gives standard land use definitions. Significantly, there are no definitions given for waste or waste facilities. Waste facilities may be interpreted to fit within ‘industry’ or ‘industry – general’ land uses, but the lack of definition for waste facilities means that they are generally not specifically considered in local planning schemes.

Some local governments have created their own definitions for waste facilities. However, there are significant inconsistencies between local planning schemes in relation to the way waste facilities are defined and incorporated. The MST is currently under review, which may present an opportunity to incorporate definitions of waste facilities. This is discussed further in section 3.1.

2.4.2.8 Guidance for the Assessment of Environmental Factors No. 3

The EPA’s *Guidance for the Assessment of Environmental Factors No. 3 – Separation Distances between Industrial and Sensitive Land Uses* (2005) details industry types, their potential impacts and recommended buffer distances.

The term ‘industrial land use’ is used in a general way to encompass a range of industrial, commercial and rural activities, as well as infrastructure, associated with off-site emissions that

may adversely affect sensitive land uses. Many categories of waste facilities are specifically mentioned in this Guidance Statement (see Table 35), including;

- composting facility
- crushing of building material, screening works (these processes may be undertaken by C&D material processors or at inert landfills)
- scrap metal recycling works
- used tyre storage – general, recycling
- waste disposal
    - Class I landfill (inert)
    - Class II and III landfill (putrescible)
    - waste depot (drop-off facility or transfer station)
    - resource recovery plant (AWT facility, recycler).

However, this Guidance Statement only covers prescribed premises. Therefore, waste facilities without a DER licence (i.e. 'clean' MRFs and unlicensed recyclers) are not covered. There are also waste facility types that have not yet been developed in WA (e.g. 'dirty' MRFs, waste-to-energy facilities) that are not specifically included. These may fit within the established industrial land use categories, or the Guidance Statement may require amendment to include them.

2.4.3 Local Government

Local governments are responsible for ensuring appropriate planning controls are in place for land use and development in their local areas. This is done through local planning schemes and strategies.

2.4.3.1 Local Planning Schemes

Each local government has a gazetted local planning scheme. Formerly known as town planning schemes, local planning schemes (LPS) are similar to region planning schemes (see section 2.4.2.5), as they classify the land within each local government area into land use zones and reservations. LPS zones and reservations must be consistent with region planning scheme zones and reservations. Region scheme reservations are automatically reserved in any LPS that falls within that region.

The LPS text gives detailed information about how the land within each zone or reservation can be developed and used. Developers must apply for local government approval before construction can begin and local government decisions on applications are guided by, and must comply with, the LPS.

Waste management infrastructure in the Perth metropolitan and Peel regions is located in a range of different LPS zones (including industrial, mixed business, special use, urban development, rural) (Table 37).

Consideration of LPS *zones* over the Perth metropolitan and Peel regions can be more complicated than MRS/PRS zones. As each local government has its own LPS, there may be differences between the land use names and definitions between local governments (see section 3.1). Not all local governments use the land use definitions and terminology given in the Model

Scheme Text (Table 37, section 3.1). For example, various local governments use the terms 'industrial', 'general industrial', 'industrial development', 'general industry' and 'industry' to describe land zoned in their LPS for industrial purposes (Table 37). While waste facilities are not a defined land use in the Model Scheme Text, and most LPSs do not specifically define waste facilities as a land use, some local governments have created their own definitions (see section 3.1).

2.4.3.2 Local Planning Strategies

Local planning strategies set out the long-term planning directions, apply state and regional planning policies, and provide the link and rationale for the zones and other provisions of the Local Planning Scheme.

2.4.4 Approval Process

This section provides a brief overview of the approvals that may be required for the development of a new waste facility. All approvals and licences must be obtained before a waste facility can begin operation.

Applications for approvals are determined by a decision-making authority (DMA), which is the public authority authorised to make a decision in respect of an assessment, approval, review or other process to which a proposal is subject under the written law. Different types of approvals must be sought from different DMAs, for example:

- Local governments, the WAPC or a Development Assessment Panel (DAP) may act as DMAs for development and subdivision approvals
- The WAPC is the DMA for subdivisions and survey strata applications.
- The Commonwealth Government and EPA are DMAs for environmental approvals
- If public health assessments become a requirement under the *Public Health Bill 2008*, the Department of Health would be the DMA for public health approvals.

In addition to approvals, waste facilities that are defined as prescribed premises under Schedule 1 of the *Environmental Protection Regulations 1987* also require a works approval and a licence. These works approvals and licences are approved and enforced by DER.

Different types of waste facilities are likely to require different types of approvals and licences. Waste facilities of the same type may vary greatly with regard to their size, capacity, and the types of technology they use (e.g. composting may be done in open windrows or enclosed vessels), so it can be difficult to generalise about the approvals and licences they require. Table 41 gives an overview of the potential approvals and licences that may be required by different types of waste facilities (although each facility would have to be considered on a case by case basis).

2.4.4.1 Planning Approvals

In WA assessment and approval by a DMA is required for development or subdivision (Western Australian Planning Commission, 2014):

> ***Subdivision*** *is the division of land into lots.*

> ***Development*** *is a change to land use, including housing, any demolition, erection, construction, alteration of or addition to any building or structure on the land and any excavation or other works.*

The construction of a waste facility may require both subdivision and development approval.

2.4.4.1.1 Subdivision Approvals

Under the *Planning and Development Act 2005,* the WAPC is responsible for determining all subdivision applications. The WAPC refers subdivision proposals for comment to service providers (e.g. Water Corporation, Western Power), local governments, and other relevant government agencies (e.g. DER, Department of Health, Department of Indigenous Affairs). These comments are taken into account when considering the application, as are region and local planning schemes, and any other relevant planning policies.

The WAPC may grant approval for the subdivision (with or without conditions) or refuse the application. If the applicant is not satisfied, they may request that the WAPC reconsiders its decision, or apply to the State Administrative Tribunal for a review of the decision.

2.4.4.1.2 Development Approvals

The WAPC has delegated to local governments the power to determine development applications under their LPS (Western Australian Planning Commission, 2014). All development applications are lodged first with the local government, which determines whether to assess them, or to refer them to the WAPC or a DAP.

Most development applications are determined by the relevant local government under its LPS. However, if the proposed development is on land reserved under a region planning scheme or is of regional significance it is referred to the WAPC for determination. For major developments (generally those with a value of more than $7 million) the development approval application is referred to a DAP (see section 2.4.4.1.3).

When considering a development application, the DMA must balance different issues to determine whether a proposal is appropriate for its site and surrounding context. Region planning schemes, local planning schemes and any relevant planning policies, structure plans, interim development orders and planning strategies must be taken into account. The development application may be referred to service providers and state government departments for comment, and may be publicly advertised.

The local government/WAPC may approve the application (with or without imposing conditions), refuse it, or refer it to a DAP. The proponent may appeal to the State Administrative Tribunal if the application is refused, if it is a ‘discretionary’ decision under the scheme or if the conditions placed upon it are considered unsatisfactory.

2.4.4.1.3 Development Assessment Panels

When a development application over $7 million is proposed, DAPs replace local governments as the DMA (although the local government planning framework will form the basis of the DAP decision-making powers).

DAPs were introduced on 1 July 2011 as part of the COAG national reform agenda aim to reduce the uncertainly and improve the timeliness associated with the development assessment process (Department of Planning, 2011). The aim of the DAPs is to streamline and increase transparency

in the decision-making process for major projects, and create a single point of assessment for proposals under both the relevant local and region planning scheme. There are 15 DAPs in WA, each made up of three independent technical experts and two elected local government representatives.

There are three types of DAP applications:

- Mandatory DAP applications - development applications valued at $7 million or more (or $15 million or more in the City of Perth) must be determined by a DAP and cannot be determined by a local government or the WAPC.

- 'Opt-in' DAP applications - for development applications valued between $3 million and $7 million (or $10-$15 million in the City of Perth) the applicant may choose to have the application determined by a DAP, rather than by the local government or WAPC.

- Local authority delegated applications - Local governments may choose to delegate their powers to determine applications within the 'opt-in' value range to their DAP.

All applications are initially assessed by the relevant local government. Once assessed, a report with recommendations from the local government is forwarded to DAP for consideration.

In 2013, the Department of Planning released the *Planning Makes it Happen: Phase Two Planning Reform Discussion Paper* (Department of Planning, 2013), which outlines potential changes to the WA land use planning system. Amongst other reforms, this discussion paper proposes an 'opt-in' option for development applications that are of regional significance. This would allow proponents of regionally significant developments to choose to have their development application determined by a DAP (rather than a local government), regardless of its value. The example cited in the discussion paper is basic raw materials extraction (e.g. quarries for sand, limestone or rock). These developments do not generally meet the DAP mandatory or opt-in value thresholds, but are important for the continued supply of basic raw materials for Perth or other regions.

In its submission to Department of Planning on the *Planning Makes it Happen: Phase Two Planning Reform Discussion Paper*, the Waste Authority noted that this proposal could potentially affect the development of some types of waste facilities, which may accept/process significant quantities of waste from areas outside the local government in which they are situated (and thus are regionally significant), but may not meet the mandatory DAP value threshold.

The WAPC has the ability to call in certain classes of applications under region schemes and it may be appropriate that this "call-in power" be extended to local planning schemes, as well.

Local governments/WAPC may be able to assess development applications from smaller-scale, lower-value waste facilities (such as transfer stations, drop-off facilities or small scale composters, recyclers or construction and demolition waste processors), but applications for most other waste facilities would be required to be assessed by a DAP, due to their value.

2.4.4.1.4 Legislation Impacting Approvals for Development and Subdivision

There are several of pieces of legislation that impact upon the power of planning DMAs to approve applications for development or subdivision (Department of Planning, 2011). This legislation may:

- Stop a DMA from making a decision until the application has been assessed by another entity (e.g. *Environmental Protection Act 1986, Contaminated Sites Act 2003*)

- Require input from another entity before a DMA can determine the matter (e.g. *Heritage of Western Australia Act 1990, Swan and Canning Rivers Management Act 2006*)
- Require referral to another entity for comment (e.g. *Swan Valley Planning Act 1995*)
- Require the proponent to comply with it irrespective of the planning legislation (e.g. *Aboriginal Heritage Act 1972, Wildlife Conservation Act 1950*).

There is also legislation that overrides planning legislation, and thus the decision-making powers of local governments, DAPs or the WAPC; for example the *Mining Act 1978* or State Agreement Acts for major resources of infrastructure projects. These Acts work in conjunction with the planning legislation and processes of local and state governments when assessing development applications.

2.4.4.2 Environmental Approvals

2.4.4.2.1 Commonwealth Government

Section 2.1.4.2 of this document outlines the Commonwealth Government's responsibilities in relation to matters of national environmental significance (MNES), under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Under the current system, any person who proposes to take an action (including a development proposal) that will have, or is likely to have, a significant impact on a MNES must refer that action to the Commonwealth Minister for the Environment for a decision on whether assessment and approval is required under the EPBC Act. The EPBC Act provides for project-by-project and strategic assessments (in addition to relevant state and local government approval processes).

Once the Strategic Assessment Process is complete for the Perth metropolitan and Peel regions, there will be a more strategic and regionally consistent response to MNES, with reduced need for project-by-project assessments under the EPBC Act (see section 2.4.1.2).

None of these waste facility types considered in this document automatically require assessment under the EPBC Act. However, this assessment would be required if the proposed facility was likely to impact a MNES (see section 2.4.1.2).

2.4.4.2.2 Environmental Protection Authority

The Environmental Protection Authority (EPA) is a five-member board appointed by the Governor of Western Australia, which has statutory obligations under Part III and Part IV of the *Environmental Protection Act 1986* (EP Act) to conduct environmental impact assessments, initiate measures to protect the environment from harm and pollution, and provide advice to the Minister on environmental matters. The EPA is not subject to the direction of the Minister for Environment.

During the planning assessment process the potential environmental impacts of a proposed development may be required to be determined. This can be in two ways; S.38 EP Act for the EPA's potential assessment of a "proposal" or S.48A for the assessment of a region or local planning scheme amendment (rezoning).

If a 'proposal' (which may include a project, plan, program, policy, development, or change in land use) is likely to have a significant impact on the environment, it may be referred to the EPA for a decision on whether or not it requires assessment under the EP Act. A new region or local planning

scheme (or any changes in reservation and zoning proposed by a scheme amendment) may also be referred to the EPA for assessment.

Section 38 of the EP Act outlines the conditions under which the Minister, the proponent, the decision-making authority or any person may refer a proposal to the EPA, and the process for this referral. All proposals referred to the EPA are subject to a seven day public comment period before the EPA determines whether and at what level it will assess a proposal.

In deciding whether a proposal is likely to cause a significant impact on the environment, and whether an Environmental Impact Assessment (EIA) is required, the EPA considers;

- the environmental values of the area affected,
- the extent and consequence of the likely impact (or change) on the environment,
- the resilience of the environment to cope with the impact,
- the extent/rigour with which the potential impact has been investigated and described by the proponent, and the confidence in the reliability of the predicted impact,
- principles of environmental protection, policies, guidelines, procedures and standards against which a proposal can be assessed,
- the degree of public interest, and
- the extent to which other statutory decision-making approval processes meet the EPA's expectations for EIA, including EPA objectives and outcomes.

If the EPA decides to undertake an EIA for a proposal, this may be done at one of two levels of assessment;

- Assessment on Proponent Information (API) level A or B, or
- Public Environmental Review (PER).

When the EIA process is complete, the EPA develops a report with recommendations on whether a proposal may proceed and if conditions should be applied to manage its environmental impacts. This report is presented to the Minister for the Environment and published on the EPA website.

The proponent then has 14 days to appeal the EPA recommendations, and a final decision on the implementation of the proposal is made by the Minister for the Environment in consultation with other relevant Ministers or DMAs.

If the EPA decides not to assess a proposal, it will record as part of that decision, either:

- Not assessed - no advice given. The EPA will not provide any advice on the proposal.
- Not assessed - public advice given. The EPA will provide advice to the relevant DMAs (e.g. local governments) and proponent on the environmental aspects of the proposal. This advice is publicly available, but is not legally binding on the decision-making authority or proponent.

Even if the EPA decides not to assess a proposal, it still expects proponents and DMAs to ensure that appropriate measures are taken to meet the objects of the EP Act.

DMAs must take into account the impact and emissions the proposal will have on the surrounding amenity (e.g. noise, dust, and odour) and proponents must demonstrate the mitigating controls proposed to reduce these likely impacts. The DMA will also consider whether the development is a suitable land use based on the advice, likely emissions, and risk. Should the application be approved, the DMA can apply conditions to the approval (Environmental Protection Authority, 2009).

An application to develop a waste facility is likely to be referred to the EPA if it is likely to have significant environmental impact, or where there is a significant degree of public interest.

Under section 48A of the EP Act, schemes and amendments to schemes are referred to the EPA when initiated by the WAPC or local governments for the EPA to decide if assessment is warranted.

2.4.4.2.3 DER Licensing for Prescribed Premises

Schedule 1 of the *Environmental Protection Regulations 1987* specifies all types of premises considered to be 'prescribed premises' under Part V of the EP Act. This includes many different types of waste facilities.

All prescribed premises require works approval and licensing from DER, in addition to the other relevant approvals. Table 41 outlines the DER licence categories for different types of waste facilities.

Prescribed premises currently include:

- Landfills (inert and putrescible, Classes I, II, III, IV and V)
- Composting facility (compost manufacture and soil blending)
- Crushing of building material (i.e. C&D material processors or inert landfills)
- Scrap metal recovery
- Used tyre storage (i.e. tyre recycler, drop-off facility or transfer station)
- Solid waste facility
- Solid waste depot (i.e. drop-off facility or transfer station).

However, it is important to note that not all waste facilities are prescribed premises. Recyclers and drop-off facilities may not be considered prescribed premises, depending on the types of waste they handle and the amount and types of waste stored on site. However, with the exception of 'clean' MRF's, all of the waste facility categores considered in this report potentially require a DEC works approval and licence.

The categories of waste facilities outlined in the EPA *Guidance for the Assessment of Environmental Factors No. 3 – Separation Distances between Industrial and Sensitive Land Uses* (2005) are based on DER licence categories.

2.4.4.3 Public Health Assessment

The proposed *Public Health Bill 2008* has been drafted to supersede the *Health Act 1911*. Provision within the *Public Health Bill 2008* has been made to introduce a formal health impact assessment process for development proposals.

Part 7 of the draft *Public Health Bill 2008* states that a "proposal" (meaning a project, plan, program, policy, operation, undertaking or development) that is subject to a specified assessment, approval, review or other process by a decision-making authority may be required to undergo a Public Health Assessment.

The Public Health Assessment gives advice on any potential public health risks and/or benefits to public health that may result from implementing the proposal, whether or not the proposal should be implemented, and any restrictions or conditions to which the proposal should be subjected if implemented.

The *Public Health Bill* is still in draft form. It was submitted to Cabinet for approval in 2012, and was referred to the Economic and Expenditure Review Committee. It is expected to go to Cabinet for approval again in 2014. If enacted in its current form, it seems likely that it will require proposals for future waste facilities to undergo a health impact assessment during the approval process.

It is speculated that some waste facilities may require a Public Health Assessment if a *Public Health Bill 2008* is enacted. However, the exact mechanisms triggering this assessment are not yet known.

2.5 Governance and Funding for Waste in Perth and Peel

Governance for the purpose of the WRIP includes the structures, mechanisms and processes in place to ensure that waste is managed within the Perth and Peel regions, specifically as they relate to providing the infrastructure to manage the waste produced within the region.

The current governance arrangements for waste are complex. They vary depending on the waste stream under consideration and have evolved over many decades. Similarly, the ownership and management arrangements around waste management infrastructure also vary and largely depend on the waste stream and the type of waste treated.

The Waste Authority, the Department of Environment Regulation and the Environmental Protection Authority are the key governance agencies at the state government level. There are 33 local governments within the Perth and Peel region; each is currently collecting and managing the waste generated by their rate payers. Waste management at the local government level either occurs on a council-by-council basis or more commonly via regional local governments. The private sector also provides several waste management services and owns and operates waste management infrastructure in the region.

Understanding the current governance arrangement is essential to determining if it is suited to delivering the infrastructure required to meet the needs of the regions in the future.

For ease of comparison with alternative governance models (as in section 5), the current governance model will be numbered 'model 1' and the alternative governance models will be numbered in sequence from this.

2.5.1 Current Governance Arrangements (Model 1)

There are three main types of entities in the waste market in the region. These are the waste generators, waste collectors and processors, and waste regulators. The role of these three types of entities within the current governance framework in explored below.

Figure 13 provides a diagrammatic representation of the current governance structure for waste management in the region.

It should be noted that the colours used in the figure represent the amount of control each of the entities have from a governance perspective within the current structure. Red indicates that the entity has the ability to make decisions and/or control outcomes; blue indicates that the entity can influence outcomes but does not have governance control; green indicates that the entity may have concerns or an interest in the outcomes, but does not have the ability to influence these.

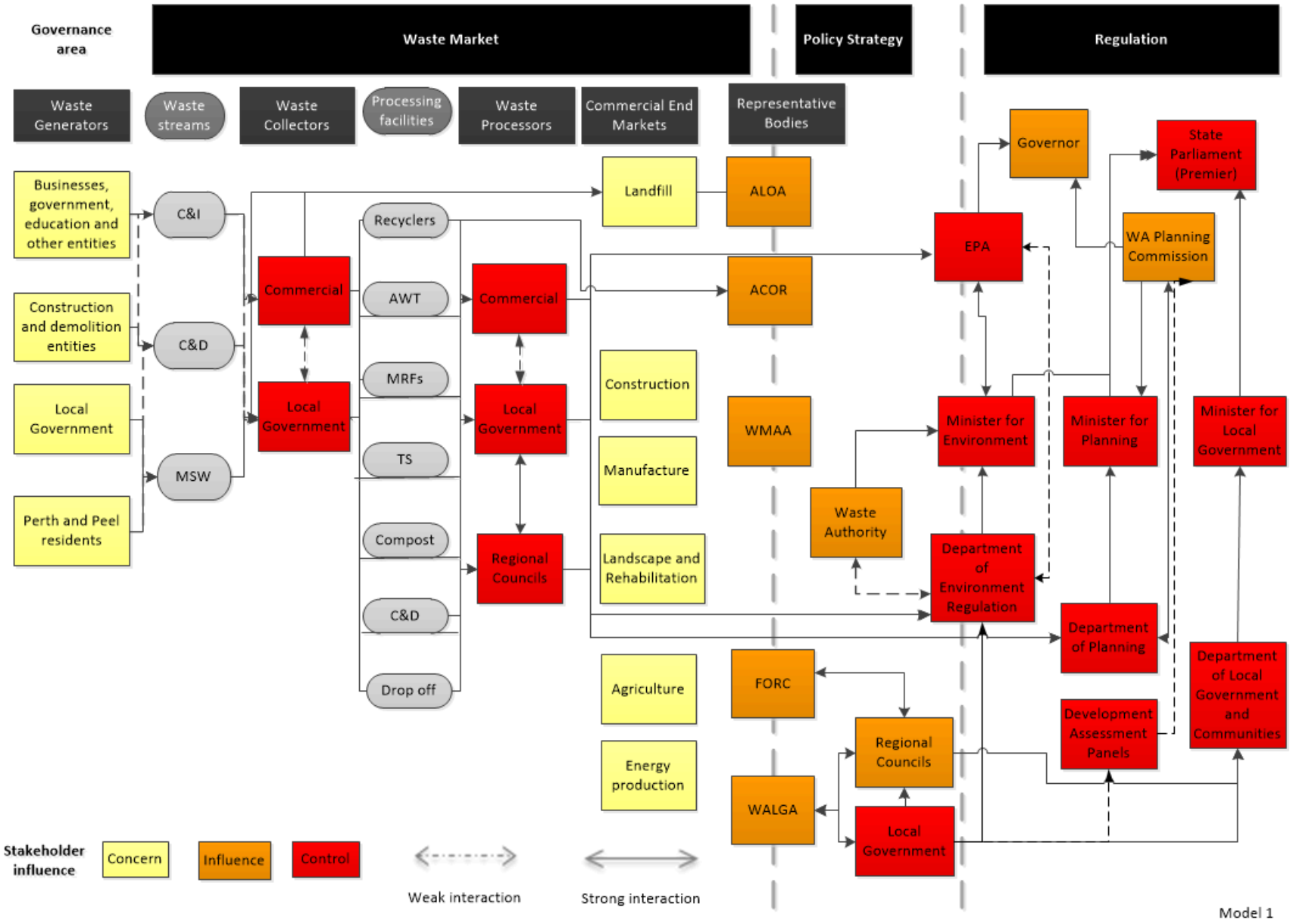

Figure 13: Current waste management governance structure in the Perth metropolitan and Peel regions

2.5.1.1 Waste Generators

Entities such as households, local governments, commercial and industrial business and construction and demolition businesses generate waste for treatment and disposal during their activities or as a consequence of providing goods and services.

2.5.1.2 Waste Collectors and Processors

The waste and resources recovery sector provides several waste management services to government, households and businesses including collection, transport, sorting, processing, disposal and resource recovery services.

2.5.1.2.1 Commercial Operators

In the Perth and Peel region, the private sector owns and operates several landfills, transfer stations, MRFs, AWTs and recycling facilities. The private sector largely manages and owns the infrastructure associated with processing and disposing of the C&I and C&D waste stream.

2.5.1.2.2 Local Governments and Regional Local Governments

Local governments largely are involved in the collection, processing and disposal of the MSW stream. Management of waste collected by local government (and also waste from other sources) was traditionally done by local government on an individual basis. However, in recent years there has been a trend towards waste processing being done by regional local governments which are established under the *Local Government Act 1995* (LG Act) and comprise several local governments acting collectively. Waste facilities operated by regional local governments include landfill, AWT facilities, composting facilities and MRFs.

A driving force behind the move to regional local governments is the high cost of modern processing facilities and the need to increase economies of scale. These drivers are likely to be increased by the move away from landfill and towards alternative processing.

There are five regional local governments established in Perth and Peel regions:

- Eastern Metropolitan Regional Council (EMRC)
- Western Metropolitan Regional Council (WMRC)
- Rivers Regional Council (RRC)
- South Metropolitan Regional Council (SMRC)
- Mindarie Regional Council (MRC).

Figure 14 shows the boundaries of the regional local governments and their member councils. It should be noted that not all the local governments within the Perth and Peel region are members of regional local governments.

It should also be noted that in recent years some local governments have exited their regional local governments and made alternative waste processing/disposal arrangements. Regional local governments are constituted on a voluntary basis and individual local governments cannot be compelled to join or to remain as members. This “defection” from co-operative arrangements is a key issue in determining how best to harness economies of scale and funding required to support waste processing arrangements and infrastructure development.

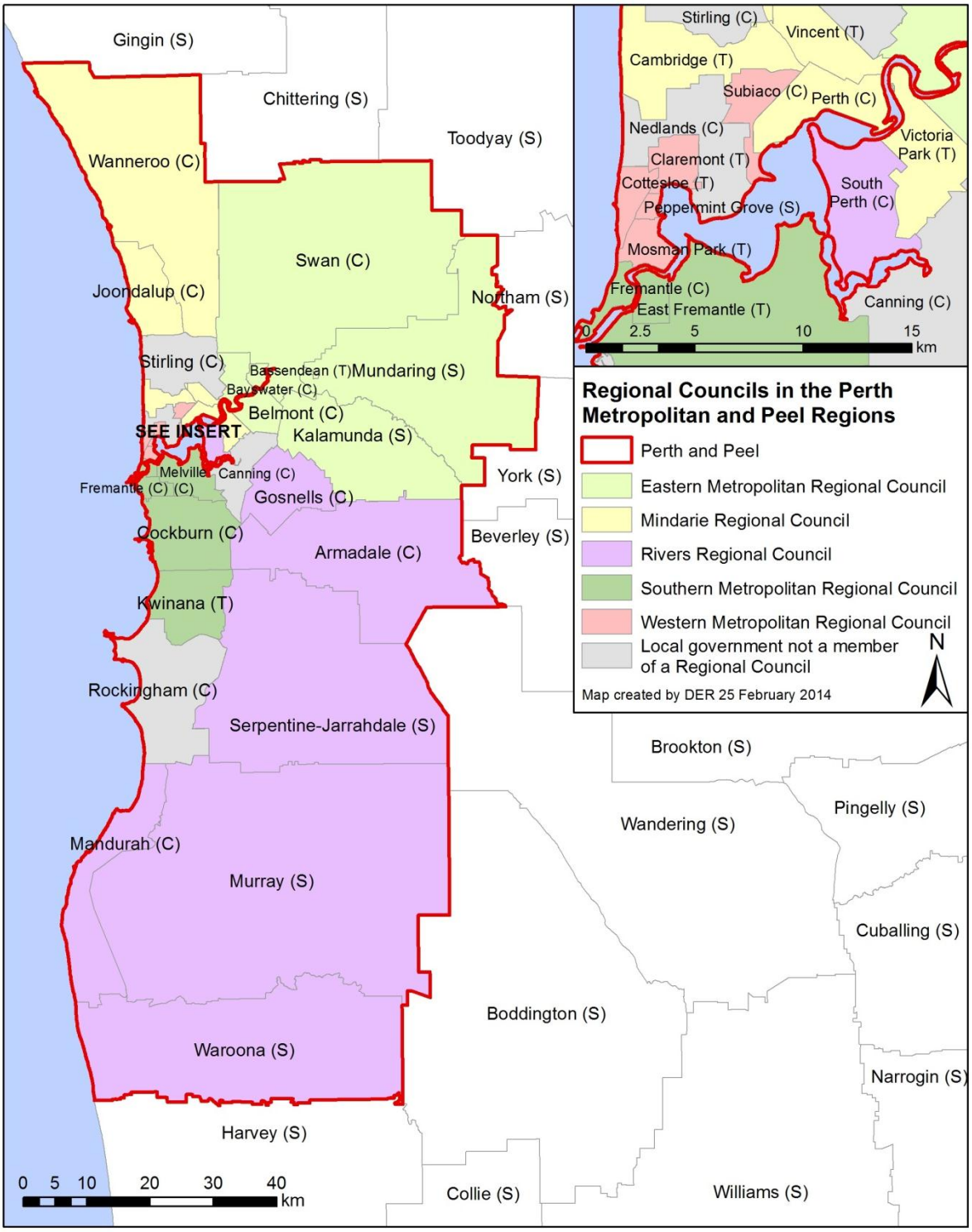

Figure 14: Regional local governments/councils in the Perth metropolitan and Peel regions

2.5.1.3 Waste Regulators

The commonwealth, state and local governments all play a role in relation to waste management. A summary of the roles of each level of government follows.

Commonwealth Government

As set out in section 2.4.1.2, the EPBC Act requires the Commonwealth Government to manage 'matters of national environmental significance' (MNES). Any action or proposal that will or is likely

to have a significant impact on a MNES must be referred the commonwealth Minister for the Environment, who will determine if assessment and approval is required under the EPBC Act. The EPBC Act provides for project-by-project and strategic assessments (in addition to relevant state and local government approval processes). Proposals for waste facilities may be required to be assessed under the EPBC Act if they are likely to have a significant impact on an MNES.

The Commonwealth Government also prepares and coordinates the National Waste Policy.

State Government

The principal mechanism for regulating waste in Western Australia is the WARR Act, which:

- provides for local government waste services
- establishes a Waste Authority to advise the Minister on matters relating to waste
- manages the WARR Account
- provides powers to make regulations for waste development
- provides the mandate for the development and administration of the Waste Strategy, which includes recovery targets for the various waste streams.

Related legislation in the form of the Waste Avoidance and Resource Recovery Levy Regulations 2008 (Levy Regulations) regulates the application of the levy imposed by the *Waste Avoidance and Resource Recovery Levy Act 2007* (Levy Act) on waste received at landfills in the metropolitan areas. The Minister for Environment currently approves the allocation of the levy funds under the WARR Act, which states that a minimum of 25% of funds be transferred to the WARR Account for waste management purposes with the remaining 75% of the levy being used to fund DER in lieu of consolidated revenue. The WARR Act does gives the Minister for Environment the discretion to transfer (hypothecate) additional funds to the WARR Account for waste management purposes.

Under the WARR Act, local governments may be required to include a waste management plan, which they are required to operate in accordance with as part of their planning requirements under the Local Government Act. The State Government has the authority to impose its own plan where the local government plan is not considered adequate.

The WARR Act gives local governments the power to directly provide or enter into contracts to provide waste services to their ratepayers. If the services provided by local government are inadequate, a permit may be issued to allow a third party to provide the service. Local governments have the power to fix their own charges for waste management. It should be noted that local governments have an effective monopoly over residential waste as the WARR Act makes it an offence for any other party to get involved in this sector without a contract or authorisation from the local government or under the Act. Local governments are, however, able to contract out delivery of their waste management function. The WARR Act does not, however, give the state government any such power over non-local government waste producers or processors, which are significant contributors to the waste stream.

The Waste Authority is a statutory body, which was established under the WARR Act on 6 May 2008 and commenced full operation on 1 July 2008. It is responsible for the following:

- developing, promoting and coordinating the implementation of the Western Australian Waste Strategy
- promoting community awareness and understanding of resource efficiency, waste avoidance and resource recovery
- working with local government to coordinate local efforts to prevent waste
- administering the WARR Account
- advising and making recommendations to the Minister for the Environment on matters relating to the WARR Act.

DER provides policy, program and administrative support to the Waste Authority.

DER is responsible for developing legislation, licensing and regulating waste management facilities that are designated as 'prescribed premises' under Part V of the *Environmental Protection Act 1986* (EP Act). Waste facilities that are prescribed premises are licensed by DER under Part V of the EP Act. DER licenses waste facilities subject to them meeting suitable environmental and other requirements. It should be noted that not all waste/recycling facilities are licensed. DER is also responsible for monitoring and assessing compliance against license conditions. In addition, DER develops and implements policy related to waste facilities and in collaboration with the Waste Authority develops policies and implements projects and programs that encourage improved waste management outcomes.

The EPA of Western Australia was established under the EP Act. It is an independent body in that it is not subject to direction by the Minister for Environment, and its advice to government is public. The five EPA members are not public servants. The EPA is responsible for the following:

- conducting environmental impact assessments
- preparing statutory policies for environmental protection
- preparing and publishing guidelines for managing environmental impacts
- providing strategic advice to the Minister for Environment.

If a development, rezoning or licence application (including for waste facilities) is likely to have a significant impact on the environment it may be referred to the EPA for a decision on whether or not it requires assessment under the *EP Act* (see section 2.4.4.2.2). All proposals referred to the EPA are subject to a seven day public comment period before the EPA determines whether and at what level it will assess a proposal. The timeframe taken to assess the proposal is influenced by the level of assessment. If the EPA decides not to assess a proposal, it can recommend that the DER take into account the environmental impacts the facility will have and require the proponent to address these via its licensing process.

From a planning perspective the WAPC, the DoP and DAPs are the key state government agencies of relevance in relation to the development of waste facilities in Perth and Peel. Sections 2.4.2 and 2.4.4.1 provide further information about the role of these agencies and the relevant legislation, policy and guidance material that they administer that relate to waste infrastructure planning.

Local Government

Local governments are responsible for ensuring appropriate planning controls are in place for land use and development, including the development of waste facilities, in their local areas via their local planning schemes and strategies. In the Perth metropolitan and Peel regions, this mainly relates to land that is zoned in the region planning schemes, as the WAPC generally has sole development control for land that is reserved. Sections 2.4.3 and 2.4.4.1 provide further detail on the role of local government in relation to siting waste facilities.

Local governments are also primarily responsible for managing MSW. Local governments collect MSW through scheduled kerbside collections (collection of 'green top' or 'yellow top' household bins) and verge-side collections (green waste and other household waste collected from verges).

Local governments also collect MSW via drop-off facilities to which their ratepayers deliver small volumes of domestic or commercial waste. MSW is also collected from public places and at special events such as concerts and sporting events. The waste is either collected by local government employees or companies contracted by local government. Some local governments provide C&I waste collection services to their local businesses.

Local governments, either individually or via regional local governments, generally own the waste infrastructure associated with treating MSW including putrescible landfills, transfer stations, drop-off facilities and MRFs. Although, some sites are crown reserves vested in the local government, rather than being owned freehold.

Although the implications of the current Metropolitan Local Government Review process on local and regional local governments are currently unclear, this is likely to have an impact on waste management in the region.

2.5.2 Current Funding Sources

Under existing arrangements, waste infrastructure is funded either by local governments, most commonly via regional local governments, or by the private sector.

It is inefficient for any individual local government to operate its own substantial processing centre and for this reason none do. Some do operate their own landfills but this disposal option will be increasingly constrained into the future due to the lack of suitable locations for new landfills on the coastal plain.

Regional councils are established under the LG Act. They can be used for a range of purposes (such as the EMRC), but most were primarily established to co-ordinate waste management to achieve economies of scale. Three of the five metropolitan regional councils have entered various arrangements to establish waste processing infrastructure to service their member councils. These arrangements are financed by debt through borrowing from local governments. This is enabled by the LG Act, which allows local governments to borrow through the Western Australian Treasury Corporation (WATC) with the approval of the Treasurer. While the public sector benefits from obtaining debt finance through WATC, in the absence of increasing revenue to repay the debt or of market structures to support the repayment of debt, the relatively low level of existing debt financing is likely to continue. One issue with borrowings is that the debts accrue to individual local governments, meaning that their borrowing capacities for other municipal functions are impacted.

The private sector generally either borrows from private lenders or bond markets via applications to the bank or investors for finance that is based either on the strength of the company's balance sheet (i.e. the finance is raised on the strength of the company and its trading history/assets) or against a project (i.e. the finance is raised on the strength of the project to generate the forecast revenue). Consultation on the current governance model revealed that from the commercial sector's perspective, the lack of long-term contracts, price certainty and a stable regulatory environment (inconsistencies in the application of the state and local government planning requirements) is a barrier to increased investment.

Under current arrangements, the State Government does not have a role in funding waste infrastructure; although, there are options currently possible (see below) to facilitate this.

In addition to the mechanisms that are currently used to fund infrastructure and waste management sources in the region, the following funding sources are available under the current model:

- **Rates -** Although the option of raising rates, either by introducing a separate waste charge or as part of general rates, to cover the increased costs of infrastructure provision and waste management is available under this model, this would likely be an unpopular with both local government and the community.

- **Sale of goods and services -** Sales of goods and services/turnover relating to waste services are unlikely to increase if existing arrangements remain. The commercial sector is likely to continue its opportunistic involvement in the sector and to consider opportunities as they occur, bearing in mind the need to be profitable.

- **Grants -** While the option of grant funding is available, an injection of significant additional funds would be required to provide the infrastructure required in the future. However, given the current economic outlook, this is unlikely to be a realistic option.

- **Waste levy -** The waste levy is available as a potential source of funding for infrastructure under the current model. This would require a substantial increase in the amount of funds allocated to the WARR Account. This could be achieved if an increased proportion of the total funds available were hypothecated for this purpose. The alternative option would be to further increase the levy and use the additional funding for infrastructure provision purposes. The additional benefit of the latter would be to further drive diversion rates. The need for the levy reduces as diversion rates are met. Therefore as diversion rates improve through time, the quantity of levy funds available to fund waste management activities could decrease.

2.5.3 Comments on Current Waste Governance and Funding Arrangements

The infrastructure ownership and governance arrangements for waste management in the region are disparate. While there are historical reasons for the current arrangements, they are now an impediment to achieving the economies of scale and scope that are necessary for modernising and improving waste management in the region. Currently, usually, whichever entity that possesses waste/recycling material has ownership of it at that point in time. This means that the collectors of the waste/recycling material can determine where it is treated or disposed. The exception is where the point of disposal is stipulated in collection contracts. This has resulted in inefficiencies in the manner that waste is processed.

While the regional local government ownership and management of processing facilities results in improved economies of scale, it is unlikely to fully realise them. This inefficiency is exacerbated by some member councils of regional local governments choosing to exit co-operative arrangements and make their own arrangements. This has an impact on the amount of waste available for processing by regional local government facilities and reduces the economies of scale for waste processing.

Under current arrangements, WATC restricts regional local governments from borrowing independently of their member councils by requiring debt to be guaranteed by the member councils. Any agreed funding for regional local governments has an impact on the member council's funding capacity, as their capacity is reduced by the amount secured for the regional local governments. Withdrawal of member councils from regional local governments also compromises the financial capacity of the regional local governments to establish the facilities required.

There is currently no alignment with state waste management policy and that of local government. While some regional local governments actively implement processing options on behalf of their councils that are consistent with state policy and strategy directions, there is no compulsion for all regional local governments to do this. As a result, many regional local governments pursue waste management options that are low cost that do not improve outcomes.

As set out in section 2.4.3.2 of this report, under the current planning system waste facilities are not generally well defined and a coordinated approach to waste infrastructure planning at a regional scale is lacking. This is a significant limitation in the current waste management governance framework as it means that transport, land use and markets in relation to waste management are not optimised when infrastructure is established. During consultation, stakeholders identified several issues under the current arrangements that presented barriers to effective infrastructure planning and development. These include:

- Waste infrastructure is not specifically addressed in several key planning documents
- There is inconsistency in the application of the planning processes between the state government and local government, as well as from one local government to another
- Planning processes are lengthy and, along with the uncertainty associated with the process, this has an impact on the cost and therefore viability of commercial investments
- There is a lack of certainty around buffer protection
- There is no guidance currently available on potential suitable and acceptable locations for siting waste facilities
- The current non-geographic membership of regional local governments does not appropriately capture natural catchment areas to accommodate efficient collection, transport and processing.

If such issues are not addressed it is unlikely that under the current governance arrangements that the scale and type of infrastructure needed to meet the future needs of the 3.5 million city will be provided in the most efficient manner possible. It is also highly unlikely that without a coordinated approach, and complementary waste management policy and complementary measures, that the region will achieve the targets set out in the Waste Strategy.

Section 0 of this report provides options for improving the way the planning system deals with waste infrastructure and alternative options to the current governance model are discussed in section 5.

2.5.4 Summary of Strengths and Weaknesses

A summary of the strengths and weaknesses of the current governance arrangements follows:

Table 5: Strengths and weaknesses associated with current waste governance arrangements

Strengths	Weaknesses
• No additional costs associated with maintaining existing governance structure as no structural reform is required. • Contractual arrangements in this model are relatively simple as they are between clients and services providers with no intermediate parties involved. • Limited intervention in the waste market is generally favourable to commercial entities.	• The planning system currently does not enable or deliver effective strategic planning for the development of waste infrastructure presenting a barrier to securing strategic sites and buffers for infrastructure required in the future. • Lack of coordination of waste streams and fragmented approach to processing waste results in suboptimal economies of scale and scope resulting in efficiencies in waste processing. • There are insufficient drivers to improve resource recovery rates. • Inconsistencies in approval processes (for example, from council to council) for siting waste infrastructure create significant uncertainty and risk for investors. • Transport costs are increased as waste facilities are not strategically sited. • Non-mandatory nature of and borrowing limitations on regional local government membership are barriers to securing waste tonnage and funding required to establish facilities of sufficient size and scope.

2.6 Finding on current waste and recycling system in Perth and Peel

Overall, there is currently insufficient infrastructure to process all the projected waste generated in the Perth metropolitan and Peel regions by 2020 in such a way that the waste diversion targets in the Waste Strategy are met. In addition, there are some aspects of the planning approval process that act as barriers to development of new waste facilities. Finally, the current governance arrangements are not conducive to establishing large-scale waste processing and recycling infrastructure.

Finding 1

The current waste and recycling infrastructure capacity is not sufficient to process the projected amounts of waste necessary to meet the waste diversion targets in the Waste Strategy.

It is unlikely that the infrastructure needed to meet the waste diversion targets would be established in the short to medium term under the current governance arrangements.

3 Integrating Waste Management with Land-Use Planning in WA

Planning for waste facilities could be improved through better integration and use of the WA land-use planning system. Some of these potential amendments, and their benefits and limitations, are explored in this section. This includes:

- Defining waste facilities in the Model Scheme Text
- Development of a State Planning Policy for waste facilities
- Securing new and existing waste facility sites through reservation under a region planning scheme.

The strategies discussed in this section are just some of the potential ways in which waste management activities can be better integrated with the land-use planning system. This will be an on-going process, requiring cooperation between the Waste Authority, Department of Environment Regulation, Western Australian Planning Commission and Department of Planning.

3.1 Defining Waste Facilities in the Model Scheme Text

Local governments are required under the *Planning and Development Act 2005* to have local planning schemes (formerly known as town planning schemes), which set out the way land is to be used and developed, and include controls to ensure long-term strategic planning objectives are achieved. The *Town Planning Regulations 1967* require local governments to prepare the text of their local planning scheme (LPS) in accordance with the Model Scheme Text, except where the Minister approves any variation or exclusion.

The Model Scheme Text (MST) forms Appendix B of the *Town Planning Regulations 1967* and provides local governments with a template to use when developing or reviewing local planning schemes.

3.1.1 Land Use Classes and Zones in the Model Scheme Text

Schedule 1 of the MST is a dictionary of defined words and expressions, divided into:

- General definitions: this section gives definitions for some for the terminology used throughout the MST (which is also likely to be used in local planning schemes), and
- Land use definitions: this section defines the land use classes, and is used in the interpretation of the zoning tables within local planning schemes.

Part 4 of the MST gives a template for developing a zoning table. All local planning schemes have a map (or maps) that show the local government area divided into land use zones, essentially for private development, as well as reservations for existing and future local public purposes. The zoning table indicates which land uses are permitted in each zone.

To illustrate this using a real local government example, an extract from the *Town of Victoria Park Town Planning Scheme No. 1* (TPS No.1) (first gazetted in 1998, with a consolidated version most recently gazetted in 2011) zoning table is provided in Table 38. Interpretation of the zoning table

requires a legend to explain the letter symbols used (Table 39) and land use definitions to clarify the types of activities allowed under each land use class (Table 40). Thirty five land use classes are given in the full zoning table in the TPS No. 1. However, only six have been shown in Table 38 (and defined in Table 40). Cross referencing Table 38 and Table 40 shows which land use classes are permitted in each zone. For example a 'convenience store' is not permitted in the residential zone, but may be permitted in the Industry 1 zone if the Council uses its discretion to grant planning approval. Facilities determined to be 'hazardous industry' and 'noxious industry' are not permitted in any zone. An amendment to TPS No. 1 would be required to permit these land uses.

Table 40 in Appendix 3 gives the land use definitions for each use class shown in Table 38:

- For the 'convenience store', 'service station' and 'light industry' use classes, a definition very similar to that given in the MST has been used (but not exactly the same)
- For the 'single bedroom dwelling' use class, the definition in the Residential Design Codes (the R Codes) has been referenced
- The 'hazardous industry' and 'noxious industry' land uses are not defined in the MST, but the Town of Victoria Park has used and defined these use classes.

This example from the *Town of Victoria Park Town Planning Scheme No. 1* is typical of local planning schemes in the Perth metropolitan and Peel region. Some of the land use classes and definitions used are based on the MST, while some have been developed by the local government to suit their own local purposes.

In addition to the land use zones shown in zoning tables local planning schemes may also have "special use" zones, which apply to special categories of land use that do not comfortably sit within any other zone in the scheme. These are areas of land (particular lots) that are zoned for a very specific use, which is described (along with any conditions of development and use) in a schedule of the LPS. No other land uses are permitted except those described.

Thus, although the MST is used as a basis for developing and amending LPSs, there is still a great degree of variation in the terminology and definitions for land uses and zones in the local planning schemes operating in WA. There is a lot of scope for local governments to change and adapt the MST, and create their own definitions. This flexibility is important, as local governments must be able to develop LPSs that suit their unique local needs, but it can also have disadvantages. For developers the process of identifying potential sites for a new development can be difficult, as different land use terminology is used across local government areas. For decision-making bodies (such as the WAPC, Development Assessment Panels or the State Administrative Tribunal) there is no consistent interpretation of land use terminology on which to form the basis of decisions and sometimes results in the need for legal interpretation, which is costly and time-consuming for an applicant for development and for the local government.

3.1.2 Waste and Waste Facilities in the Model Scheme Text

Schedule 1 of the MST (the dictionary of defined words and expressions) gives no definitions for waste or waste facilities. Waste facilities could be included under the definitions given for 'industry', 'industry – general' or 'industry – light', however none of these definitions specifically mention waste management activities or facilities.

This means that there is no established commonly agreed terminology related to waste in land-use planning in WA.

The definitions of waste and waste facilities gazetted under the WARR Act 2007 (see section 2.1.4) are used within the waste industry, but are rarely incorporated into state and local government land-use planning documents. The MST is the main reference used by state and local government for land use definitions, so in order to encourage government agencies to include waste management in their land-use planning activities, and ensure that consistent terminology is used, waste and waste facilities should be defined in the MST.

Some local governments have created their own land use definitions for waste facilities. Of the 33 local governments in the Perth metropolitan and Peel regions, only one has a specific land use definition for waste facilities in its LPS. Appendix 1 of the *City of Mandurah Town Planning Scheme No. 3* includes a land use definition for waste transfer stations:

> ***Waste transfer station:*** *means a facility for reducing waste by catering for the separation of the discrete components of the waste stream for re-use, recycling and reprocessing, with unused materials being transferred to a waste disposal facility.*

There are also four other local governments in Perth and Peel with LPSs which have considered waste management activities as a land use, and explicitly include recycling, treatment of waste materials, waste depots, or waste storage, processing, or treatment, in their land use definitions for 'industry'; City of Canning, City of Fremantle, City of Vincent and Shire of Mundaring.

There are no land use definitions for waste facilities in the remaining 28 local governments in Perth and Peel. In ten of these remaining local governments (Cities of Armadale, Bayswater, Belmont, Gosnells, Mandurah, Melville, Stirling, Towns of Cambridge, Victoria Park) waste facilities are not specifically defined, but are indirectly included in the land use definitions for 'noxious industry' or 'hazardous industry'.

In these LPSs 'noxious industry' or 'hazardous industry' land uses include all prescribed premises under Part V of the *Environmental Protection Act 1986*, as listed in Schedule 1 of the *Environmental Protection Regulations 1987*, and this encompasses most waste facility types, including

- Landfills (inert and putrescible)
- Composting facilities (mixed organic and/or green waste)
- Construction and demolition (C&D) material processors
- Licensed recyclers
- Transfer stations (putrescible, inert, or mixed inert/recyclable) receiving more than 500 tpa
- Drop-off facilities receiving more than 500 tpa.

'Clean' MRFs and small scale (unlicensed) recyclers are not currently prescribed premises.

This means that most waste facilities would be prohibited in these local government areas.

Some examples of local governments creating their own land use definitions for waste facilities can also be seen in LPSs in the Wheatbelt and Southwest region.

- **Shire of Harvey:** defines **'waste disposal'** as the use of land for the storage and disposal of solid waste and includes a garbage depot, rubbish tip or landfill

- **Shire of Gingin:** defines **'landfill site'** as where waste including landfill Classes I to V as defined within the DEC document titled *Landfill Waste Classification and Waste Definition 1996* (as amended) is stored, process, recycled or buried

- **Shire of Chittering:** defines **'landfill/refuse centre;** as a premises used in the disposal, storage and recycling of waste material

- **Shire of Toodyay:** proposed amendments to the LPS define **'waste disposal and treatment'** as any class of landfill site as defined under the *Landfill Waste Classification and Waste Definition 1996* (as amended) and includes areas for the physical, chemical, biological processing of waste for disposal or reuse; and **'waste transfer station'** means a facility used for reducing waste by catering for the separation of the discrete components of the waste stream for re-use, recycling or reprocessing, with unused materials being transferred to a waste disposal facility.

Lack of guidance in the MST may be a reason that inconsistent terminology and definitions for waste facilities are found in LPSs.

In LPSs where waste facilities are explicitly included within the land use definition for 'industry', or indirectly included under the 'industry' land use because they are prescribed premises, there is no basis for the local government to distinguish waste management activities from other industrial activities.

Even where waste facilities are a defined land use, the definitions used in LPSs often include all types and scales of waste facilities (from putrescible landfills to composters to recyclers) in a single land use category despite their very different characteristics.

These broad definitions of waste management activities do not allow local governments to distinguish between different types of waste facilities in their planning activities. This does not give local governments a clear framework for decision making if a development application for a waste management facility is received, and may stifle the development of the resource recovery facilities that are essential for achieving the landfill diversion targets of the Waste Strategy.

The inclusion of definitions of waste and waste facilities in the MST is particularly relevant now, as local government amalgamations may be occurring in 2015, and new local planning schemes might be developed for the newly formed metropolitan local governments.

The WAPC is currently reviewing the MST, which may provide opportunity for the inclusion of definitions for waste and waste facilities (see section 2.4.2.7).

3.1.3 Waste and Waste Facilities in Land-Use Planning in Other States

The land-use planning systems in all states around Australia have standard provisions (similar to WA's MST), which provide a reference document or template for local government planning schemes. The land use definitions in the standard provisions used in Victoria, New South Wales, South Australia, Tasmania and Queensland all differ. However, all explicitly deal with waste and waste facilities in some way.

3.1.3.1 Victoria

The *Victorian Planning Provisions* (VPP) provide local governments with a template for development of planning schemes. Waste facilities are included in the definition of industry, and definitions are given for materials recycling, refuse disposal, and transfer stations:

> ***Industry:*** *Land used for any of the following operations:*
>
> *a) any process of manufacture;*
>
> *b) dismantling or breaking up of any article;*
>
> *c) treating waste materials;*
>
> *d) winning clay, gravel, rock, sand, soil, stone, or other materials (other than mineral, stone, or soil extraction);*
>
> *e) laundering, repairing, servicing or washing any article, machinery, or vehicle, other than on-site work on a building, works, or land; or*
>
> *f) any process of testing or analysis.*
>
> *If materials are recycled, goods resulting from the operation may be sold by retail. Includes materials recycling, refuse disposal, transfer station, research and development centre, rural industry, service industry.*
>
> ***Materials recycling:*** *Land used to collect, dismantle, treat, process, store, recycle, or sell, used or surplus materials.*
>
> ***Refuse disposal:*** *Land used to dispose of refuse, by landfill, incineration, or other means.*
>
> ***Transfer station:*** *Land used to collect, consolidate, temporarily store, sort or recover refuse or used materials before transfer for disposal or use elsewhere.*

3.1.3.2 New South Wales

In NSW local governments prepare Local Environment Plans (LEPs) to guide planning decisions. The *Standard Instrument – Principal Local Environmental Plan* provides a template for the LEPs. In it, waste facilities are defined separately from industry and a distinction is made between waste disposal and resource recovery:

> ***Resource recovery facility*** *means a building or place used for the recovery of resources from waste, including works or activities such as separating and sorting, processing or treating the waste, composting, temporary storage, transfer or sale of recovered resources, energy generation from gases and water treatment, but not including re-manufacture or disposal of the material by landfill or incineration.*
>
> ***Waste disposal facility*** *means a building or place used for the disposal of waste by landfill, incineration or other means, including such works or activities as recycling, resource recovery and other resource management activities, energy generation from gases, leachate management, odour control and the winning of extractive material to generate a void for disposal of waste or to cover waste after its disposal.*

Waste or resource management facility *means any of the following:*

a) a resource recovery facility,

b) a waste disposal facility

c) a waste or resource transfer station,

d) a building or place that is a combination of any of the things referred to in paragraphs (a)–(c).

Waste or resource transfer station *means a building or place used for the collection and transfer of waste material or resources, including the receipt, sorting, compacting, temporary storage and distribution of waste or resources and the loading or unloading of waste or resources onto or from road or rail transport.*

3.1.3.3 South Australia

In SA, local government planning schemes are known as Development Plans. The *South Australian Planning Policy Library Terminology List* provides local governments with a list of standard terms. Interestingly, the list not only defines standard terms, but also lists the terms that are not accepted. 'Landfill', 'waste transfer station' and 'rubbish dump' are not acceptable terms. 'Waste reception, storage, treatment or disposal' is used for all waste and recycling activities:

Waste reception, storage, treatment or disposal: *Defined as 'waste within the meaning of the Environment Protection Act 1993' (see Schedule 1 to the Development Regulations 2008). The Environment Protection Act defines it as:*

a) any discarded, rejected, abandoned, unwanted or surplus matter, whether or not intended for sale or for recycling, reprocessing, recovery or purification by a separate operation from that which produced the matter; or

b) anything declared by regulation (after consultation under section 5A) or by an environment protection policy to be waste, whether of value or not.

Development of land for the purpose of the reception, storage, treatment or disposal of waste is a decision by the Development Assessment Commission.

3.1.3.4 Tasmania

In Tasmania, *Planning Directive No. 1 – The Format and Structure of Planning Schemes* incorporates the *Planning Scheme Template for Tasmania*, which is applied when local governments prepare planning schemes. Land use definitions related to waste management activities are relatively limited:

Refuse disposal: *means use of land to dispose of refuse by landfill, incineration, or other means.*

Waste transfer station: *means use of land to receive and temporarily store waste before it is disposed of elsewhere.*

3.1.3.5 Queensland

The *Queensland Planning Provisions* (QPP) provide Queensland local governments with standard planning scheme provisions. In QPP Version 3.0 (currently in draft form), Industry Activities are broken down into different categories of industry, some of which include waste management related activities:

- Medium impact industry includes recycling and reprocessing batteries and recycling or reprocessing tyres including re-treading.
- High impact industry includes recycling chemicals, oils or solvents, waste disposal facility (other than waste incinerator), and recycling, storing or reprocessing of regulated waste.
- Noxious and hazardous industry includes waste incinerators.

Definitions are given for recyclable and domestic waste:

> ***Recyclable waste:*** *Clean and inoffensive waste that is declared by the local government to be recyclable waste for the area.*
>
> ***Domestic waste:*** *Waste, other than domestic clean-up waste, green waste, recyclable waste, interceptor waste or waste discharged to a sewer, produced as a result of the ordinary use or occupation of domestic premises.*

3.1.4 Proposed Definitions of Waste and Waste Facilities in the MST

Like car parks, restaurants or child care centres, which are all defined land uses in Schedule 1 of the MST, waste facilities are land uses with their own particular characteristics. Inclusion of definitions for different types of waste facilities along with other land uses in the MST would be a formal recognition of waste management activities as unique land uses. These definitions would enable local governments to better consider waste facilities when developing or amending a LPS. They will be useful to state government agencies in land-use planning activities.

Potential benefits of defining waste and waste facilities in the MST could include:

- It could make waste management a more prominent issue in land-use planning activities in WA
- It could encourage local governments and state government agencies to consider waste management issues when developing local planning schemes and other land-use planning policies and strategies
- The new metropolitan local governments which will form through the amalgamation process in 2015 will be developing new LPSs, providing an opportunity for waste and waste facilities to be incorporated into LPSs across the metropolitan region
- It could lead to more consistency in approach, and terminology related to, waste management activities in local planning schemes
- If separate, consistent definitions are created for different types of waste facilities, local governments will have a greater ability to permit, permit with conditions, or not permit the development of waste facilities in the various land use zones in their local planning schemes, and distinguish between different types of waste facilities

- It will give the WAPC, State Administrative Tribunal and other decision makers clear terminology for use in land-use planning decisions related to waste facilities.

There are also limitations, however, to the potential effectiveness of the inclusion of waste and waste facility definitions in the MST:

- Local governments may seek variation or exclusion from the provisions of the MST, so may still be able to create their own definitions (or exclude definitions) for waste and waste facilities in their local planning schemes

- Local governments do not generally review local planning schemes frequently. A review is required every five years, but it is done less frequently than this in many cases (Metropolitan Local Government Reveiw Panel, 2012). New local governments that may be formed in 2015 would not be legally required to develop new LPSs before or immediately after their formation. It could, therefore, take many years for many local governments, particularly those outside the metropolitan region, or those not affected by the amalgamation process, to incorporate MST definitions for waste and waste facilities into their LPS. However, new regulations under section 257B of the Planning and Development Act, if implemented, may enable definitions to be applied via regulations, automatically applying the MST definitions

- Local governments have sometimes created definitions for waste facilities if they are seeking to restrict or prohibit waste facilities within their LPS. Definitions for waste and waste facilities in the MST may simply make it easier for local governments to prohibit waste management activities. Although, as outlined above, local governments may be less likely to 'blanket ban' all waste management activities if they have clear definitions that enable them to distinguish between different types of waste facilities.

- Different types of waste facilities are likely to be introduced into WA as waste management technology develops. For example, there are currently no waste-to-energy facilities in Perth and Peel, but there two new facilities are proposed for Kwinana. This may mean that any definitions for specific types of waste or waste facilities may need to be frequently reviewed and updated, to incorporate technological developments.

The terms 'waste' and 'waste facility' are defined in the WARR Act. Any definitions developed for the MST should eb consistent with those in the WARR Act. For the purposes of land-use planning activities, however, there is a need to develop commonly agreed terminology that distinguishes between different types of waste and waste facilities.

The examples from other states may offer a basis for developing definitions for waste and waste facilities for the WA Model Scheme Text. However, no state provides a 'perfect' model. Any definitions developed for the MST will be most useful if they are suited to the WA context, are flexible enough (or updated regularly enough) to include all types of waste and waste facilities found in WA (and those planned for the future) and enable differentiation between different types of waste facilities in a way relevant to the planning system.

Schedule 1 of the *Environmental Protection Regulations 1987* and the EPA's *Guidance for the Assessment of Environmental Factors No. 3 – Separation Distances between Industrial and Sensitive Land Uses* (Environmental Protection Authority, 2005) may provide a basis for definitions of different waste facility types. In the *Environmental Protection Regulations 1987,* all waste facility categories that are prescribed premises (and thus require a DER licence) are described according

to the type and volume of waste they receive, and the way in which it is stored and processed. These categories are further broken down into different facility types in the EPA Guidance Statement, for the purpose of determining buffers.

There are limitations to the usefulness of these definitions in a land-use planning context, however, because the land use definitions typically used in the MST are generally not as specific or technical as those used in the *Environmental Protection Regulations 1987* or *Guidance for the Assessment of Environmental Factors No. 3 – Separation Distances between Industrial and Sensitive Land Uses*. It would be inappropriate to include these more technical definitions in the MST. A balance needs to be found between a single definition for all waste facilities (as in the WARR Act 2007) and these detailed and technical descriptions of facilities.

To be useful in a land-use planning context, waste facilities should be grouped by their likely impact on the environment and the amenity of surrounding land users, including visual amenity, noise, odour, vibration and traffic impacts.

For the purposes of creating land use definitions, waste facilities (whether licensed or unlicensed) could be divided into four categories:

- **Waste disposal facilities:** landfills and incinerators (e.g. biomedical waste incinerators, not waste-to-energy treatment facilities).
- **Enclosed resource recovery facilities:** facilities where resources are recovered from waste. This would incorporate AWT facilities (mechanical biological treatment, waste-to-energy), MRFs (‘clean’ and ‘dirty’),enclosed composting facilities, enclosed C&D materials processors, and recyclers.
- **Non-enclosed resource recovery facilities:** facilities where resources are recovered from waste in an open area. This would incorporate the traditional composting facilities and C&D materials processors.
- **Temporary waste storage facilities:** transfer stations and drop-off facilities, which need to be easily accessible to users.

This is similar to the way waste facilities have been categorised in the NSW *Standard Instrument – Principal Local Environmental Plan* (see section 3.1.3.2), although with one important difference. In NSW, definitions are given for ‘resource recovery facilities’ and ‘waste disposal facilities’, but waste-to-energy facilities have not been explicitly considered in either of these definitions. The ‘energy generation from gases and water treatment’ included in the NSW definitions refers to processes such as methane capture from landfills, not purpose built waste-to-energy facilities. Both definitions also mention ‘incineration’, but this is intended to cover land uses such as biomedical or chemical incinerators (not waste-to-energy facilities) (Dalton-Aran, 2013).

There are currently no mixed MSW waste-to-energy facilities operating in Australia and, thus, until recently there has been little consideration of these facilities in waste, environmental or planning legislation. None of the waste-related land use definitions used by the MST-equivalents in other states specifically define or categorise waste-to-energy facilities as a land use. However, with two such facilities proposed in Perth and Peel and one approved for Port Hedland, it is important that these facilities are considered in WA’s land-use planning system.

The draft definitions below have been supplied to the Department of Planning for potential incorporation into the MST, which is currently under internal Department of Planning/WAPC review. There is no timeframe given for the review process at this stage.

General Definitions:

waste *means 'waste' as defined in Part 1 of the Waste Avoidance and Resource Recovery Act 2007.*

municipal solid waste (MSW) *is solid waste generated from domestic (household) premises and local government activities.*

commercial and industrial (C&I) waste *is solid waste generated by the business sector, state and federal government entities, schools and tertiary institutions.*

construction and demolition (C&D) waste *is solid waste from residential, civil and commercial construction and demolition activities.*

Land Use Definitions:

waste facility *means 'waste facility' as defined in Part 1 of the Waste Avoidance and Resource Recovery Act 2007.*

waste disposal facility *means premises used for the disposal of waste by landfill, incineration of hazardous/clinical/biomedical waste, or other means. Includes inert, putrescible, secure and intractable landfills.*

inert landfill *means Class I landfill as described by the Landfill Waste Classification and Waste Definitions 1996 (as amended December 2009).*

putrescible landfill *means Class II or III landfills as described by the Landfill Waste Classification and Waste Definitions 1996 (as amended December 2009).*

secure landfill *means Class IV landfill as described by the Landfill Waste Classification and Waste Definitions 1996 (as amended December 2009).*

intractable landfill *means Class V landfill as described by the Landfill Waste Classification and Waste Definitions 1996 (as amended December 2009).*

enclosed resource recovery facility *means an enclosed premises used for the recovery of resources from waste. Includes activities such as enclosed (indoor or in-vessel) separating, sorting, processing, treating, composting, construction and demolition waste processing, mechanical biological treatment and thermal treatment of waste. Does not include waste disposal facilities.*

non-enclosed resource recovery facility *means a non-enclosed premises used for the recovery of resources from waste. Includes activities such as non-enclosed separating, sorting, processing, treating, composting, and construction and demolition waste processing. Does not include waste disposal facilities.*

> ***temporary waste storage facility*** *means premises used to collect, consolidate, temporarily store, or sort waste before transfer to a waste disposal facility or resource recovery facility. Includes commercial and domestic scale facilities.*

The MST should be amended by including an addition clause under section 10.2 of Appendix B of the Town Planning Regulations 1967 (*Matters to be considered by local government*) to to ensure that local governments have due regard to the provision of waste storage and collection services in considering an applications for planning approval.

3.2 Planning Policy for Waste Facilities

There are various layers of existing planning policy that could potentially facilitate the development of waste management infrastructure, and the integration of waste management activities into planning processes. This section outlines one of these potential options, the development of a state planning policy for waste facilities, which the Waste Authority could explore further with the Department of Planning and WAPC.

3.2.1 State Planning Policies

State planning policies, and their accompanying guidelines, influence land-use planning at both the local government and state government level. They are implemented in different ways through planning activities such as strategic plans, region and local planning schemes, conservation and management strategies, plans, guidelines, and through day-to-day decision making on subdivision and development applications. State planning policies are discussed in section 2.4.2.1.

3.2.2 State Planning Policies in Other States

3.2.2.1 Victoria

The Victorian planning system does not have a direct equivalent of WA's SPPs. The *Victorian Planning Provisions* (VPP) document provides local governments with a template for development of their planning schemes. Within the VPP is the State Planning Policy Framework, which covers strategic issues of state importance. Every local government planning scheme in Victoria contains the State Planning Policy Framework, which is identical in all schemes.

Local governments must develop planning schemes which incorporate, and are consistent with, the State Planning Policy Framework. Decision-making authorities, such as local governments, state government departments and the Victorian Civil and Administrative Tribunal, must take the State Planning Policy Framework into account when making land-use planning decisions.

Clause 19 of the State Planning Policy Framework is related to planning for infrastructure development for Victoria and includes a planning policy for waste and resource recovery (Clause 19.03-5), the objective of which is: '*To avoid, minimise and generate less waste to reduce damage to the environment caused by waste, pollution, land degradation and unsustainable waste practices'.*

The strategies used to achieve this objective are:

- Establish new sites and facilities to safely and sustainably manage all waste and maximise opportunities for resource recovery

- Encourage facilities for resource recovery to maximise the amount of resources recovered
- Provide sufficient waste management and resource recovery facilities to promote re-use, recycling, reprocessing and resource recovery and enable technologies that increase recovery and treatment of resources to produce energy and marketable end products
- Encourage waste generators and resource generators and resource recovery businesses to locate in close proximity to enhance sustainability and economies of scale
- Ensure buffers for waste and resource recovery facilities are defined, protected and maintained
- Site and manage waste disposal and resource recovery facilities in accordance with the *Waste Management Policy (Siting, Design and Management of Landfills)*.

The waste and resource recovery planning policy also lists all of the legislation, policies and plans that must be considered when planning, or making decisions related to, waste and resource recovery facilities.

3.2.2.2 New South Wales

In NSW, State Environmental Planning Policies (SEPPs) have a similar role to SPPs in WA. They are made by the Governor on the recommendation of the Minister for Planning and deal with planning issues significant to the state.

The aim of *SEPP (Infrastructure) 2007* is to facilitate the effective delivery of infrastructure by improving regulatory certainty and efficiency through a consistent planning regime for infrastructure. Part 3 Division 23 of this SEPP gives guidance for planning for waste or resource management facilities by:

- Defining resource recovery facilities, waste disposal facilities, and waste or resource transfer stations (using the definitions established in the *NSW Standard Instrument – Principal Local Environmental Plan*)
- Outlining the land use zones where development of waste or resource management facilities may be carried out
- Describing the issues that decision-making authorities (called ‘consent authorities’ in NSW) must consider when determining development applications for the construction, operation or maintenance of landfills. This includes whether waste recovery activities have been undertaken to ensure waste sent to landfill is minimised; whether best practice design and operation standards are met; whether transport links to the landfill are optimised to reduce the environmental and social impacts associated with transporting waste; and whether the landfill is located to avoid land use conflicts.

3.2.2.3 South Australia

In South Australia, the State’s planning policies are contained in the *South Australian Planning Policy Library Version 6.0* (the Library). The Library is similar to the *Victorian Planning Provisions*, because it combines the template used by local governments when creating Development Plans (the SA equivalent of WA’s Local Planning Schemes) and the overarching state-wide planning policies that must be included in, and form the basis of, every Development Plan.

The Library includes a 'Waste Management Facilities' section with the objectives of:

- The orderly and economic development of waste management facilities in appropriate locations
- Minimisation of human and environmental health impacts from the location and operation of waste management facilities
- Protection of waste management facilities from incompatible development.

It also outlines the principles of development control which must be used when planning for waste management facilities. This includes detailed information covering issues such as site sizes, buffer distances, transport requirements, fencing, appropriate soil types, and other siting and operational matters.

3.2.2.4 Tasmania

In Tasmania, planning directives are the mechanism that provides state-wide direction on planning matters. In WA, only the WAPC can prepare state planning policies, but in Tasmania anyone, including local governments, state government agencies, individuals and the Tasmania Planning Commission, can prepare planning directives, which must then be assessed by the Commission and approved and issued by the Minister for Planning.

There are currently four planning directives in place:

- *Planning Directive No. 5 Bushfire-Prone Areas Code*
- *Planning Directive No. 4 Standards for Single Dwellings in Residential Zones*
- *Planning Directive No. 3 Single Dwelling in Residential Zones*
- *Planning Directive No. 1 The Format and Structure of Planning Schemes.*

There are also State Policies that represent the government's overarching position on sustainable development issues. These contain matters such as sustainable development of natural and physical resources, land-use planning, land management, environmental management, and environment protection. The current State Policies in place are:

- *State Coastal Policy 1996*
- *State Policy on Water Quality Management 1997*
- *State Policy on the Protection of Agricultural Land 2009.*

There are no planning directives or State Policies directly related to waste management.

3.2.2.5 Queensland

In Queensland, state planning policies are the instrument used by the Minister for Planning to protect matters of state interest. These are similar to WA's SPPs. Local government planning schemes must be consistent with state planning policies. There are no state planning policies specifically related to waste management activities. However, *State Planning Policy 5/10 – Air, Noise and Hazardous Materials 2010* provides policy on the location and protection of industrial

land uses. While this state planning policy does not specifically mention waste management activities, waste and recycling facilities are generally considered to be industrial land uses under the *Queensland Planning Provisions*.

Somewhat similar to WA's *SPP 4.1*, the Queensland *State Planning Policy 5/10* seeks to provide strategic direction about where industrial land uses should be located to protect communities from the impacts of air, noise and odour emissions and hazardous materials. It also considers how land for industrial land uses will be protected from unreasonable encroachment by incompatible land uses. It defines sensitive land uses and provides a framework for considering the location and management of industrial land uses.

3.2.3 A WA State Planning Policy for Waste Facilities

The potential benefits and limitations of developing a state planning policy for waste facilities depend largely on the policy's scope and objectives.

There are many potential advantages to having a state planning policy (or policies), with accompanying guidelines, for waste facilities:

- It could make waste management a more prominent issue in land-use planning activities in WA and encourage local governments and state government agencies to consider waste management issues when developing local planning schemes and other land-use planning policies and strategies

- It could provide decision making authorities (DMAs) and proponents in Perth and Peel (or throughout the state) with a clear and consistent policy framework for the preparation, assessment, and determination of scheme amendments, and applications for planning approval for waste facilities, as well as guidance on their location, siting and design. With this guidance, proponents may be less likely to propose inappropriate waste facility types in unsuitable locations and DMAs will have a clear framework to assist them in their deliberations

- The new metropolitan local governments that may form through the amalgamation process in 2015 may develop new LPSs, providing an opportunity for the provisions of a SPP for waste facilities to be incorporated into LPSs across the metropolitan region

- It could clarify/simplify the development approvals process for certain kinds of waste facilities that would help achieve the landfill diversion targets of the Waste Strategy

- It could lead to more consistency in approach to waste management activities in local planning schemes and other land-use planning policies and strategies.

There are also limitations, however, to what can be achieved through a SPP for waste facilities.

The development of a state planning policy for waste facilities is a very 'high level' response to the planning barriers facing the development of waste facilities in Perth and Peel. The introduction of a SPP for waste facilities would not, in itself, address all planning barriers to the development of waste facilities, and there would likely be many other measures and policies required to more fully integrate waste management activities with the land-use planning system (such as has occurred with the WAPC's draft State Planning Strategy.

It is also important to remember that SPPs are primarily land-use planning instruments. They provide direction and information on planning matters and are intended for use by land-use planning agencies (e.g. development proponents, local governments, WAPC, Development Assessment Panels, the State Administrative Tribunal) in land-use planning processes (such as the creation and determination of development applications and planning appeals).

SPPs and their accompanying guidelines address planning issues and are not intended to take the place of a more holistic waste and recycling plan, which may consider many other issues in addition to planning matters. SPPs should be consistent with, but not replace, policies such as the Waste Strategy, waste facility licensing and regulations, and best practice guidelines for the operation of waste facilities.

A SPP for waste facilities would not be a 'quick fix', as it could take many years for many local governments, particularly those outside the metropolitan region or not affected by the amalgamation process, to incorporate new SPP provisions into their LPS, unless the relevant parts of the SPP were made "deemed provisions" under section 257B of the Planning and Development Act. The SPP may also need to be reviewed and updated, to incorporate the different types of waste facilities that are likely to be introduced into WA as waste management technology develops.

Finally, each proposed waste facility must still be considered on a case by case basis. Development of new waste facilities will require consideration of many other factors alongside planning matters.

3.2.4 What could a State Planning Policy for Waste Facilities Look Like?

The structure and content of a SPP depends largely on its objectives, scope and application, which should be clearly defined before the SPP is developed.

There are 28 SPPs in operation in WA (see Table 42) and these, along with the policies developed in other states, may provide a good basis for a new SPP for waste facilities.

State Planning Policy 5.2 Telecommunications Infrastructure (Western Australian Planning Commission, 2004) provides a good example of a SPP that covers a wide range of planning matters for the development of a particular type of essential infrastructure, and may provide a helpful basis for the development of a waste facility SPP (see Case Study 1 - Table 44, page 214). *SPP 5.2 Telecommunications Infrastructure* has accompanying guidelines, which are intended to be read in conjunction with the SPP and provide information on the location, siting, and design of telecommunications infrastructure.

There are some similarities between telecommunications infrastructure (which includes networks of mobile phone towers, aerial telephone cables, remote interface modules and pillars) and waste facilities. For example:

- Telecommunications infrastructure is considered essential infrastructure that is regulated, but not owned, by the state government (the federal government regulates the telecommunications industry but local and state governments make planning decisions in relation to the development of telecommunications infrastructure)

- Development of an efficient telecommunications system requires a coordinated approach across Perth and Peel (and the state). This is supported by the SPP

- Effective telecommunications systems require a network of different facility types located throughout Perth and Peel and the development of these facilities (particularly mobile phone towers) can face community opposition from neighbouring land users

- There is a need to minimise the loss of amenity and environmental disturbance that can potentially be caused by telecommunications infrastructure and ensure it complies with all relevant health and safety standards

- Proponents of telecommunications infrastructure must apply to local governments for planning approval. So, it is beneficial to have a consistent approach to the preparation and assessment of applications across Perth and Peel (and the state)

- Co-location of telecommunications infrastructure is considered beneficial.

The objectives of *SPP 5.2 Telecommunications Infrastructure* may be similar to the kinds of objectives that a SPP for waste facilities would seek to achieve (Case Study 1 - Appendix 3).

In the development of a state planning policy and guidelines for waste facilities, the Department of Planning and the WAPC, with the assistance of the Waste Authority, should consult with the waste industry and local governments to determine the most useful objectives, scope, application, structure and content.

The DoP and WAPC have previously taken a collaborative approach to the preparation of SPPs (e.g. Swan-Canning River SPP with SRT and Development Contributions for Infrastructure SPP with Urban Development Institute of Australia (WA)) and such an approach could be fostered between the WAPC and the Waste Authority.

3.3 Securing Sites for Waste Management Activities in the Long Term

Designating strategic sites for waste management purposes over the long term would provide certainty and stability, which would facilitate investment in waste processing infrastructure.

An example of the way infrastructure sites can be planned and secured can be seen in wastewater treatment plants and other important waste water and water infrastructure (such as water chlorination facilities, pumping stations, etc.), which are planned, developed, operated and owned by the Water Corporation (including some sites which are not currently developed, but anticipated for future requirements).

These sites are reserved for ‘public purpose’ (PP) use under the State’s region planning schemes and most have designated odour buffer areas around them, which must be taken into account when any development is proposed in the surrounding areas. The public purpose reservation means that these sites can generally only be used for their intended purpose (i.e. wastewater treatment) and, therefore, ensures that sites to provide for adequate wastewater treatment capacity are available when and where they are needed. There is also long term security for existing wastewater treatment facilities, although the land uses around them may change over time.

Planning for electricity infrastructure sites also includes reservation in region schemes, as are thoses for major roads, railways and high schools. The long term planning for land requirements for major infrastructure has been a long-standing and well proven way of successfully securing, and where in private ownership, acquiring land for future public purposes, since the 1963 MRS.

There is potential for both existing waste facilities and sites for future waste facility development to be secured in a similar way, by reserving them for public purposes use under the region planning schemes. Some reasons for, and potential benefits of, securing sites for waste management activities in this way include:

- **Waste Strategy Strategic Objective 1:** Securing waste facility sites through PP reservation will contribute to enabling access to suitably located land with buffers sufficient to cater for the State's waste management needs over the long-term, which is part of Strategic Objective 1 of the Waste Strategy.

- **Recognition of waste management as an essential service:** Sites for other essential utilities (e.g. electricity provision, wastewater treatment) are reserved for PP use through region planning schemes, but there is no such security for waste facilities. Securing waste facility sites through PP reservation will contribute to the formal recognition of waste management as an essential service and give waste facilities a level of protection in the planning system similar to other essential utilities.

- **Long-term planning:** Government and the waste industry are better able to plan for the long term if there is more certainty about the sites, and potential facilities they could accommodate, that are likely to play an important role in the management of waste in Perth and Peel into the future. Long-term certainty about the location and operation of waste facility sites will better enable long-term planning and investment decisions to be made.

- **Encroachment:** Development of sensitive land uses too close to waste facilities can lead to conflict and complaints, which may inhibit the ability of the waste facility to operate or expand its capacity. Securing sites for waste management activities, and clearly identifying them through region planning scheme mapping, should reduce or prevent encroachment and land use conflict. It will help ensure that these sites can continue to be used for their intended purpose, even if the surrounding land uses change over time. Proponents of developments in the areas surrounding the waste facilities will be more aware of the intention for waste management activities to occur at these sites for the long term.

- **Competition for 'high value' land uses:** There is demand for industrial land in Perth and Peel. As a result, waste facilities in industrial areas may face pressure for development for 'higher value' land uses. Ensuring that sites can only be used for waste management activities would help relieve this pressure, as well as recognise the role of waste facilities providing an essential service.

- **Limited availability of alternative waste facility sites:** The limited availability of industrial land in the highly developed areas of Perth and Peel (particularly the Metro-Central sub-region) means that, if existing waste facilities here were to cease operations, it is very likely to be difficult to find other suitable sites nearby. These 'irreplaceable' facilities in highly constrained areas should be protected where there is limited availability of alternative waste facility sites.

- **Links between waste generators and treatment facilities:** As the urban footprint of Perth and Peel expands, and residential density increases, there will be an increasing need for waste facilities that form a link between central waste generators and waste treatment facilities on the urban fringes. Waste facility sites that are strategically located between generators and processors will play an increasingly important role in ensuring the efficiency

of waste management systems in Perth and Peel. As such, they should be secured in the long term.

3.3.1 Reserving Land for Public Purpose Use in the Region Planning Schemes

Reserving sites under a region planning scheme is a potential mechanism for securing land for waste management activities in the long term. Under the three region planning schemes operating in WA (Metropolitan, Peel and Greater Bunbury Region Schemes), land may be reserved for community purposes, to protect a resource or to provide areas for infrastructure. There are a number of different categories under which land may be reserved, including:

- Parks and recreation / region open space
- Railways
- Port installations
- State forests
- Water catchments
- Civic and cultural
- Waterways
- Public purposes
- Primary regional roads
- Other regional roads

The reservation most relevant to waste facilities is ‘public purposes’ (PP). Public purpose land is reserved for public facilities such as hospitals, high schools, universities, prisons, utilities (electricity, water and wastewater treatment), commonwealth government and other special uses.

While there is currently no PP category specifically related to waste management activities, waste facilities could be included with other utilities. Alternatively, a new PP category could be created by a minor amendment to the schemes. If it was determined that a property should be secured for waste management activities in the long term, the relevant region planning scheme could be amended to change its current zoning or reservation to a public purposes reservation for waste management activities.

Reserving land as public purpose would require an amendment to the MRS and/or the PRS.

The WAPC is responsible for reviewing the region planning schemes and initiating changes where necessary. Amendments to region planning schemes are made under the provisions of the *Planning and Development Act 2005*.

The process for amending region schemes includes full public consultation. Approval by the Minister for Planning is required for minor amendments and the amendment has effect from the gazettal date. For major amendments, the amendment must be approved by the Governor and laid before both Houses of Parliament within six sitting days of the date of gazettal and becomes effective after 12 sitting days if neither House passes a resolution to disallow the amendment.

When a region planning scheme is amended, local planning schemes must also be amended to ensure consistency. In the case of a zoning change, an affected local government must initiate an amendment to its local planning scheme within three months of a region planning scheme amendment being finalised. A change to a region planning scheme reservation is automatically included in the local planning scheme.

3.3.2 Acquisition, Ownership and Management of Reserved Land

As discussed above, land is reserved through an amendment to the relevant region planning scheme. When land is reserved in a region planning scheme the owner becomes entitled to compensation from the responsible authority under certain circumstances. The WAPC is the responsible authority in areas covered by the Metropolitan, Peel and Greater Bunbury Region Schemes.

Owners of reserved land are consulted by the WAPC during the amendment process, to ensure they are aware of the implications of the change in reservation for their property. Owners of reserved land have a number of options:

- retain ownership of the property, and under non-conforming use rights, continue to use the property for the purpose for which it was legally being used immediately before the reservation came into effect
- apply to develop or subdivide the property (which may be approved if the use is for a temporary use, or would not be in conflict or is consistent with the long-term intended purpose of the reservation)
- sell the property on the open market
- offer the property for sale to the WAPC.

Land reserved under region planning schemes is generally ultimately acquired by the WAPC, but usually remains in private ownership until needed by the government (Western Australian Planning Commission, n.d.). If a property is urgently required and the owner is unwilling to sell it, the WAPC can compulsorily acquire the property (with compensation paid to the landowner). It is common for large reserved areas to go through a transition period, where the properties within the area have a mixture of different owners (e.g. a combination of private landholders, local government, WAPC, other state government agencies).

If the WAPC refuses a development application on reserved land, or approves it subject to conditions that are unacceptable to the applicant, the applicant can make a claim for compensation for injurious affection. The WAPC may elect to purchase the property instead of paying compensation.

The WAPC may be willing to purchase a reserved property if an owner is unable to achieve a private sale (subject to acquisition priorities and the availability of funds). The WAPC purchases reserved properties at their current market value, ignoring the effect of the reservation (subject to acquisition priorities and the availability of funds).

In the Perth metropolitan region, funds for the acquisition of land by the WAPC, and paying compensation to land owners, come from the Metropolitan Region Improvement Fund (MRIF), which is raised through the Metropolitan Region Improvement Tax (MRIT).

The MRIT established in 1959 under the *Metropolitan Region Improvement Tax Act 1959* (Department of Treasury, 2013). It is an annual tax, collected with the State Land Tax, based on the taxable value of land in the Perth metropolitan region. All MRIF funds are administered by the WAPC and are collected and spent in the metropolitan region for the provision of regional open space, transport corridors and other public facilities. Currently, there is no similar mechanism in place to fund the acquisition of reserved land in the Peel or Greater Bunbury regions. However,

the State Government allocates funds directly from consolidated revenue for the purchase of sites in these areas.

An estimated $86.4 million was raised through the Metropolitan Region Improvement Tax in 2012/13 (Department of Treasury, 2013). In recent years, these funds have not been entirely spent each year, but have accumulated.

Case Study 2: Yellagonga Regional Park in Appendix 3 gives an example of the process of reserving, acquiring and managing land for a public purpose. Before the park was established, the land in the area was already subdivided, had many different owners and was used for a variety of purposes. The WAPC has gradually purchased most of the prvate land since 1975 and aims to eventually acquire all of the properties within the park area.

Although WAPC is responsible for acquiring land that has been reserved through a region planning scheme, the WAPC does not have a long term land management role. Once acquired, the ownership of reserved land is transferred to the appropriate agency (e.g. as seen in Case Study 2 all lands reserved for regional parks at Yellagonga are vested in the Conservation Commission of WA and the Cities of Joondalup and Wanneroo). This agency is then responsible for the development and implementation of management plans (although other organisations or government agencies may be engaged to undertake this role on behalf of the landholder). If land is reserved for a public purpose but has not been acquired by the WAPC, it may continue to be used as it was before the reservation came into effect. However, any changes to use should generally be in accordance the reservation and the management plans that may be in place for these sites.

The MRIF can be used to acquire any type of reserved land in the Perth metropolitan area. However, the WAPC does not purchase land for agencies that have other funding sources for land acquisition. For example, over time the WAPC has purchased land reserved for primary regional road use for the Perth to Darwin National Highway and transferred ownership to Main Roads WA. Main Roads has now received state and federal government funds for the completion of some sections of this road and part of such funds would be used to purchase the portions acquired by the WAPC, with such funds going back into the MRIF. So, the WAPC is no longer purchasing land on its behalf in these areas. Main Roads is now responsible for the acquisition of the properties required for road construction.

3.3.3 Development on Reserved Land

In the WA land-use planning system, ‘development’ is the development or use of any land including any demolition, erection, construction, alteration of or addition to any building or structure on the land and the carrying out on the land of any excavation or other works. Normally, all applications for approval to commence development are to be submitted to the local government in whose district the land is situated and are assessed with due consideration of the LPS, as per the process described in section Approval Process2.4.4.

Local planning schemes automatically include land reserved under a region planning scheme (e.g. public purpose). On these sites development approvals are determined by the WAPC (Western Australian Planning Commission, 2004). Approval to commence development may not be required at all, if the use of reserved land owned by or vested in a public authority is for the purpose for which the land is reserved, for the purpose which it has lawfully been used before the scheme came into effect or for any other purpose for which the land may lawfully be used by the public authority.

Therefore, once a site is reserved in the region scheme, obtaining approval to develop the site should be quicker and easier, with more consistent decision-making, than for non-reserved sites, provided the development is in accordance with the site management plan.

3.3.4 Using Public Purposes Reservation to Secure Waste Facility Sites

As discussed above, reserving sites for public purpose use under the region planning schemes is an established mechanism in WA's land-use planning system for the long-term securing of land for essential services and infrastructure. This same mechanism could potentially be used to secure existing waste facilities, as well as sites for development of future facilities.

3.3.4.1 Reserving Existing Waste Facility Sites for Public Purposes Use

A public purposes reservation could potentially be applied to any existing waste facility site. However, not all waste facilities require the long-term security of reservation.

As a starting point, six waste facilities on sites owned/operated by local governments or regional councils have been identified for potential reservation (Table 6). These sites have been used as a basis for the Perth and Peel waste management system examples for 2020 and 2050 in section 7. The examples also use the JFR (Jim) McGeough Resource Recovery Facility, which is on a crown reserve site already reserved for public purposes use under the MRS, and some potential new localities for waste facilities identified through a preliminary site assessment process (see section 5.4).

These existing local government waste facility sites have been identified for potential public purpose reservation because they are not currently reserved under a region planning scheme, and have some (or all) of the following characteristics:

- the waste facilities on site contribute to the diversion of waste from landfill in a significant and direct way (e.g. they include a materials recovery facility, recycler, or an alternative waste treatment facility)
- the site is large enough or could be expanded to include several waste facilities
- the site is within an area compatible with the development and operation of waste facilities (e.g. an established industrial zone or potential industrial area)
- the site is well located for the operation of waste facilities (e.g. it is near waste sources, it has access to necessary services and transport routes)
- the site is in a highly developed or constrained area, and opportunities for finding alternative waste facility sites nearby are likely to be limited.

Table 6: Waste facilities on sites owned by local governments proposed for public purpose reservation under the Metropolitan Region Scheme

	Facility Name	Site Owner	Facility Operator	Size of Site	Waste Facilities Currently Operating	Current MRS zoning/ reservation
	Neerabup Resource Recovery Facility	Mindarie Regional Council	Biovision 2020 Pty Ltd (SITA)	10.4ha	AWT facility (MBT)	Industrial
	Balcatta Recycling Centre	City of Stirling	City of Stirling (with contracted private operator)	10.7ha	Putrescible transfer station, drop-off facility (plus vehicle depot)	Industrial
	Hazelmere Recycling Centre	Eastern Metropolitan Regional Council	Eastern Metropolitan Regional Council	9.5ha	Timber and mattress recycling	Industrial
	Bayswater Transfer Station and MRF	City of Bayswater	Transpacific Industries (TPI)	1.9ha	Putrescible transfer station and 'clean' MRF	Industrial
Adjacent Sites	SMRC Regional Resource Recovery Facility	City of Canning	Southern Metropolitan Regional Council	32ha	AWT (MBT), 'clean' MRF, green waste drop-off and mulching	Industrial
Adjacent Sites	Ranford Road Waste Transfer Station	City of Canning	City of Canning	65.5ha	Drop-off facility, inert transfer station, green waste mulching	Rural*

* identified as potential industrial area in *Economic and Employment Lands Strategy*, (Western Australian Planning Commission, 2012).

These sites are all within the boundaries of the MRS and are concentrated around the centre, north and east of the metropolitan area (Figure 15). No sites in Peel were selected because the major local government-owned waste facilities in this region (Mandurah Waste Management Centre and Tim's Thicket Septage and Inert Waste Disposal Facility) are on sites already reserved for public purposes use under the Peel Region Scheme.

Local government-owned putrescible landfill sites in Perth and Peel have not been identified for potential public purpose reservation sites at this stage. None of these landfill sites currently include MRF or AWT facilities, and they also carry the inherent risks associated with the post-closure management of putrescible landfill sites. Further investigation would be needed to determine how much developable land was potentially available at these sites, and what the long term post-closure implications would be. The Red Hill Waste Management Facility, which currently includes a Class III landfill, Class IV landfill, green waste mulching, and drop-off facility, should be given particular consideration, as the Eastern Metropolitan Regional Council are in the planning stages for an AWT facility at this site.

In December 2013, Department of Environment Regulation officers undertook informal consultation with officers from the local government/regional council site owners listed in Table 6. There was general support for the idea of reserving sites.

3.3.4.2 Reserving New Waste Facility Sites for Public Purpose Use

It is not necessary (or desirable) to limit the development of new waste facilities to sites that are reserved for public purpose use. However, reserving sites for future waste facilities has potential

advantages. It can decrease the lead time taken to develop new waste facilities, because the potentially time-consuming task of finding suitable sites has already been completed.

The building up of a waste facility 'land bank' over time can help ensure that sites are available when and where they are needed, particularly for major facilities with regional significance; this enables long-term planning.

The areas determined to be potentially suitable for the development of waste facilities through a preliminary site assessment process could be used as a starting point for the identification of sites for the development of new waste facilities that may benefit from public purpose reservation (see section 5.4).

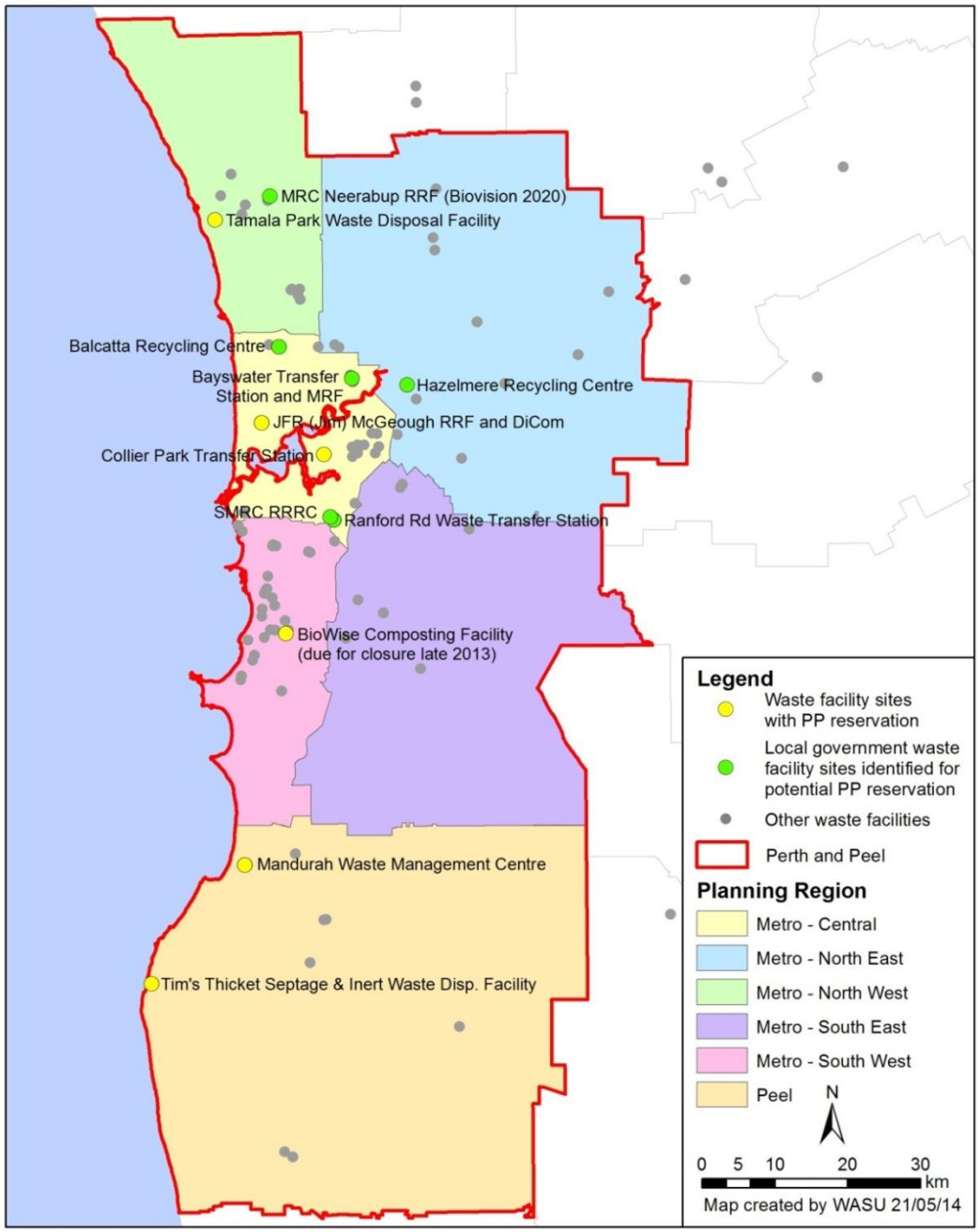

Figure 15: Existing waste facilities on sites owned by local governments/regional councils proposed for potential public purpose reservation under a region planning scheme

3.3.4.3 Funding the Acquisition of Reserved Waste Facility Sites

Once existing and new waste facility sites have been identified for public purpose reservation, it would need to be determined if and when the sites require state government acquisition. If reserved, land is acquired by the WAPC, then it is created as a crown reserve and vested in a management agency. If the land is to be used for a purpose for which recoupment applies, then it would be transferred at market value to the appropriate state government agency. For waste facility sites, this agency would be determined by the governance model in place (see section 6.3 for information on governance options). These sites are usually purchased over time as they come up for sale, but may be compulsorily acquired if necessary.

The appropriate state government agency would need to develop and implement a long-term acquisition plan for reserved waste facility sites, which outlines which sites will be acquired, when they will be needed, and for what purpose. An outline of the acquisition process is presented in Figure 33. Land acquisition strategies would involve consideration of not only the location and cost of a site, but the investment of time and money required to make it development-ready.

In the Perth metropolitan region, funds for the acquisition of reserved land by the WAPC for community purposes comes from the MRIF (see section 3.3.2). Sites reserved for waste facilities could be acquired by the WAPC using the MRIF and ownership transferred to the appropriate state government agency to manage the sites, in a similar way to land reserved for primary regional roads where funds are recouped to the MRIF.

However, there are potential disadvantages to relying on the use of the MRIF for acquisition of waste management sites.

Firstly, the WAPC generally has long-term commitments in place for the expenditure of the MRIF due to the large amount of land reserved in the MRS. Waste facility sites would have to compete with other acquisition priorities.

Secondly, the MRIF can only be used to acquire land within the boundaries of the Metropolitan Region Scheme. So, it could not be used to purchase waste facility sites in the Peel region or other areas. A DoP discussion paper on planning reform (Department of Planning, 2013) flags the desirability of funding schemes outside the metropolitan region (e.g. establishing separate improvement funds for different regions), but these mechanisms are not yet in place.

Other essential service providers that own PP reserved sites (Water Corporation, Western Power) use their own funds for the acquisition of sites and do not rely on the MRIF.

The Waste Avoidance and Resource Recovery Levy (WARR Levy) may be an alternative source of funds for acquisition of waste facility sites and paying compensation to land owners when required. In 2012/13, $39 million was forecast to be raised through the WARR Levy, of which $9.75 million was allocated to the Waste Avoidance and Resource Recovery Account (WARR Account). Following the recent increase in the landfill levy from 1 January 2015, it is anticipated that the funds allocated to the WARR Account will increase from $16 million in 2014/15 to approximately $30 million per annum by 2015/17. WARR Account monies are currently spent on Waste Authority projects and staffing of the DER Waste Management Branch and Office of the Waste Authority.

One of the Infrastructure Strategies under Strategic Objective 1 of the Waste Strategy is the provision of funding support for the public purchase of strategic sites and buffers throughout the State, in consultation with the WAPC.

The Waste Authority considers that funds from the WARR Account could be used for acquisition of reserved strategic waste facility sites or compensating owners of reserved sites. A proportion of WARR Account funds would need to be set aside for this purpose. Like the MRIF, these WARR Account funds would need to accrue over time, to provide a pool of funds for purchasing sites and a contingency for paying compensation. The WARR Account funds could be used in one of two ways.

1. WARR Account funds are used to reimburse the WAPC

WAPC would amend region planning schemes to reserve slected strategic existing and long-term future waste facility sites for PP use. The MRIF could be used by the WAPC to purchase these sites and compensate owners in accordance with the acquisition plan developed by the appropriate state government agency. Ownership of the sites would then be transferred to that agency and WARR Account funds used to reimburse the WAPC's MRIF at market value at the date of transfer.

The advantage of this strategy is that the WAPC, which is very experienced in the acquisition of land and has policies and mechanisms in place for purchasing reserved properties, would undertake the acquisition process. The appropriate state government agency would, however, be required to manage the sites once acquired. This strategy may also overcome the potential difficulty of waste facility sites having to compete with other reserves for MRIF funds, as WARR Account funds would be available to reimburse the WAPC. It does not, however, address the problems caused by the restriction of MRIF expenditure to the Perth metropolitan region. This strategy could not be used to purchase land in the Peel region, or any other regions.

2. WARR Account funds are used to directly purchase sites

WAPC would amend region planning schemes to reserve waste facility sites for PP use, but MRIF funds would not be used to purchase these sites and the WAPC would not need to acquire them. Instead, the appropriate state government agency would develop an acquisition plan and purchase sites directly, in accordance with this plan. This is similar to the way some other essential service providers that own PP reserved sites (Water Corporation, Western Power) acquire reserved land. It is also the way reserved sites are acquired by state government agencies where funding is available for a particular project (e.g. Perth to Darwin National Highway).

The advantage of this strategy is that the appropriate state government agency has more control over when and how reserved waste facility sites are purchased. It also means the agency has the freedom to purchase sites whether or not they are reserved. For example, the agency could purchase some industrial zoned land adjacent to a PP reserved waste facility site to create a buffer. It also overcomes the geographical limitation of the MRIF, which can only be spent in the Perth metropolitan region at present. The agency could to purchase sites in any region. The potential disadvantage of this strategy is that the state government agency that developed the acquisition plan would be responsible for the acquisition process, which would require ongoing financial, legal and administrative expertise.

There could be a combination of these approaches depending on circumstances. Whichever way sites were purchased, they should be created as crown reserves for waste management facilities to ensure long-term security for such purposes.

Whichever acquisition strategy is used, WARR Account funds would need to be set aside and allowed to accumulate specifically for the purpose of acquiring sites reserved for waste facilities and paying compensation to land owners.

Financial modelling is required to determine whether either of these strategies would require an increase in the WARR Levy. The costs involved would depend on the amount of land reserved and the timeframe of region planning scheme amendments, as the State Government would potentially be liable for the cost of purchasing/compensating owners for all waste facility sites. This is potentially on a few hundred hectares, which would not be a greatly significant task - in the context of the approximately 30,000 hectares of reserved land purchased by the WAPC since 1960.

For some reserved waste facility sites, where the current owner is managing the site in a way which is consistent with the government's intentions for the site, state government acquisition may not be necessary. This would have to be considered on a case-by-case basis. For example, some of the local government waste facility sites identified for potential public purposes reservation (see section 3.3.4.1) already include waste facilities that contribute to the diversion of waste from landfill in a significant and direct way (e.g. MRFs, recyclers, or AWT facilities). If the local government intends to retain ownership of the site and continue operating the waste facilities on it, or develop/upgrade facilities in a way which is consistent with the site's management plan, the State Government may not need to acquire the site. Contingency funds must be in place, however, in case the state is required to purchase the site (e.g. if the local government decides to sell it), or pay compensation to the owner (e.g. if the local government is limited in the use or development of the site because of the reservation).

The state government agency can potentially offset the purchase and administration/management costs of waste facility sites by using them to generate income. This could be achieved by leasing sites at a commercial rate.

3.3.4.4 Ownership and Management of Reserved Waste Facility Sites

Options for ownership and management of reserved waste facility sites depend on the governance model in place (see section 6.3), the current ownership and use of the site and the acquisition process. There are many potential options.

For *existing* waste facility sites that are reserved for public purpose use, the options include the following:

- the current landholder could retain ownership and continue operation of facilities
- the state government could purchase the site, create it as a crown reserve and lease it back to the current owner/operator to operate the facility (or contract an organisation to operate it)
- the state government could purchase the site, created it as a crown reserve, then directly contract the current owner/operator (or another organisation) to operate the facility
- the state government could purchase the site, create it as a crown reserve and operate the facility.

For *new* waste facility sites which are reserved for public purpose use, the options include the following:

- the site could be reserved but continue with current non-waste management use until it is required, and purchased by, the state government

- the state government could purchase the site, create it as a crown reserve, construct waste facilities, and contract another organisation to operate the facilities
- the state government could purchase the site, create it as a crown reserve and contract another organisation to construct and operate the facilities
- the state government could purchase the site, create it as a crown reserve, construct waste facilities, and operate waste facilities.

Regardless of the ownership and operation arrangements for reserved waste facility sites, the appropriate state government agency will need to develop and implement management plans for each reserved site. Implementation of management plans would likely be collaboration between the state government, site owners and facility operators.

Local planning schemes do not apply in areas reserved under a region planning scheme so at these sites the WAPC would determine development applications (see section 3.3.4).

3.3.4.5 Potential Implications of Reserving Strategic Waste Facility Sites

Reserving waste management infrastructure sites through the region planning schemes may have some potential considerations, as discussed below.

Roles and responsibilities

The appropriate government agency (or agencies) to undertake the roles of development of an acquisition plan, site ownership, and management of reserved waste facility sites would need to be identified or created. This will depend on the governance structures in place.

Funding

Funding for waste facility site acquisition and compensation would need to be secured if the MRIF was not used, and a mechanism put in place for its expenditure. Use of WARR Account funds may require establishment of a special account for land acquisition/ compensation purposes. This is likely to require an increase in the amount of funding allocated to the WARR Account. This could be achieved by either an increase in the proportion of landfill levy hypothecated to the WARR Account or by an further increase in the landfill levy rates.

Long term land availability

Reserving waste facility sites will secure them for waste management activities in the long term. Waste treatment technologies and requirements may change over time and the types of waste facilities operating at these sites may change accordingly. However, the land will always be available for waste management activities. This enables long-term planning and investment decisions to be made. It should be noted that reservation of waste facility sites will not increase their level of protection from community complaints, and waste facilities must operate in accordance with their licence conditions, whether on reserved sites or not.

Appropriate selection of sites to be reserved, and appropriate regulation and operation of these facilities, will help reduce the likelihood of conflict with sensitive land uses, and ensure waste facilities can operate at these sites in the long term.

Buffer areas

Buffer areas should be reserved and acquired as part of new sites for development of waste facilities. In some cases it may be possible to use existing land uses as buffers between waste facilities and sensitive land uses (e.g. regional open space, existing industrial development). If acquisition of buffer areas is included in sites, these can potentially be used for activities such as low-impact waste facilities, other (non-waste management related) industrial land uses or other compatible activities.

Change in development approvals process

Local planning schemes would no longer apply at waste facility sites that were reserved, with development approvals determined by the WAPC. This may help simplify, streamline and make more consistent the approvals process for proponents.

Local governments would be able to comment on development applications for reserved sites and proponents will have to demonstrate that they have taken local planning schemes into account. However, the WAPC would be the decision-making authority at reserved waste facility sites.

Approval to commence development may not be required at all, if the use of reserved land owned by or vested in a public authority is for the purpose for which the land is reserved. For example, WAPC approval may not be required for a change of use of a site reserved for waste management activities where one waste facility type is replaced with another or a new waste facility is added to the site. However, all normal environmental approvals and licences would still be required.

Greater state government involvement in the waste industry

In the past, there has been no state government coordination of the siting of waste facilities in Perth and Peel, with proponents of new facilities choosing locations according to land availability and their own evaluations of site suitability.

The waste industry, local government, Regional Councils, the Waste Authority, Department of Environment Regulation, WAPC, Department of Planning and the state government agency (or agencies) responsible for ownership and management of reserved waste facility sites will all need to have input into and cooperate with the reservation and acquisition of waste facility sites.

Changes in land requirements

If, in the long term, it was determined that a site that had been reserved for waste management activities was not needed for this purpose, the site could be rezoned through a region planning scheme amendment. It could then be re-developed or sold in any way consistent with its new zoning.

Finding 2

Waste management activities could be better integrated into the State's planning system using existing mechanisms. In particular, defining waste facilities in the Model Scheme Text, development of a state planning policy for waste facilities and reserving strategic sites for waste management purposes under the Western Australian Planning Commision's region planning schemes could remove significant barriers to establishment of waste processing infrastructure.

Finding 3

The WARR Account could provide a source of funding for the acquisition of waste facility strategic sites reserved for public purposes use under the region planning schemes, and compensation of site owners, subject to adequate WARR Levy funds being available for this purpose. Acquired strategic sites would be made available on a leasehold basis to waste manaegemnt operators to ensure long-term security for sites.

4 Technology

The following section provides a high-level assessment of a range of different waste management technologies. The assessment of these technologies against several suitability criteria has been used as a basis for the technology mixes in the waste management package examples for 2020 and 2050 in section 7.

4.1 Criteria for Determining Suitability of Technologies

There are a number of issues to consider when determining which technologies are suitable for the Perth metropolitan and Peel regions. These issues are explored below.

4.1.1 Ability to Contribute to the Achievement of the Waste Strategy Landfill Diversion Targets and Place in the Waste Hierarchy

The primary purpose of the WRIP is to improve waste management in the Perth metropolitan and Peel regions and to contribute to the achievement of the waste recovery targets as set out in the Waste Strategy (see Table 1). Therefore, consideration of the technologies and technology mixes that will best be able to contribute towards delivering these targets is an important factor. Issues such as the ability to divert waste from landfill and allow waste to be reused, recycled, recovered or treated will be considered under this criterion.

4.1.2 Readiness of Technology

The readiness of the technology is an indication of its availability and suitability to be deployed within the Perth metropolitan and Peel regions in the near future. Generally, technologies that are ‘ready’ are those for which commercial-scale reference plants are currently operating and a similar commercial-scale plant could be fully operational in Perth within 5 years of receiving all approvals.

4.1.3 Reliability of Technology

Reliability is a measure of the extent to which the technology will be able to effectively process waste as designed. To be considered reliable, there must be several examples of a commercial-scale plant of this technology that have been processing waste with a operational availability of over 90%.

4.1.4 Capacity of Technology

A key consideration is the capacity of the technology, i.e. the quantity of waste that a waste facility can process annually. Plants must be able to be constructed, and preferably have the ability to be expanded, to have the throughput capacity to process the amount of waste expected to be generated as the population grows. Where technical restraints limit the size of a plant, this would be seen as detrimental.

4.1.5 Flexibility of Technology

The flexibility of the technology means the ability of the technology to accommodate variations in the amount and composition of the waste being processed. It also includes the ability for the plant to be easily converted to process other, similar waste streams.

Facilities that are more flexible are likely to be able to generate improved economies of scope by managing several waste streams in an integrated way improving efficiency.

4.1.6 Environmental Performance of Technology

Any technology that is included in the infrastructure plan will need to have a low risk that it would not meet the environmental regulatory requirements of Western Australia. In addition, it is preferable that the technologies included in the infrastructure plan process waste in a manner that is environmentally preferable when compared to conventional technologies. While technologies that have a higher position within the waste hierarchy will be generally considered to be better environmental performers than those lower in the hierarchy, it is also useful to consider the broader environmental impact of the waste technologies, for example, consider emission of pollutants, emissions of carbon-di-oxide, impact on soil and groundwater, noise and odour produced, waste produced and energy and water consumed.

4.1.7 Siting Requirements and Suitability within Perth and Peel

Siting requirements for waste facilities can vary according to facility type, with some waste facilities are easier to site than others. However, there are some siting issues that are common to all facility types.

Siting waste infrastructure will need to take into consideration amenity issues (such as odour), buffers and transport issues. Being able to locate infrastructure in close proximity to the source of waste generation is also a key consideration to avoid congestion and pollution impact associated with transporting waste.

Essentially, the risk profile of a technology will inform decisions on siting; as such, this will need to be taken into account when determining how suitable particular technologies are for the Perth metropolitan and Peel regions.

Siting issues are discussed in more detail in section 5.1.

4.1.8 Cost of Technology

The overall expected economic impact of a technology is important. Costs to be considered include capital costs, operational costs, the cost of post-closure care, transport costs, the value of any products, the cost of disposing of residues, and so on. Each of these will affect the final gate fee; this will determine how competitive the plant will be compared to alternatives.

In addition, other economic impacts could be considered, such as the potential for employment.

4.2 Summary of waste technologies

This section provides a brief summary of individual technology categories considered in the WRIP and an initial assessment of each technology type against the assessment criteria above.

4.2.1 Transfer Stations

For the purposes of the SWIPP, transfer stations are aggregation points for bulk quantities of waste prior to recycling or disposal. They do not permanently store waste, but are a short term transfer depot where collection vehicles bring waste, where it is then loaded into larger haulage vehicles to be transported to other facilities for processing or disposal (material recovery facilities,

waste-to-energy facilities, recyclers or landfill). Using larger vehicles to consolidate waste reduces the overall haulage costs. Transfer stations can allow for waste to be screened in order to retrieve recyclables and remove contaminants. It should be noted, however, that not all waste goes through a transfer station, with much going directly to a mixed-waste processing facility or directly to landfill.

4.2.2 Drop-off Facilities

Drop-off facilities are places where residents or small businesses can deliver small volumes of domestic or commercial waste. They are usually operated by local governments and regional councils. These facilities do not accept waste from commercial collection vehicles or large volumes of C&I waste. Drop-off facilities usually consist of a series of large receptacles or bunkers for different categories of waste. The waste is then bulked for onward transfer to a reprocessing, treatment or disposal facility.

4.2.3 Landfills

Landfill sites offer a controlled method of disposal for solid waste materials and are a well-established, proven waste technology. Landfills are a carefully designed structure either built into or on top of the ground in which waste is buried. They vary in type and design, depending on local conditions and requirements and the type of waste they accept. Although landfills are the least preferred waste management option in the waste hierarchy, they are a crucial element in the management of materials that cannot be recovered or treated in other waste facilities.

Encapsulated or dry tomb landfills are lined, often with an impermeable layer of clay with an overlying flexible membrane layer, designed to minimise water infiltration and to prevent contamination to the surrounding environment and groundwater. When water percolates through the landfill it combines with the broken down waste material to form leachate. Leachate drainage and removal systems are operated to manage the potential of contamination to the local environment. Landfill gases are also produced, which contain around 50% methane, 50% carbon dioxide and small amounts of other gases. These gases must be managed to avoid a major hazard. Therefore, landfills either vent or burn the gases. In more recent years, the methane has been extracted from the gas and to be used as a fuel. Leachate and landfill gas is managed throughout the operating life of the landfill; and for several decades beyond closure, to manage emissions to air and land.

Bioreactor landfills accelerate the process of decomposition within the landfill through the re injection of leachate. The accelerated decomposition produces methane at a higher rate than traditional landfills. This higher concentration of methane is more efficient for use through a gas turbine to produce electricity. If the gas is not used to produce electricity it is flared to convert it into carbon dioxide, reducing its greenhouse impact. Generally, the size of the landfill and the quantity of feedstock will determine if landfill gas management is a commercially viable option. The increased rate of decomposition also reduces the mass of the landfill therefore significantly maximising the landfill capacity which is an additional advantage.

In Western Australia, landfills are licensed by the Department of Environment and Conservation under Schedule 1 of the *Environmental Protection Regulations 1987*.

Inert landfills or Class I landfills are licensed under Category 63 of the *Environmental Protection Regulations 1987* to receive non-hazardous, non-biodegradable waste. Inert landfills are the main disposal option for construction and demolition waste.

Putrescible landfills or Class II or III landfills are licensed under Category 64 or 89 of Schedule 1 of the *Environmental Protection Regulations 1987* and are the main disposal option for municipal solid waste and commercial and industrial waste generated in the Perth-Peel region. Putrescible landfills can receive both putrescible waste (waste that is likely to become putrid and thus decompose) and inert waste.

4.2.4 Materials Recovery Facilities

A materials recovery facility (MRF) is a facility for sorting and pre-processing materials from the waste stream for resource recovery through a combination of manual and mechanical sorting. MRFs are either considered 'clean' or 'dirty' depending on the nature of their feedstock. MRFs may be 'clean' (source-separated recyclables are sorted into different material types for recycling) or 'dirty' (mixed waste is sorted to separate recyclable and non-recyclable waste). Waste received by 'dirty' MRFs often requires pre-sorting to remove contaminants, to open plastic bags and to shred the waste.

The sorting process used at MRFs varies depending on the waste stream and the target market for the separated materials. Waste typically recovered for recycling includes paper, glass, metals and plastics which are then sent to third parties for processing. Residual waste is sent to putrescible landfill. 'Dirty' MRFs produce more residual waste to landfill than 'clean' MRFs.

The mechanisms for separation can include screens for paper and cardboard, advanced optical scanners for glass and plastics, magnetic bands for steel and eddy currents to separate aluminium cans. Optical scanners are excellent to separate multiple grades of plastics. However, the capital cost of the investment is so large that high volumes of feedstock are required to justify the investment. As a result, manual sorting often takes place in smaller MRFs. Alternatively, materials are transported onward to another facility for further separation. The value of fully sorted plastics is much higher than that of mixed plastics. The waste is then further sorted to recover clean streams of material, which can then be recycled.

4.2.5 Alternative Waste Treatment - Mechanical Biological Treatment

Alternative waste technology (AWT) is a technology used to recover resources from the mixed waste stream; it is an alternative to landfill. Mixed solid waste can be converted into energy or useful by-products by being treated in AWT facilities using mechanical, biologic or thermal processes. While AWT diverts waste from landfill, it does generate some residual waste, which is ultimately disposed of in landfills.

Mechanical biological treatment (MBT) facilities are the most common form of AWT used in Australia. There are a wide variety of types of MBT plants. However, they all follow the same a basic process.

Initially, a mechanical sorting stage separates the non-organic components of the waste stream either for recycling or disposal in landfill. The waste stream undergoes initial preparation to remove large foreign objects such as mattresses. Refuse bags are split to expose that material inside and start the breakdown process of any biodegradable material. The waste is then subject to a sorting process to separate out recyclable materials, which in many advanced facilities use technology similar to a MRF.

The organic waste is then treated aerobically and/or anaerobically to produce a stabilised compost material for use on land. The organic stream which is separated out is then sent for biological treatment through either aerobic or anaerobic digestion.

During the process of ***aerobic digestion***, organic material is decomposed by microbial activity in the ***presence of oxygen***. During the process: temperature increases; carbon dioxide and water are produced; and pathogens are destroyed. Depending on the feed stock and process technology, aerobic decomposition can achieve waste stabilisation, fuel production or produce compost. There are three main types of aerobic treatment: tunnel composting is carried out in batches of waste inside large rectangular concrete tunnels with aeration provided via floor channels; in composting halls material is composted in large sheds/halls where windrows are turned by large augers; in rotating drum composters, the waste is continuously mixed and aerated by the rotation of the drum.

During the process of ***anaerobic digestion***, organic material is broken down by microbial activity in the ***absence of oxygen***. The process takes place in large vessels in which temperature and pH is controlled. As materials break down, methane-rich biogas is released and captured in biodomes. The gas is then used to produce steam or to power a gas turbine engine to produce electricity. Heat is also produced, which can be used for heating the digesters or for drying materials in another process. The residual biodegraded material, referred to as digestate, is a nutrient-rich organic material, which can be used as a fertiliser or soil conditioner.

The residual waste that is not appropriate for recycling or biological treatment is usually sent to landfill. However, it may also be suitable for incineration as refuse-derived fuel.

4.2.6 Alternative Waste Treatment - Thermal Waste-to-energy

Thermal waste-to-energy treatment facilities are those that use heat to assist in the decomposition of waste. There are various technologies that fall under this category: incineration, gasification, and pyrolysis. Some of these technologies are still being developed.

The most mature type of waste-to-energy technology is the process of incineration. Modern incinerators have undergone technological improvement and are subject to much stricter controls on emissions. During incineration, the organic component of the waste stream is combusted in excess oxygen. This process produces a waste gas, ash and heat, which can be used to generate power.

The most common types of incinerator are moving grate combustion and fluidised bed plants. A moving grate combustion plant passes waste through a combustion chamber via a moving grate system and waste is burned. The hot flue gases that are generated by the combustion process travel through the boiler, which transfers heat to water to produce steam. Ferrous metals are extracted from the incinerator bottom ash (IBA) and recycled. The IBA can be used as a secondary aggregate in the construction industry or is disposed of to landfill as inert waste; this depends on its characteristics and whether there are any markets for it as a product. The flue gases pass through an emissions treatment process to reduce the pollutants to a minimum before they are released to atmosphere.

In the fluidised bed method of incineration, waste is screened to remove large recyclable materials and then shredded to reduce the size down to less than 150mm. This process is thermally more efficient than moving grate combustion, but it does produce a greater volume of fly ash. The process consists of a bed of particles, through which a flow of air is pumped mixing the waste on

the bed. The waste is then fed through to the combustion chamber and as a result of the mixing of the waste it is easier to burn at a lower temperature. During the process, the levels of nitrogen oxides that are produced are generally much lower than that of the moving grate system.

Gasification is the process of heating the organic component of the waste in a slightly oxygen reduced environment to produce a synthetic gas - syngas. The process uses very small amounts of oxygen to which steam is combined and cooked under an intense pressure. A series of reactions then produce a gaseous mixture consisting of mainly carbon monoxide and hydrogen. The gas can be combusted immediately, or cleaned for use in gas turbines, upgraded to a higher fuel type or used to create chemicals. An inert waste residue in the form of an ash or slag is also produced.

Pyrolysis is the thermal decomposition of waste in the absence of oxygen. The reactor is heated to a temperature that causes the organic waste to break down into three products: pyrolysis oil, pyrolysis gas and solid char. The pyrolysis oil can be further processed to produce a synthetic fuel oil. The char can be used as a fuel or in agricultural applications as a soil improver.

There is often confusion around the difference between gasification and pyrolysis. Essentially pyrolysis is performed at a lower temperature and in the absence of air. The main output is predominantly a liquid and smaller amounts of gas and solids. If the process is carried out at higher temperatures, the main output is syngas, with smaller amounts of liquid and solid.

4.2.7 Construction and Demolition Recycling Facilities

Construction and demolition (C&D) waste recycling facilities process C&D materials (asphalt, bricks, concrete and sand, soil, clean fill and rubble) and other C&D waste (e.g. timber, metal, plastic) for reuse and recycling. There are four major C&D materials recycling facilities in the Perth metropolitan and Peel regions (Figure 11) and a number of smaller-scale facilities that transport, salvage, sort and aggregate all types of C&D waste.

C&D recycling facilities may receive source-separated waste or mixed waste. They screen, sort and process materials such as brick, concrete, asphalt, rubble, metal, timber and plastic. As material is received into the facility, the waste is usually given an initial inspection to remove any unsuitable materials. Materials are then screened using various mechanical separation methods such as magnets, screens, density separators, wind sifters and manual picking lines. One material in particular that must be excluded or removed is asbestos. Its historical use in Australian construction means that it is fairly common.

Once materials are separated, crushing operations are carried out on concrete and masonry. Various methods are used including mechanical jaw, impact crushers and cone crushers, depending on the final specification requirements. The final output is an aggregate material for construction, as well as landscaping products such as road base, aggregate, drainage material, clean fill and sand.

4.2.8 Composting Facilities

For the purposes of this project, composting facilities are taken to be facilities that process source-separated organics, such as household garden and food waste, to produce a high quality mulch or composted product. In Perth and Peel, there are a number of these facilities of a variety of sizes; each one accepts different organic wastes and uses a slightly different treatment process.

The most common type of organic processing in Perth and Peel is open windrow composting. The waste is shredded and placed in extended piles usually on an impermeable pad. The windrows are turned on a regular basis to for good distribution of oxygen, heat and moisture. The final compost product is screened and may be stored in stockpiles for further maturation. The final output is ideal for use as a soil improver, mulch, top soil or growing medium ideal for landscaping and agriculture applications. The production of compost can take between 12 to 20 weeks to complete.

Composting can also be undertaken in enclosed or semi-enclosed environments, referred to as In-vessel Composting (IVC). The enclosed vessels are carefully monitored for temperature, moisture and aeration levels, to create the perfect environment for aerobic decomposition. The material is left to mature for a period of between four to eight weeks. The turning compost frequency is optimised to ensure that the product is rapidly sanitised and stabilised. Additional benefits of closed composting systems or 'in-vessel' systems are that potential odour and vermin issues can be reduced.

4.2.9 Other 'Recycling' Facilities

This category includes facilities dismantle/shred, sort, decontaminate and/or bale materials such as e-waste, scrap metal, paper, glass, timber, plastic and send them interstate or overseas for recycling.

4.3 Waste Management System Options Modelling

The network of major waste and recycling infrastructure obviously needs to operate in an integrated way. The principles guiding the selection of the technology mix are as follows:

- treatment of waste should be as close to the point of generation as possible
- the system should maximise the diversion of waste from disposal (both landfill and waste-to-energy)
- the system should maximise the value of recovered materials.

4.3.1 Waste Management Technology System Options – Sensitivity Analysis

The aim of this component of the project was to test the ability of different technology types to achieve the waste diversion targets. The waste flows for four waste management system options have been modelled as if implemented for the entire Perth and Peel regions. The options modelled are:

1. Use of mechanical biological treatment (MBT) plants to process mixed solid waste to produce a compost-like output (CLO), which is utilised as either a low-grade compost or as a feedstock for another composting plant.
2. Use of MBT plants to process mixed solid waste to produce a refuse-derived fuel (RDF), which is utilised in a waste-to-energy (W2E) plant.
3. No MBT plants are used, and all mixed waste is processed through a W2E pre-treatment plant and then a W2E facility.

4. Neither MBT nor W2E plants are used. Waste diversion relies on source separation, with all mixed waste not separated at source for recycling being disposed to landfill.

Apart from the characteristic described above, each of the waste system options assume comprehensive source-separated collections, particularly of organic waste, in both the MSW and C&I waste streams. This is currently not the case. So, it would need to be implemented for these models to be valid.

Flow charts for each system option are presented in Appendix 5A.

The model relies on a large number of assumptions, including the recovery rate by material type by waste stream. Therefore, the outputs would vary widely, depending on the actual capture rates for each 'recyclable'. The assumptions are listed in Appendix 5B.

For each option, three different scenarios were modelled:

1. High waste generation rate (band E population growth) and low source separation (30%);

2. Medium waste generation rate (band C population growth) and medium source separation (50%); and

3. Low waste generation rate (band A population growth) and high source separation (70%).

These scenarios were chosen to demonstrate the impact of changes to the amount of mixed waste needing to be processed. Scenario 1 results in a large amount of mixed waste, while scenario 3 results in a much lower amount of mixed waste requiring processing.

The outcomes of the modelling, presented below, indicate that considerably more processing capacity is required to meet the landfill diversion targets in the waste strategy.

Please note that the total estimated infrastructure capacity is greater than the waste generation, as the outputs from some facilities are input streams for other facilities.

4.3.2 Option 1 – Mechanical Biological Treatment producing compost-like output

Under this option, mixed putrescible waste from the MSW and C&I waste streams are processed through a MBT facility, with the recovered organics being sent to a compost market and the residuals disposed to a putrescible landfill. Material collected through local government vergeside hard waste collections is sent directly to putrescible landfill for disposal.

This system is similar to that already in place in the Southern Metropolitan Regional Council (SMRC) and the Mindarie Regional Council (MRC).

A flow chart and the modelling outputs of this option are presented in Appendix 5.

The high proportion of organic material in the MSW waste stream means that MBT processing, combined with source-separated collections, can result in high diversion rates using this system. However, it sometimes results in low quality products with market acceptance difficulties.

Reasonably high diversion rates in the C&I waste stream can also be achieved, provided there is full access to MBTs for processing mixed C&I waste.

The low proportion of organic material in the C&D waste stream means that this sector needs to rely on either high levels of source separation or high recovery rates from mixed C&D waste processing to achieve high diversion rates.

Under this option, there would need to be a substantial increase in the processing capacity of MBT and enclosed composting for source-separated organics. There would also need to be a substantial increase in the processing capacity of source-separated C&D waste.

4.3.3 Option 2 – Mechanical Biological Treatment Producing Refuse-Derived Fuel for Thermal Waste-To-Energy Plants

Under this option, mixed putrescible waste from the MSW and C&I sector would be treated in a MBT facility to produce a refuse-derived fuel (RDF) that is then processed in a waste-to-energy facility. The residuals from the waste-to-energy facility are disposed to putrescible landfill.

Material collected through local government vergeside hard waste collections is assumed to be processed in a mechanical pre-treatment facility prior to being processed in a thermal waste-to-energy plant.

The mixed waste stream from the C&D sector that is not sent to a recycling facility is assumed to be treated in a mechanical pre-treatment plant prior to being processing in a thermal waste-to-energy plant.

A flow chart and the modelling outputs of this option are presented in Appendix 5A.

A summary of the outcomes of the waste flow modelling for Option 2 for the year 2020/21 are as per the tables in Appendix 5B.

The inclusion of waste-to-energy in this system results in a very high waste diversion rate for all waste streams.

This option would require extensive new processing capacity for MBT and waste-to-energy facilities. Further, the current MBT facilities would not necessarily be suitable as pre-treatment for W2E.

The degree of source separation and the waste generation rate has a significant impact on the amount of MBT and W2E capacity required. Under scenario 1, the MBT required is 2 Mtpa and the W2E required is 2.6 Mtpa, while under scenario 3, the amount of processing capacity required is half of the amount in scenario 1. This has a significant impact on the capital investment required.

4.3.4 Option 3 – Waste-To-Energy

Under this option, mixed waste from the MSW, C&I and C&D sectors is treated in a mechanical pre-treatment facility prior to being processed in a thermal waste-to-energy facility.

Material collected through local government vergeside hard waste collections is assumed to be processed in a mechanical pre-treatment facility prior to being processed in a thermal waste-to-energy plant.

A flow chart and the modelling outputs of this option are presented in Appendix 5B.

This option results in a very high rate of diversion of waste from landfill. However, it has a high capital cost.

4.3.5 Option 4 – No Mixed Putrescible Waste Processing

This option has no processing of mixed waste for resource recovery in the MSW and C&I waste streams. It relies on source separation to divert materials from landfill. C&D waste can be processed through either source-separated recycling facilities or mixed-waste recycling facilities. Material collected through local government vergeside hard waste collections is disposed directly to landfill.

Under this Option, the current MBTs would be converted to enclosed composting facilities, processing source-separated food and green waste. In order to meet the targets in the waste strategy, source-separated collection systems would need to be maximised.

A flow chart and the modelling outputs of this option are presented in Appendix 5.

The waste diversion rates are much lower than those predicted in other options that have processing of mixed putrescible waste.

This option also has much lower overall processing capacity requirements. The capacity that is required is for lower cost plants, such as MRFs and recycling plants. As a result, it also has much lower capital costs.

4.3.6 Summary of sensitivity modelling results

A summary of the sensitivity analysis of the four system options is presented in Table 7, Table 8, Figure 16 and Figure 17 below.

As can be seen clearly from the graphs, while waste-to-energy results in much higher waste diversion rates, it also has a much higher capital investment cost than systems without waste-to-energy included.

As can be seen clearly in Figure 16 and Figure 17, increased source separation results in significantly less processing capacity required and significantly lower capital costs. Whether the difference in capital cost is offset by increased collection costs is yet to be determined.

Overall, some kind of processing of mixed putrescible waste will be required to meet the waste diversion targets. In addition, maximising source separation of recyclables will be important for minimising the capital cost of the processing infrastructure.

Finding 4

Some kind of mixed putrescible waste processing will be required to meet the waste diversion targets. In addition, maximising source separation of recyclables will be important for minimising the capital cost of the processing infrastructure.

Table 7: summary of infrastructure capacity requirements (ktpa)

Infrastructure requirements ('000 tpa)	O1S1	O2S1	O3S1	O4S1	O1S2	O2S2	O3S2	O4S2	O1S3	O2S3	O3S3	O4S3
Materials Recovery Facility (MRF)	439	439	439	439	657	657	657	657	1010	1010	1010	1010
Enclosed composting	233	233	233	233	458	458	458	458	617	617	617	617
Open windrow	101	101	101	101	132	132	132	132	162	162	162	162
Mechanical Biological Treatment (MBT)	1560	1560	0	0	1133	1133	0	0	680	680	0	0
W2E pre-treatment (mechanical)	0	2062	3623	0	0	1240	2373	0	0	824	1504	0
Waste-to-energy	0	2644	3417	0	0	1688	2249	0	0	1128	1466	0
Recyclers	547	797	803	532	829	977	982	817	1108	1154	1155	1104
C&D recycler (source-segregated)	864	864	864	864	1414	1414	1414	1414	1943	1943	1943	1943
C&D recycler (mixed)	647	647	647	647	636	636	636	636	259	259	259	259
Diversion rate	50%	80%	83%	36%	64%	83%	85%	54%	72%	84%	86%	66%

Table 8: summary of infrastructure capital cost estimates ($million)

Infrastructure CAPEX ($million)	O1S1	O2S1	O3S1	O4S1	O1S2	O2S2	O3S2	O4S2	O1S3	O2S3	O3S3	O4S3
Materials Recovery Facility (MRF)	44	44	44	44	66	66	66	66	101	101	101	101
Enclosed composting	74	74	74	74	146	146	146	146	198	198	198	198
Open windrow	2	2	2	2	2	2	2	2	2	2	2	2
Mechanical Biological Treatment (MBT)	1014	1014	0	0	737	737	0	0	442	442	0	0
W2E pre-treatment (mechanical)	0	165	290	0	0	99	190	0	0	66	120	0
Waste-to-energy	0	2644	3417	0	0	1688	2249	0	0	1128	1466	0
Recyclers	137	199	201	133	207	244	245	204	277	288	289	276
C&D recycler (source-segregated)	22	22	22	22	35	35	35	35	49	49	49	49
C&D recycler (mixed)	32	32	32	32	32	32	32	32	13	13	13	13
TOTAL	1325	4196	4081	307	1225	3049	2965	486	1082	2287	2238	639

NB: “O” = “Option” and “S” = “Scenario. For example, O1S1 is Option 1 Scenario 1.

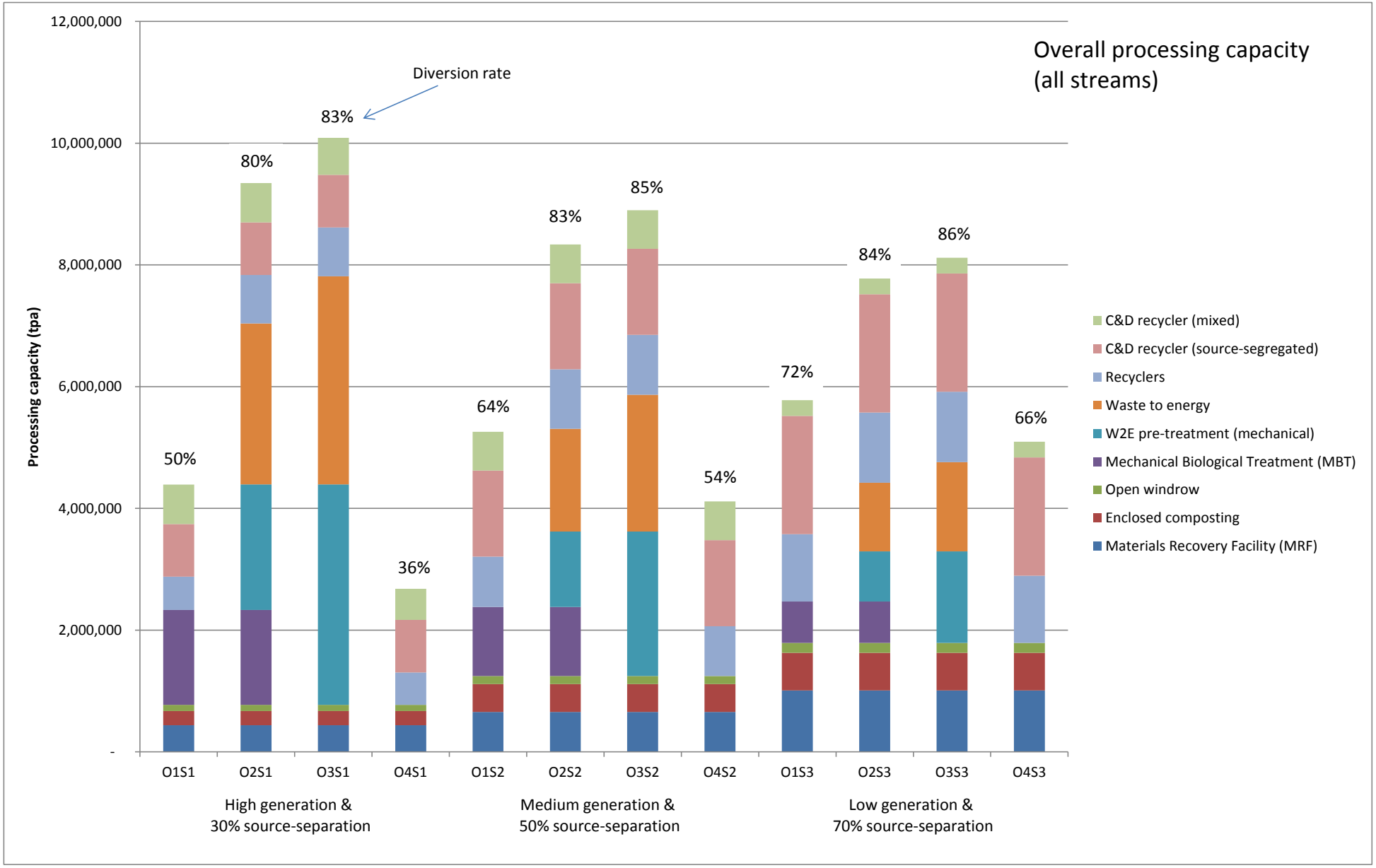

Figure 16: Comparison of scenario model results – required processing capacity

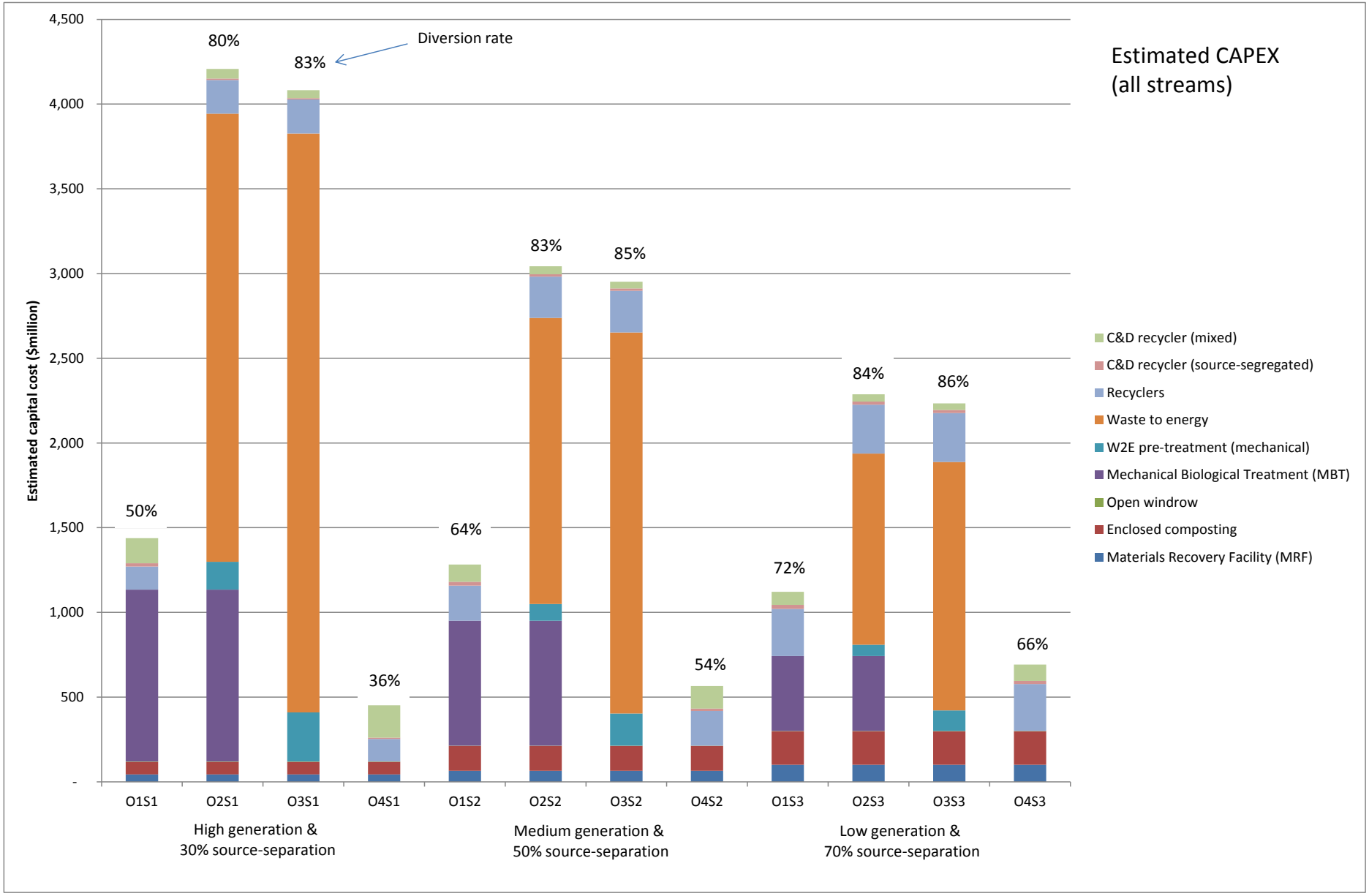

Figure 17: Comparison of scenario model results – required processing capacity

5 Sites for the Development of Waste Facilities

As discussed in previous sections, there will be a need to secure sites for waste facilities in future to process the waste generated in the Perth and Peel regions. It is preferable that these facilities are established in waste precincts, which are on sites that are reserved for waste management purposes in the region planning schemes. Therefore, a co-ordinated long-term approach to identifing and securing suitable waste facility sites, with adequate buffers, in Perth and Peel will contribute, in a strategic way, to achieving the landfill diversion targets of the Waste Strategy.

5.1 Characteristics of Potential Waste Facility Sites

There are a range of issues that must be considered when identifying suitable sites for waste management infrastructure. Some of these are discussed below.

A. Access to Transport Corridors

In the waste industry, there is a heavy reliance on road transport. Materials are likely to enter and leave a facility via a variety of vehicles, from residents' cars to commercial collection vehicles to long-haul freight trucks.

It is, therefore, important that waste management facilities are located within easy access to primary roads. In addition, it is important that the roads surrounding the facility are suitable for heavy vehicles.

There is also potential for transport of waste by rail, and for future export of waste types overseas through ports. So, access to these transport options should also be considered when locating waste facilities.

B. Proximity to Waste Sources and End Points

Locating waste management infrastructure close to sources of waste generation can reduce the need to transport waste over long distances; reducing traffic congestion, truck noise, cost and the carbon footprint of waste management. Ideally, waste management facilities would be located close to the sources of waste they process.

In estimating where waste is generated, it is important to consider both the waste produced by new residents or businesses (e.g. in greenfield sites to be developed in the metro northwest or metro southwest sub-regions), and the on-going waste produced by existing residents and businesses (e.g. in the metro inner and metro middle sub-regions).

Access to waste end points is also important, as waste delivered to facilities is likely to be processed and then transported off site. For example, recyclable materials are generally transported to recycling facilities overseas, AWT residues are transported to landfill and green waste is transported off site for composting.

C. Zoning and Protection from Buffer Encroachment

While proximity to the urban and commercial areas where waste is generated is advantageous, it is also important that waste facilities are protected from sensitive land

uses encroaching on buffer areas. Waste management facilities may create noise, dust, or odour issues and face community opposition and complaints.

Buffers between waste facilities and sensitive land uses may be created in a variety of ways. *Statement of Planning Policy 4.1 State Industrial Buffer Policy* (WAPC 1997b) recognises that while all industries and infrastructure should incorporate buffer areas within their site boundaries, this may not always be practical or economically viable. Buffer areas, both on- and off-site, may be used for other purposes (e.g. public open space, low-impact waste facilities or other industrial facilities).

Locating waste infrastructure within appropriately zoned areas, surrounded by compatible land uses, can reduce the likelihood of problems caused by buffer encroachment. Co-location with compatible existing land uses or facilities (such as existing waste facilities, quarries, closed landfills or Water Corporation sites) may be beneficial for both the existing facility and the new waste infrastructure.

D. Access to Services/Utilities

Waste management facilities, like most general industrial facilities, require access to waste, power, gas and sewage services. Some facilities, such as anaerobic MBTs and waste-to-energy facilities, may also produce electricity. So, it is important that these can access the power grid to supply electricity to it.

E. Environmental Protection

All industrial land uses, including waste management facilities, should be located in environmentally suitable areas. This includes consideration of Bush Forever sites, Public Drinking Water Source Areas, wetlands (especially Conservation Category wetlands), flora and fauna (TEC's, DRF's etc.), acid sulphate soils etc.

Consideration also needs to be given to the proximity to sensitive receptors. Even if the facility has the specified buffer, all waste facilities release emissions beyond their boundary and buffer, from time to time. Therefore, the further the facility is from sensitive receptors, the better.

F. Potential Workforce

Proximity to a potential workforce is one of the criteria use in the *Economic and Employment Lands Strategy* (WAPC 2012a) in identifying which areas may be suitable for development as Industrial zones in the future. This also applies to sites that may be suitable for waste management facilities.

5.2 How Much Land is needed for Waste Facilities in Perth and Peel?

In order to estimate the amount of land likely to be required for development of new waste facilities in Perth and Peel, waste facilities were assigned default site sizes. These are presented in Table 9.

Table 9: Default site sized used to estimate land requirements for waste facilities.

Default Site Size	Min. ha per facility	Max. ha per facility
C&D waste recycling (enclosed)	2ha	12ha
Composting (enclosed/in-vessel)	2ha	10ha

Default Site Size	Min. ha per facility	Max. ha per facility
Mechanical biological treatment facility	2ha	10ha
Materials recovery facility	1ha	3ha
Waste-to-energy	3ha	10ha

These default site sizes have been applied to the Perth and Peel waste management package examples for 2020 and 2050 in section 0 to give an estimate of the amount of land required for development of new waste facilities. It is estimated that by 2020 approximately 50ha to 265ha of land may be needed in Perth and Peel to accommodate the waste facilities required to meet the landfill diversion targets of the Waste Strategy for all waste streams (MSW, C&I and C&D). To maintain this diversion rate when the population reaches 3.5 million it is estimated that 54ha to 473ha will be required (Table 71, Table 72). This does not include the area needed for buffers.

This estimate incorporates the larger scale facilities likely to be processing a large throughput of mixed waste or waste from several different waste streams. Other facilities that may be required (but which are not included in the land estimate above) are

- smaller scale recyclers of source-separated materials (e.g. e-waste, scrap metal, paper, glass, timber, plastic)
- transfer stations (putrescible, inert, or mixed inert/recyclable)
- drop-off facilities
- inert landfills
- putrescible landfills.

The exact number of hectares given in this estimate should not be taken as a precise evaluation of land requirements. A more detailed level of modelling is required to determine this more accurately. There are many factors that could affect land requirements. Several examples are given below:

- Facility footprints and site requirements can vary greatly depending on the specific waste treatment technology used and the scale of the facility. Land requirements may be reduced by choosing technologies with small footprints, or increased where large-scale facilities with a greater capacity are required
- Requirements for space for storage, access, parking, administration etc. may vary greatly at different facilities
- Overall land requirements may be reduced with efficient use of land at co-location sites or precincts

This estimate does indicate, however, that over the next 30 yeatrs or so, tens to several hundred hectares of land may be needed for development of new waste facilities, rather than thousands or tens of thousands of hectares.

The *Economic and Employment Lands Strategy* identifies 12,990ha of potential industrial sites and 13,737ha of zoned industrial land in the Perth and Peel, of which 1,211ha is vacant. Although, much of this vacant land is not suitable for development in the short to medium term due to pre-

existing activities. Compared with the potential amount of industrial land available, the amount of land estimated to be required for waste facilities is relatively small. This does not mean, however, that waste facility sites will necessarily be easy to identify and secure. Waste facilities will have to compete with other industrial facilities for a limited supply of land. The timing of land availability is important; development of waste facilities must keep pace with increasing waste generation and there are many factors that make identifying strategic waste infrastructure sites a complex process.

Land requirements for new waste facilities may in part be met by co-locating new facilities at existing waste facility sites, redeveloping existing waste facility sites or upgrading existing facilities, particularly in more highly restricted or developed areas where new sites may be more difficult to identify and obtain. This has many potential benefits, as it can

- make more efficient use of existing waste facility sites
- reduce the time and cost associated with finding new suitable sites
- reduce the cost required to make new industrial land development-ready
- rake use of established infrastructure (e.g. roads, driveways, weigh bridges, parking areas), services (e.g. water, power, sewage) and buffer areas.

Land requirements will likely need to be met by a combination of existing and new waste facility sites.

5.3 Distribution of Waste Facilities: Use of Waste Precincts and Co-location

5.3.1 Defining Waste Facility Co-location and Waste Precincts

It is important to clarify the use of the terms “waste facility co-location” and “waste precinct” for the purposes of this document:

> ***Waste facility co-location:*** *two or more waste facilities are accommodated at a single site, where the facilities are owned/managed/operated by the site owner.*

In the Perth metropolitan and Peel regions are there are some examples of co-located waste facilities at sites owned and operated by private companies. Most sites include an inert landfill or transfer station in combination with other waste facilities (Table 34).

There are also numerous examples of co-located waste facilities at sites owned by local governments or Regional Councils, where the facilities are operated by the local government/Regional Council or their contracted staff (Table 34). Drop-off facilities are included at all local government/Regional Council sites with co-located waste facilities, in combination with other facility types which process municipal solid waste (which may be dropped off by residents or collected by the local government/Regional Council).

One atypical Regional Council site is the Western Metropolitan Regional Council (WMRC) JFR (Jim) McGeough Resource Recovery Facility. This site is a Crown Reserve vested in the WMRC and initially included only facilities owned and operated by the WMRC. In 2007, however, the WMRC signed an agreement with DiCOM AWT Operations Pty Ltd (Anaeco and Palisade Investment Partners) to construct a DiCOM alternative waste treatment (mechanical biological treatment) facility at the site. The WMRC owns and operates other waste facilities at the site, but

does not own or operate the DiCom facility. In this way the JFR (Jim) McGeough Resource Recovery Facility now operates in some ways like a waste precinct.

> ***Waste Precinct:*** *an area (which may be sub-divided into smaller sites) that accommodates two or more waste facilities which are owned/managed/operated by separate entities, which may be independent of the site owner.*

The ownership and governance structure of waste precincts is potentially more complicated than that of co-located waste facilities, as it may involve one (or more) land owner(s) and more than one organisation owning and operating waste facilities, leasing sites from the landowner.

One example of this structure is the Wingfield Waste and Recycling Centre in South Australia. Wingfield Waste and Recycling Centre is a waste precinct owned and developed by Adelaide City Council. It is a 96ha former landfill site located approximately 9km north of the Adelaide CBD. The precinct is located within an industrial area, with industrial land to the south and undeveloped potential industrial land to the north, which protects it from encroachment from sensitive land uses. It is within an area zoned *Industrial (Resource Recovery)* by the SA State government.

The Wingfield Landfill closed in 2004, and the Adelaide City Council redeveloped the site as a waste processing and recycling centre. It put all the service infrastructure in place and selected four compatible/complimentary primary tenants for the precinct through an expression of interest process:

- Amcor - Paper and cardboard waste
- Adelaide resource Recovery (ARR) - Construction & demolition waste and clean fill
- Jeffries Group - Green waste
- TPI - Residual waste (transfer station).

The Adelaide City Council leases sites within the precinct to these tenants. It owns the common weighbridge for the site, which enables it to collect data on all of the materials entering and leaving the site. In 2007, almost one million tonnes of waste was accepted at the precinct, approximately 87% of which was recycled. Some 84 people are employed within the precinct.

Potential waste precinct ownership, governance and operational models (and their advantages and disadvantages) require further investigation to determine which is preferable in the context of the Perth metropolitan and Peel regions.

There are currently no examples of waste precincts operating in the Perth metropolitan and Peel regions, although the JFR (Jim) McGeough Resource Recovery Facility operates like a waste precinct in some ways.

Facilities within a waste precinct may operate cooperatively or completely independently. It is important, however, that facilities within a precinct are compatible.

5.3.2 Potential Advantages and Disadvantages of Co-location and Precincts

Grouping compatible waste facilities together through the use of co-location or precincts can have many potential benefits, some which are discussed below.

Land use efficiency

Use of co-location and precincts may require less land overall, as land at well-designed sites can potentially be used more efficiently (e.g. shared buffers, access points, parking and boundaries). This is consistent with the *Economic and Employment Lands Strategy* aim of making industrial land development meet state needs as efficiently as possible (Western Australian Planning Commission, 2012).

Flexibility

Sites that could potentially accommodate a number of waste facility types are likely to be the most useful; they will enable maximum flexibility into the future. Larger sites that could be subdivided into smaller lots, or accommodate several facilities within a single site, may be more flexible than smaller sites. They may also allow more capacity to change waste facilities over time as needed.

Coordination and staging

Waste precincts or co-location sites may give the state government a greater ability to coordinate the development of different combinations waste facilities, ensuring the facilities are developed when and where they are needed. Larger sites allow for scheduling of the development of different parts of the precinct over time.

Data collection

Use of a single weighbridge for the various facilities within a waste precinct or co-location site could enable increased data collection related to waste and recycling materials and efficiency.

Buffer efficiency and protection

Compatible facilities grouped together can share buffers. Some of the potentially less publicly-accepted facility types and those facilities with larger buffer requirements may be surrounded by other compatible waste facilities or other compatible land uses.

Planning efficiency

The WAPC anticipates increasing competition for industrial land in the Perth metropolitan and Peel regions. It is, therefore, likely that smaller sites for more easily-located waste facilities (such as small-scale recyclers) may be secured by proponents. However, larger sites and sites for more difficult-to-locate facilities may be increasingly difficult to secure. Proactively considering co-location or precinct sites, and securing/developing them over time as land becomes available, will ensure waste facilities are not ‘out competed’ by other industrial land uses.

Landfill diversion efficiency

The strategic grouping of waste management facilities can potentially improve recycling and recovery rates, as facilities have the capacity to work cooperatively. The outputs of one process may form the inputs of another process. For example, mixed waste may be processed through an AWT to separate recyclables from organic waste; the recyclables may then be processed though a MRF to sort them into different material types; recyclers may then clean/bale/shred sorted materials for recycling.

Transport efficiency

The location of compatible waste management facilities on the same site could reduce the need for road or rail transport of waste: the outputs of one process may form the inputs of another process. Grouping waste facilities together in areas appropriately located on transport corridors may also help reduce waste-related truck movements through sensitive areas

Business and employment opportunities

Larger sites that could accommodate a range of facilities types, both large and small, may create opportunities for smaller companies, as well as larger ones.

Long-term security and stability

Although the specific businesses or facility types may change over time, the establishment of waste precincts or co-location sites can help give more certainty to the waste industry regarding the amount and location of land available in the long term

Consistency with WAPC and Department of Planning objectives

The draft *State Planning Strategy* (Western Australian Planning Commission, 2012) supports the principles of industrial ecology and economic clusters, and encourages co-location of similar enterprises, including waste facilities. The *Economic and Employment Land Strategy* (Western Australian Planning Commission, 2012) forecasts increasing demand and competition for industrial zoned land, and prioritises more intensive use of the existing industrial areas of high economic and location value. Well-designed waste facility precincts or co-location sites could help achieve this by making efficient use of industrial land. One of the objectives of *Directions 2031 and Beyond* (Western Australian Planning Commission, 2010) is to manage urban growth and make efficient use of available land and infrastructure. This includes maximising essential service infrastructure efficiency and minimising conflict between land use and key infrastructure assets.

There are also some potential disadvantages or limitations to the use of waste precincts or co-location sites. Some of these are discussed below.

Community perceptions

If there are problems with one facility within a precinct (e.g. odour, litter), the whole precinct may face community opposition and complaints.

Community acceptance

There may potentially be greater community opposition to the development of a waste precinct, which will house a number of different waste facilities together, than to a stand-alone waste facility. Significant public consultation and education would be required to mitigate this.

Traffic congestion

A waste precinct or co-location site could potentially have a high volume of traffic, with a range of users and vehicle types. Traffic would have to be managed to ensure that the site can operate safely and efficiently. These issues can be addressed through site design. For example, waste trucks and the cars of residents dropping off waste should always be separated on site and the site should be designed for efficient flow of vehicles. The impact of increased traffic on the surrounding area would also need to be considered to minimise potential problems (e.g. congestion, noise).

Management and administration

There are many different ways in which a waste precinct or co-location site could operate. However, they often require some level of centralised management and administration. The issues of who would do this, how it would be done, and how it would be funded must be considered. This would add an administration overhead and some operational constraints to the facilities on the site.

Finding and securing sites

It may potentially be more difficult to find and secure the larger, more flexible sites needed for precincts or co-location sites compared with the smaller sites needed for stand-alone facilities.

Local amenity

Like any industrial area, a waste precinct or co-location site has the potential to impact negatively on the amenity of its local area. This can be mitigated with the implementation of design guidelines for the precinct or co-location site. Although, it would be important to ensure that all facilities complied with any guidelines.

Attracting and sustaining businesses

The precinct or co-location site must be located, managed and marketed in such a way as attract to the appropriate types of waste facilities. Mechanisms such as economic incentives or a streamlining of the planning and approvals process may be considered to attract operators to the site. A waste precinct will not be successful if the waste industry does not consider it a desirable location for building new facilities, if there are barriers to the construction or operation of waste facilities at the site, if it is not economically competitive with other location options, or if an incompatible combination of waste facilities and other businesses are established at the site.

It is likely that the future land requirements for waste facilities will be met by a combination of precincts, co-location sites and stand-alone facilities.

Finding 5

The grouping of waste facilities in precincts or co-location sites can have many potential benefits. This type of industrial development is broadly supported by the WAPC and Department of Planning.

Waste facility precincts and co-location sites should be well planned, designed and operated, and should incorporate required buffers to maximise advantages and minimise potential disadvantages.

5.4 Preliminary Assessment of Potential Waste Facility Locations

Ensuring that Perth and Peel regions have adequate processing capacity to deal with the anticipated amount of increased waste and to meet the landfill diversion targets of the Waste Strategy will require both identifying and securing sites for the development of new facilities. The continued and efficient operation of existing waste facilities will also be required.

Appropriate site selection for waste facilities at the beginning of the development process is important as it can avoid potential delays in approvals processes, reduce public concern, and reduce the need for expensive design and on-going management measures to overcome problematic sites (Department of Urban Affairs and Planning, 1996). Examining potential locations in a methodical way, based on appropriate criteria, can help ensure that suitable sites are selected;

it can ensure that the development and operation of waste facilities will not be restricted due to inappropriate site choice.

A preliminary assessment of 93 areas zoned industrial under the MRS or PRS, identified as potential industrial land in the EELS, or owned and nominated by the Water Corporation, was undertaken to identify locations that could be suitable for waste facility precincts or co-location. This section outlines the background, methodology and outcomes of the preliminary assessment of potential waste facility locations.

It should be noted that it is not intended that the development of all new waste facilities be restricted to locations identified through the preliminary assessment process It is not intended that existing waste facilities that fall outside the assessed areas should be moved or cease operations.

The first step in enabling access to suitably located land with buffers to cater for the State's waste management needs (Strategic Objective 1 of the Waste Strategy) is identifying where this 'suitably located land' is available. The preliminary assessment process is the starting point in achieving this.

5.4.1 Objectives and Assumptions of the Preliminary Assessment Process

As a starting point for the identification of suitable sites for future development of waste facilities, the Strategic Waste Infrastructure Planning Working Group engaged a consultant to undertake the preliminary assessment of a number of locations in the Perth metropolitan and Peel regions, in accordance with the following objective:

> ***Waste Facility Location Assessment Objective:*** *The objective of the location assessment process is to identify sites that will potentially suit a range of waste facility types. The sites should enable facilities to contribute to the Waste Strategy landfill diversion targets by operating as efficiently as possible, with a minimum of negative impacts on the surrounding community and environment, as part of an integrated waste management network in the Perth metropolitan and Peel regions.*

It is expected that any assessment process to determine suitable specific sites for a waste precinct or single waste facility would be undertaken in several stages. The preliminary assessment is a broad 'first pass' review of areas in Perth and Peel that are zoned industrial, indicated as potential industrial in the EELS or nominated by Water Corporation. The aim of the review was to determine the potential suitability of these areas for waste facilities that have a presumed buffer separation distance of up to 500m, which are generally industrial in nature and that are usually best suited to industrial zoned areas.

This preliminary assessment process provides an indication of the *potential* suitability of a *general* location only. It is not intended to identify particular lots or blocks of land. It is assumed that detailed assessment and modelling will be required once it is known what type and how many waste facilities may be developed.

The preliminary assessment process is NOT intended to

- identify particular lots for the development of waste facilities
- identify sites for the development of specific waste facilities (i.e. specify the exact type and capacity of a facility to be developed at a location
- replace the normal planning and approvals processes for development of waste facilities.

5.4.2 Types of Waste Facilities

The preliminary assessment process focuses primarily on finding potential locations for the development of waste facilities that have a presumptive buffer separation distance of up to 500m and that are usually best suited to industrial zoned areas. A generic presumptive buffer based on the EPA buffer recommendations have been allocated to ifferent waste facility types. These are listed in Table 10.

Table 10: Presumptive buffer separation distances allocated to waste facilities for the purposes of the Stage 1 area assessment process

Waste Facility Type	Potential Impacts(1)	Presumptive Buffer Separation Distance
C&D waste recycling (enclosed)	Noise, dust, odour	500m
Composting (enclosed/in-vessel)	Noise, dust, odour	500m
Mechanical biological treatment facility	Gaseous, noise, dust, odour, risk	500m
'Dirty' materials recovery facility	Gaseous, noise, odour, risk.	500m
Waste-to-energy	Gaseous, noise, odour, risk	500m
Recycler (e-waste, scrap metal, paper, glass, timber, plastic)	Noise, dust, odour.	200m or 500m (depending on scale and type of material)
Transfer station (putrescible, inert, recyclables)	Noise, dust, odour.	200m
'Clean' materials recovery facility	Not covered in EPA Guidance	200m

(1) Sourced from *Guidance for the Assessment of Environmental Factors – Separation Distances between Industrial and Sensitive Land Uses* (Environmental Protection Authority, 2005).

In reality, buffer requirements would be considered on a facility-by-facility basis Buffer requirements would change depending on the technologies used, DER licence requirements, surrounding land uses, and conditions placed on the proponent of a waste facility by decision making authorities when determining their application for development. For the purposes of the preliminary assessment process, however, a generic buffer has been assumed, to give a general indication of the types of waste facilities that may be potentially suited to the areas assessed.

Existing waste facilities in Perth and Peel are located in areas with a range of different zonings and reservations. However, around half are in industrial zones. Many modern waste facilities that sort, process, aggregate and recover resources from waste, have many similarities with other industrial facilities. As such, they could be considered best suited to industrial zones. This includes both prescribed premises (as described in Schedule 1 of the EP Regs) and unlicensed facilities.

There are currently no waste-to-energy facilities in Perth and Peel, but in its advice to the Minister for Environment under Section 16(e) of the *Environmental Protection Act 1986* the EPA (in conjunction with the Waste Authority) recommended that waste-to-energy plants be sited in appropriate current or future industrial zoned areas with adequate buffer distances to sensitive land uses (Environmental Protection Authority, 2013).

There are also no 'dirty' MRFs operating in Perth and Peel. However, these facilities would also likely be suited to industrial zoned sites, as they have many characteristics similar to other facilities that receive and process putrescible waste (such as MBT facilities).

However, there are some waste facility types in Perth and Peel that are found in a range of different land use zones, and cannot be assumed to be best suited to Industrial zoned areas:

- **Putrescible landfills (Category 64)** - Putrescible landfills do not easily fit into any of the land use zones or reservations in the region planning schemes. In Perth and Peel, most putrescible landfills are found in areas zoned "rural". These were generally constructed at the rural-urban fringe. Although, increasing urbanisation means many are now surrounded by urban areas. The environmental attributes of a site are more important than its zoning when identifying new putrescible landfill sites.

- **Inert landfills (Category 63)** – Inert landfills are often located in active or former quarries. So, existing inert landfills in Perth and Peel are found in a range of different land use zones, depending on quarry locations.

- **Composting facilities** - In Perth and Peel, composting facilities are found in a range of different land use zones, but are most often in either rural or industrial zoned areas. The type of waste composted, the composting processes and technology used and the scale of the facility all help determine which land use zone will be suitable for composting facilities.

- **Drop-off facilities** – Drop-off facilities may be placed in a range of locations depending on their scale and the types of waste they accept. The larger local government drop-off facilities in Perth and Peel, which allow residents to drop-off a range of different waste types and recyclable materials, are often co-located with other local government waste facilities (usually landfills or transfer stations). So, their locations are dependent on where these facilities are found and not, in the first instance, the land use zone. However, in future, it may be desirable to locate drop-off facilities in commercial or even residential areas for convenience.

When assessing potential waste facility locations, therefore, it is important to first determine what type of facilities will be located on the sites. Different sites may be sought, depending on the types of facilities required. The focus on the preliminary assessment process is identifying potentially suitable locations for the larger scale industrial-type waste facilities which area best suited to industrial zoned areas.

It should be noted that identifying sites for landfills (putrescible or inert) is not part of this project. The aim of the Waste Strategy to increase the diversion of waste to landfill, and reach set diversion targets in 2015 and 2020. The WRIP will assist with the achievement of these targets by identifying potential locations to establish recovery, reprocessing, recycling and energy recovery facilities. While planning for future landfills is an important issue, the identification of new landfill sites does not form part of the WRIP.

5.4.3 Areas Assessed

Through the preliminary assessment process, a total of 93 areas within the Perth metropolitan and Peel regions were assessed for their potential suitability for waste facilities that have a presumptive buffer separation distance of up to 500m, which are generally industrial in nature and that are usually best suited to industrial zoned areas. These areas include:

- All existing areas zoned industrial under the Metropolitan Region Scheme and Peel Region Scheme (40 areas, approximately 13,950ha)
- All areas identified as potential industrial areas in the WAPC's *Economic and Employment Lands Strategy* (38 areas, approximately 14,115ha)
- Several sites owned by the Water Corporation, and nominated by the Water Corporation as potentially suitable for co-location with waste facilities (15 areas, approximately 581ha).

The areas assessed are presented in a map in Appendix 7.

There are many potential advantages to locating waste facilities at sites already zoned "industrial" or that have been identified by the WAPC as potential industrial areas.

Most of the existing and potential industrial sites in Perth and Peel have been planned so that they do not overlap with potential incompatible areas such as priority 1 or 2 Public Drinking Water Source Areas, RAMSAR wetlands, and national, state or Aboriginal heritage sites. There are some exceptions to this, however. So, sites must be considered on a case-by-case basis to determine whether these potentially exclusionary factors exist and, if so, can be overcome.

Industrial sites give the most flexibility with regard to which types of facilities can be built on them, because most waste facility types are suited to industrial zones. If other zones are selected (e.g. rural) there may be greater restrictions on the types of waste facilities that may be constructed at the site.

Waste facilities built within existing or potential industrial areas are likely to be surrounded by other industrial facilities. This may have several advantages:

- it may provide opportunities for industrial ecology
- industrial facilities are likely to be compatible neighbours to waste facilities, reducing the likelihood of restrictions on the construction or operation of waste facilities due to incompatible adjacent land uses
- industrial facilities may provide a buffer between waste facilities and sensitive land uses.

Existing or potential industrial areas are likely to have (or have potential for) the services and infrastructure required for waste facilities (e.g. roads, utilities).

Using areas zoned "industrial" means developing waste facilities on land already designated for an industrial purpose, rather than taking land away from other purposes (e.g. high quality agricultural land, high value urban land).

Developing waste facilities in existing or potential industrial areas is consistent with the WAPC's vision for the development of Perth and Peel, as outlined in policies and strategies such as the draft *State Planning Strategy*, the EELS, and *Directions 2031 and Beyond*.

The Strategic Assessment of the Perth metropolitan and Peel regions is currently underway (see section 2.4.1.2). When the process is complete it will streamline the approvals process for new developments, and provide more certainty for proponents and state and local governments, because actions undertaken in accordance with the endorsed MNES Plan will not need further approval under the EPBC Act 1999. Developments that do not conform to the MNES Plan (and

section 16(e) advice developed by the EPA on state environmental matters) must seek approvals on a project-by-project basis. This means that undertaking industrial development (such as construction of waste facilities) in areas outside those already assessed as suitable for this purpose could involve additional approvals processes, and thus be more complicated and time consuming, and less certain

The approvals process for waste facilities is likely to be quicker, easier and more certain if sites already have an appropriate zoning under a region planning scheme.

The potential disadvantages of using Industrial zoned sites for waste facilities are competition and cost. There is limited industrial land available in Perth and Peel, and waste facilities face competition from many other industrial land uses for industrial sites. The cost of purchasing or leasing serviced industrial land may be expensive. Undeveloped potential industrial sites may be cheaper to purchase/lease upfront, but there may be high costs associated with making such sites “development-ready” (e.g. upgrading roads, connection to utilities).

Another possibility is the development of waste facilities at, or within the buffer areas of, waste water treatment plant sites owned by the Water Corporation. This could have potential benefits, such as:

- waste and waste water treatment facilities are generally compatible land uses
- there is potential for industrial ecology between waste facilities and waste water treatment facilities (e.g. composting of bio-solids, water recycling)
- many waste water treatment facilities have mapped buffer areas, and are located at a suitable distance from sensitive land uses
- waste water treatment plant sites are ‘secured’ through public purpose reservation under the region planning schemes (see section 3.3).

There is increasing competition for the limited Industrial zoned sites in Perth and Peel. Therefore, it is important to identify and secure the industrial sites needed for waste facilities in a timely and strategic manner.

5.4.4 Assessment Outcomes

The preliminary assessment process is intended to be a broad ‘first pass’ assessment of potential waste facility locations. Therefore, the assessment criteria used are not the detailed criteria that would be used to identify lots for development of specific waste treatment technologies. The preliminary assessment criteria are aimed at identifying areas with the planning and technical characteristics potentially suitable for the development of industrial-type waste facilities that have a presumptive buffer separation distance of up to 500m (listed in Table 10).

The 93 industrial, potential industrial and Water Corporation nominated areas (see Appendix 7B) were assessed using the criteria outlined in Table 64 and assigned an ‘Area Category’. Determination of the Area Category was mainly a qualitative assessment based on technical and planning characteristics and general advantages/disadvantages of the area, but quantitative assessment of the potential for buffers was also an important consideration.

There are three Area Categories:

- **Area Category A** - Area is potentially suitable for a range of waste facilities that have a presumptive buffer separation distance of up to 500m, as per Table 10.
- **Area Category B** - Area is potentially suitable for a more limited range of waste facilities (only suited to facilities with a presumptive buffer separation distance of 200m or less)
- **N/S** - Not likely to be suitable for development of waste facilities (i.e. areas with no potential for a 200m or 500m buffers to sensitive land uses, or where waste facilities are not a permitted land use within the local planning scheme). These locations may be suitable for small-scale facilities that do not require buffers (or buffers of less than 200m), but they are not suitable for development of waste precincts or co-location sites.

Where even a small proportion of an area had the potential for a 500m buffer from sensitive land uses (e.g. 10-15%), it was assigned an Area Category A.

Of the 93 industrial, potential industrial and Water Corporation nominated areas assessed through the preliminary assessment process, 57 were determined to be potentially suitable for industrial-type waste facilities with a presumptive buffer separation distance of up to 500m (Area Category A), 17 were potentially suitable for a more limited range of waste facilities (Area Category B) and 19 were not likely to be suitable for the development of industrial-type waste facilities (Area Category N/S).

Table 11 shows the amount of land that falls within each category. It should be noted that Table 11 shows the total hectares of the areas assessed. This is not an indication of the amount of land within each area that is suitable or available for the development of waste facilities. There are many reasons that development within these areas might be restricted:

- many areas (e.g. existing industrial areas) are highly developed and construction of waste facilities here may require demolition/renovation of existing buildings
- within each area there is land that is not suitable for waste facilities (or other types of industrial development) e.g. Bush Forever sites, parts of the area too close to sensitive land uses, undevelopable areas required for drainage, contaminated sites
- it may not be practical or affordable to service some parts of the potential industrial areas with the transport and utilities infrastructure required by waste facilities.

Table 11: Outcomes of Stage 1 assessment of industrial, potential industrial and Water Corporation nominated areas in Perth and Peel

Area Category	Industrial Zoned Areas	Potential Industrial Areas	Water Corporation Nominated Areas	TOTAL
A	16 areas 8,580ha	29 areas 13,389ha	12 areas 548ha	**57 areas** **22,517ha**
B	10 areas 1,145ha	5 areas 528ha	2 areas 11ha	**17 areas** **1,684ha**
N/S	14 areas 4,225ha	4 areas 198ha	1 area 22ha	**19 areas** **4,445ha**
TOTAL	**40 areas** **13,950ha**	**38 areas** **14,115ha**	**15 areas** **581ha**	**93 areas** **28,646ha**

For some areas, there is potential for the Area Category to be changed, if barriers to the development of waste facilities can be overcome. For example, an area zoned “industrial” may have been given Area Category B, because its potential for a 500m buffer to sensitive land uses is limited by a sensitive, non-industrial development (e.g. restaurant, retail) within the industrial zone. Removal of the sensitive land use may mean the Area Category can be upgraded to A.

Areas assigned Area Category A have been used as the basis for nominating locations for the development of new waste facilities, precincts and co-location sites in the Perth and Peel waste management system examples for 2020 and 2050 presented in section 0, with two exceptions:

- Examples 4, 5 and 6 - the Balcatta Recycling Centre is nominated as the location for a new MRF. The Balcatta industrial area was given an Area Category of N/S as only a small proportion of the area can accommodate a 200m buffer to sensitive land uses. MRFs are unlicensed facilities; they do not have an EPA-recommended minimum buffer distance. It is assumed that the MRF would be developed within the existing Balcatta Recycling Centre site

- Examples 3, 4 and 5 - the Red Hill Waste Management Facility (EMRC – see section 3.3.4) has been nominated as the location for a new waste-to-energy facility. Under the MRS the Red Hill site is zoned “rural”; therefore, it was not assessed through the preliminary assessment process. Although this site is not in an industrial zoned area, it has many characteristics that make it suitable for waste facilities. It is a large site with an established buffer and has several existing waste facilities (Category 64 landfill, drop-off facility, green waste mulching). The EMRC is in the planning process for development of an AWT facility at the site. No specific technology has been selected at this stage.

5.4.5 Integration of New and Existing Waste Facilities

There are more than 90 licensed and unlicensed waste facilities in the Perth metropolitan and Peel regions; of these, 26 are owned or operated by local governments and Regional Councils and the rest owned/operated by private industry. Catering for Perth and Peel’s future waste management needs, and achieving the targets of the Waste Strategy, will require the development of new waste facilities, and the on-going operation and expansion of existing waste facilities. Land requirements will likely be met by a combination of existing and new waste facility sites.

In the waste management package examples for 2020 and 2050 presented in section 0, the areas assigned Area Category A through the preliminary site assessment process have been used as the basis for nominating locations for the development of new waste facilities, and waste precincts sites. In addition to this, existing local government/regional council waste facility sites have also been proposed as potential locations for the development of new facilities, or as the ‘hub’ of new waste precincts (section 3.3.4).

At some existing waste facility sites there is space for the development of additional facilities within site boundaries, at others additional land would need to be acquired to develop new facilities and establish precincts/co-location sites.

Both existing and new waste facility sites can potentially be secured through public purpose reservation under the region planning schemes (see section 3.3).

To better coordinate the planning, governance and funding of waste facilities, there is a need to develop an integrated waste management network in the Perth metropolitan and Peel regions that incorporates both existing and new waste facilities.

Finding 6

A broad 'first pass' preliminary assessment of 93 industrial, potential industrial and Water Corporation nominated areas in the Perth metropolitan and Peel regions found that 57 areas were potentially suitable for the development of industrial-type waste facilities.

These potentially suitable areas should be used as a basis for further investigation and identification of sites for the development of waste precincts / co-location sites in Perth and Peel.

6 Potential alternative governance models

As set out in section 2.5, given the limitations of the current waste management governance model, it is timely to consider the effectiveness of alternative models to facilitate the achievement of the aims of the WRIP.

This chapter consists of two sections: the first discusses key issues that need to be considered when selecting a governance model for the the waste sector and the second describes a number of different governance models.

The second section sets out the alternative governance models considered and provides commentary on their strengths and weaknesses when compared with the current governance model. It also provides information on potential funding options available under each of the alternative governance models. It incorporates the feedback received from the consultants and from the consultation sessions conducted. A comparison of how each of the models performs against the criteria identified is also provided in Appendix 3.

As set out in section 8.1, the waste management sector in the region comprises three main types of entities - waste generators, waste collectors and processors and waste regulators. For ease of comparison with the current governance model, the current governance model is numbered 'model 1' and the alternative governance models are numbered in sequence from this.

For each alternative governance model considered, the role of the waste regulators is set out first and this is followed by a discussion on the role of the waste collectors and processors. It should be noted that the role of waste generators remains unchanged under the alternative governance models.

6.1 Determining suitability of governance models

For the purposes of the WRIP, any new governance model should be able to achieve the following:

- enable a coordinated and integrated regional approach to waste infrastructure planning, across all waste streams that will improve the ability of the State to meet the Waste Strategy targets
- provide the mechanisms for the appropriate sites and buffers to be secured to cater for the future waste infrastructure needs of the region.

In addition, there are a range of issues that need to be considered when assessing the suitability of different governance models for delivering waste management infrastructure in the Perth metropolitan and Peel regions. These are set out below.

6.1.1 Alignment with state government policy priorities

The main aim in developing the WRIP is to improve waste management outcomes in the region and assist in achieving the recovery rates set out in the Waste Strategy.

To be consistent with the State's policy priorities, any future waste model will need be capable of meeting growing demand for waste management while diverting an increasing proportion of waste away from landfill, towards recycling and other alternative waste processing treatments.

Importantly, the model would need to contribute to the delivery of the waste diversion targets for MSW, C&I and C&D waste - as set out in the Waste Strategy.

Any governance model would also need to enable consistency and appropriate interaction with state government policies, for example planning and environmental policies, and be aligned with relevant public service structures.

6.1.2 Financial impact on government

The financial impact of any alternative governance model on government debt and expenditure is a significant consideration.

Making any changes to the existing waste management governance system is likely to result in costs in three areas:

- **Funding the implementation of the governance changes -** Funding would be required to establish new governance structures under each model. This could include legislative change, structural change to existing public service entities or the creation of new entities. In addition, funding would be required for the development of policies and procedures to support the new governance arrangements.

- **Funding the on-going governance structures -** Funding would be required to maintain and operate the governance structures under each model. This could include administrative costs and the costs associated with delivering various measures to achieve desired outcomes.

- **Funding infrastructure/land -** Under some models, there are costs associated with purchasing land for the purposes of siting waste management infrastructure, for procuring existing processing facilities and for establishing new facilities or providing new services.

The financial impact of these costs will need to be taken into consideration.

6.1.3 Financial impact on participants in waste sector

Participants in the waste sector, including local governments and the commercial sector, have invested significant funds in waste processing infrastructure as well as in the infrastructure required to deliver waste collection services. The financial impact of each governance model on existing participants in the sector and issues of equity and disadvantage will need to be considered. In addition, the ability of the governance model to provide investment security to participants in the sector will need to be considered; specifically, the ability of participants to raise the required capital to deliver new infrastructure and/or services. The ability of the model to facilitate the development of stable markets that allow for improved waste management is also important.

6.1.4 Ability to improve efficiency of waste management

The ability or efficiency of any alternative governance model to improve the efficiency of waste management and assist in achieving the Waste Strategy targets is critical when determining if it might be appropriate for the region.

Key considerations under these criteria would be the ability of alternative model to

- generate appropriate economies of scale

- generate appropriate economies of scope
- better coordinate waste inputs
- provide incentives for the waste sector to improve its efficiency.

Economies of scale are the cost advantages that organisations obtain due to size, with cost per unit of input, or per service delivered, decreasing with increasing scale; this is a result of fixed costs being spread out over more units of output or service. For example, a large waste processing facility would be expected to have a lower cost per unit of input than a smaller facility, all other factors being equal. An organisation with many facilities should have a cost advantage over a competitor with fewer.

Economies of scope refer to the efficiency advantages of being able to manage different products in an integrated way. For instance, while landfill and AWTs are different technologies, there are advantages in having both within an integrated system as this allows for waste streams to be managed in the most efficient way.

Another desirable outcome is the coordination of waste collection. Currently, MSW is collected by or on behalf of individual local governments. Collection arrangements and, therefore, the composition of the waste streams may vary widely between local government boundaries. This has a downstream impact on waste processing, because the extent to which different forms of waste processing and disposal can efficiently be implemented is to some extent driven by waste collection arrangements. The regional local government structure provides for coordination between individual regional local government facilities with participating local government waste streams, but any move to a larger scale is likely to require a greater degree of standardisation of waste collection to allow better integration into a larger system.

The issue of coordination is more pronounced for the C&I and C&D waste streams. Collection from these sectors is completely driven by the free market, with little or no opportunities for co-ordination. Both the C&I and C&D waste streams are much more heterogenous than the MSW waste stream, with both amount and composition of waste depending on the specific source. As a result, the range of services offered, particularly to the C&I sector, varies widely.

Waste is a relatively small proportion of the Australian economy. However, as with any sector of the economy, it is important that it be processed as efficiently as possible. Inefficient waste management has a number of potential costs, such as:

- reducing general economic growth by removing resources from other, higher value areas
- resulting in suboptimal pricing that favours waste disposal options with higher environmental costs
- encouraging illegal waste disposal and result in associated pollution and amenity issues.

The ability of the model to reduce these costs and improve efficiency is a key consideration.

6.1.5 Ability to facilitate better planning for waste infrastructure

Any governance model will need to enable better planning for the waste infrastructure needs of the region as it heads to a population of 3.5 million by mid-century. If waste is generated and processed at current trends then this could mean a doubling of waste infrastructure requirements. Even if significant reductions in waste generation and major increases in recycling are made,

meaning existing absolute levels remain steady, there will still be a need for new infrastructure as existing assets are exhausted.

An effective governance model would need to clearly identify who is responsible identifying the need for new infrastructure. It would also need to clearly identify who is responsible for long-term planning. There would need to be mechanisms to ensure that the land required is identified and made available when needed. The structure established to deliver waste facilities also needs to be capable of meeting the expanding waste needs of the region, as it grows.

The ability of the model to deliver both large-scale changes as well as drive continual improvement is also a key consideration.

6.1.6 Trade practices considerations and Australian Competition and Consumer Commission (ACCC) oversight

Under the WARR Act, local governments have an effective monopoly over MSW collection in their area, although not for other types of waste. There are clear "public good" advantages for a monopoly for MSW and similar arguments could be made to apply to certain segments of the C&I waste stream. Perth is a small market. To achieve economies of scale to make waste collection and processing viable, it might be necessary to create monopolies relating to geographic areas or certain waste types. This would also present the opportunity to reduce the number of collection vehicles in areas of high traffic congestion.

Consideration of the case for monopoly under alternative governance arrangements would need to take account trade practices considerations and ACCC oversight issues.

6.1.7 Ease of implementation

An important factor will be how practical a particular model is to implement. Timeframes for implementation, the need for legislative change and disruption to the industry all need to be considered.

6.2 Model 2: The WALGA vision for waste management

The Western Australian Local Government Association (WALGA) released its 'Vision for waste management in the metropolitan area' (WALGA's position paper) in July 2013, which set out local government's preferred governance model for waste management in the metropolitan region (WALGA model). (Western Australian Local Government Association, 2013)

6.2.1 Model 2 - "The WALGA model"

The WALGA model proposes a reduction in the number of regional local governments in the region from five to three and sees the state government taking on an increased role in waste management in the region. It should be noted that the WALGA model proposes a governance structure that only covers the MSW stream. Additional mechanisms will be required under this model to cover the C&I and C&D waste streams, which account for around 75% of the waste generated within the Perth metropolitan and Peel regions.

Figure 18 provides a diagrammatic representation of the WALGA model and a discussion of the roles of the various key entities within this model follows.

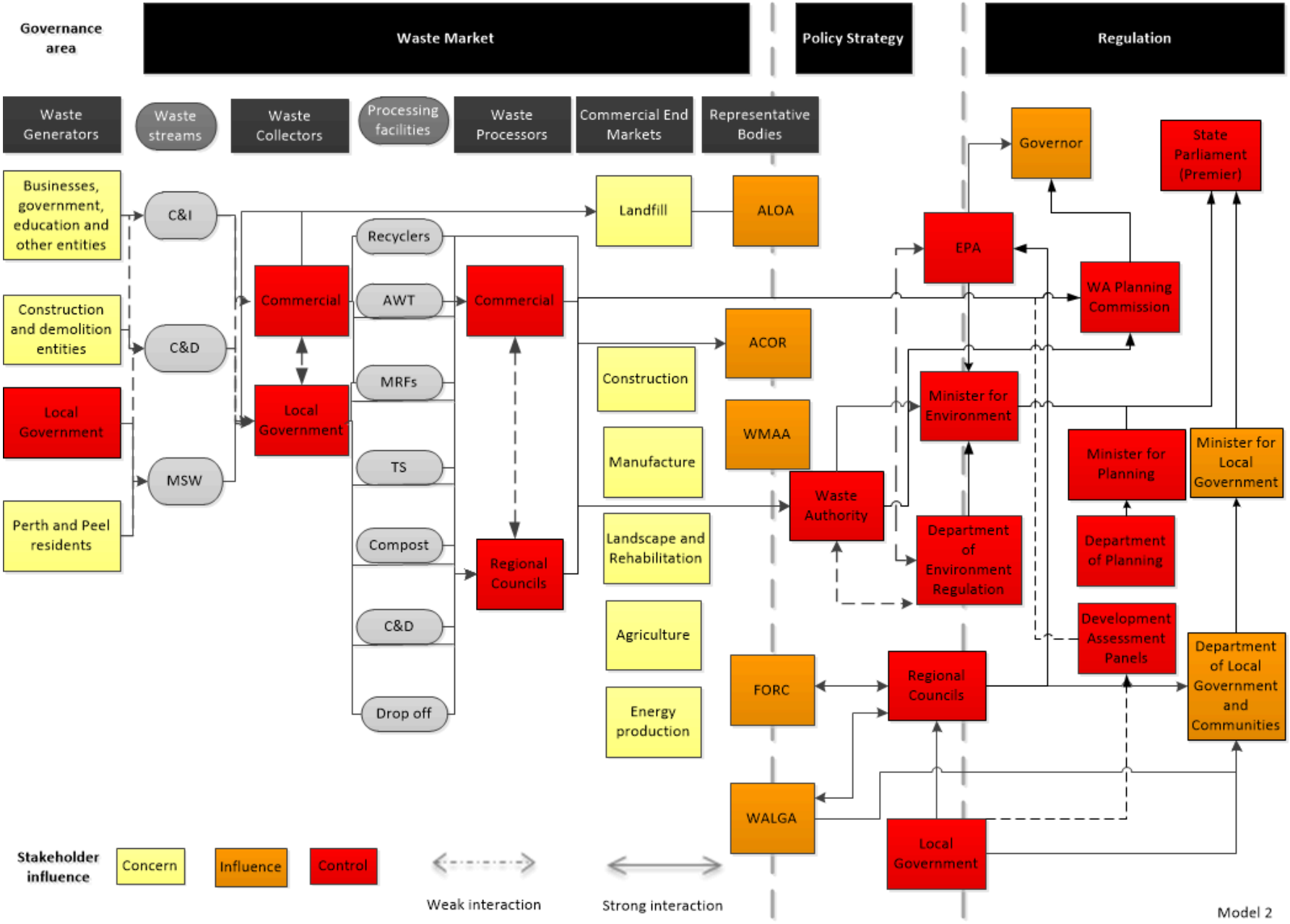

Figure 18: Model 2 - WALGA model

6.2.1.1 Waste regulators

The WALGA model proposes an increased level of state government involvement in the management of waste within the region.

Role of state government

Under this model, it is proposed that the Waste Authority remain a statutory body, but that it no longer be housed within DER. The Waste Authority would be responsible for developing a statutory waste management plan for the Perth metropolitan and Peel regions in consultation with key stakeholders including local government, industry and the public. The plan would identify the waste management goals and broad strategic directions for the regions. The Waste Authority would require regional local governments to develop regional delivery plans that would contain the measures that they would implement to achieve the aims and objectives of the plan for the region. The Waste Authority would approve the regional waste management plans if they were consistent with its broader statutory plan. In addition, the Waste Authority would be responsible for coordinating research on waste technology, running public awareness campaigns and developing waste management policy (in consultation with stakeholders).

The Waste Authority would establish committees or working groups to engage with regional local governments, local governments and other relevant stakeholders on various issues. The membership of the committees would depend on the subject matter and members would be appointed on the basis of their skills and expertise. Members would be drawn from state government, local government and industry as relevant.

The Waste Authority would administer the landfill levy funds and it would have the power to expend these independent of the Minister. The Waste Authority would set out the funding required to deliver the objectives of the statutory waste management plan and identify the various initiatives that the funds have been committed to in its annual business plans.

DER would retain responsibility for developing and enforcing regulation related to managing the environmental impact of waste facilities. The general waste management policy development and program implementation function currently being undertaken by DER's Waste Management Branch would be transferred to the Waste Authority.

While WALGA's position paper does not explicitly address potential governance mechanisms for infrastructure planning and development, consultation with WALGA representatives indicated that there was a preference for the Waste Authority to develop, in consultation with key stakeholders, an infrastructure plan for the region that would provide information to infrastructure proponents on sites that were deemed suitable for their purposes (sites suitable for various infrastructure types). WALGA's preference was for the Waste Authority to work with the DoP and the WAPC to secure sites and appropriate buffers through the planning system for waste management purposes. It should be noted these functions are compatible with governance model 4A developed by the SWIPWG.

There is no role for the state government in the operation of waste management facilities under this model.

Role of regional local government

Under this model the number of regional local councils in the region would be reduced from the existing five councils to three, which would cover the northern, eastern and southern areas of the

region. WALGA's discussion paper does note that while the option of transitioning from five regional councils to one is available, that the transitional and logistical issues associated with doing this would be extremely complex; the transition to three councils would be more workable.

The primary role for regional councils would be to develop regional delivery plans that would set out the measures that would need to be implemented to meet the aims, objectives and any requirements of the statutory metropolitan plan developed by the Waste Authority. Regional councils would also be responsible for standardising collection systems within their region to increase the efficiency of processing and for delivering relevant education programs to their communities.

Regional councils would retain responsibility for providing MSW processing and disposal services to their communities, either by owning and operating these themselves or via contracts to the private sector.

WALGA's discussion paper and consultation with WALGA representatives identified that the ability of local governments to withdraw from their regional council establishment agreements under current arrangements is a major barrier both to securing waste supply for processing and to securing funds to establish waste infrastructure. WALGA is working with local governments and producing tools to reduce the risk of this occurring in the future.

An option proposed under the WALGA model is for regional councils to transition to a regional subsidiary model. Under the regional subsidiary model, regional councils would effectively function as body corporates which can acquire, hold, deal with and dispose of property (for example, waste facilities) on behalf of their constituent councils. Significantly, they can invest funds, according to their relevant legislation's provisions, and can borrow money, subject to approval if relevant.

Using the model of regional subsidiaries that exist in South Australia, the Department of Local Government and Communities (DLGC), in its discussion paper 'Regional Local Government entities – Models for regional collaboration in remote areas, identifies the following additional key features of regional subsidiaries:

- Their Board of Management may include persons who are not elected members of a council
- The addition of new members and withdrawal of existing members generally requires approval
- They are generally closely directed and supervised by, and are accountable to, their constituent councils, which are ultimately liable for their activities
- They are generally bound by the same or similar accounting and audit standards, conflict of interest provisions and external review mechanisms that apply to local governments.

(Department of Local Government and Communities, 2011)

It shouldbe noted, however, that legislative change is required for regional subsidiaries to exist under the Local Government Act 1995 (LG Act) and there are some concerns around this model.

That the corporate structure of regional subsidiaries, that is boards comprised of elected and unelected members, is a further step removed from being truly representative of local communities. There may be financial risks to local government members if regional subsidiaries are exempt from

some of the safeguards that exist within the financing restrictions that regional local governments and local governments are subject to.

Provisions to introduce the regional subsidiaries model were drafted in the Local Government Amendment Bill (No. 2) 2012 and introduced to Parliament. The amendments to the LG Act would have allowed two or more local governments to form a regional subsidiary to jointly provide a service or carry on an activity, including waste management. The amendments have not since been passed by Parliament.

The LG Act currently has a number of safeguards that make it difficult for individual local councils to withdraw from their regional local government agreements. In addition, a number of regional local councils are currently able to access non-WATC funds to establish their facilities (WATC funds are preferred due to preferential conditions offered) and are operating these facilities on a commercial basis. Therefore, a viable alternative to the regional subsidiaries model could be to determine any barriers in the LG Act to regional local government funding waste infrastructure (for example, allowing regional local governments to borrow against their own assets without requiring their member councils to guarantee this debt) and investigate options to resolving these.

Further consideration would need to be given to the regional subsidiaries model and its applicability from a waste management perspective, if this was determined to be a potential alternative future direction for local government.

Role of local government

Individual local governments would continue to provide waste collection services under this model. Services would be provided in accordance with the relevant regional delivery plan. Local government would also continue to play a key role in delivering waste avoidance and reduction programs to their communities.

6.2.1.2 Waste collectors and processors

Waste collection would occur according to the specifications in the relevant regional delivery plan and investment may be required to standardise collection systems across regional councils. The consistency of waste supply and improved economies of scale due to securing larger quantities of waste from regional councils could make it more attractive for the commercial sector to increase investment in waste infrastructure, driving increased investment in diversion technologies.

It is anticipated that more consistent collection services would result in more consistent and better quality feedstocks to processing facilities. This could be further enhanced if effective education campaigns were implemented to improve community source separation of waste. This should provide more attractive products to the end markets from MSW and any C&I outputs from the same facilities, which could facilitate achievement of Waste Strategy diversion targets.

6.2.1.3 Potential funding sources under model

The WALGA discussion paper advocates for greater hypothecation of the landfill levy (or other state government funding) to help fund waste infrastructure and management. It also notes that using Extended Producer Responsibility Schemes to shift the burden of responsibility to producers might be another option for consideration.

The following potential funding sources are available under this model:

- **Rates** – The consolidation of the existing five regional local governments into three should increase the amount of funding, via rates, to be directed to the three regional local governments; although, the total revenue raised is unlikely to increase. It is anticipated that there would be lower costs, as the overheads are shared; but this is unlikely to be material. The greater amount of waste would enable economies of scale and scope to be achieved. In addition, there may be the opportunity to treat more types of waste, for which the local governments would be able to charge higher rates.

- **Sale of goods and services** – The level of revenue received from sales of goods and services could increase as regional local governments develop and offer new waste derived products into the market.

- **Grants** – Grants are unlikely to provide significant additional funding

- **Waste levy** – Increased hypothecation of the waste levy to the Waste Authority would enable the Waste Authority to use the funding to support the funding of infrastructure.

6.2.1.4 Funding requirements

Funding will be required to implement the changed governance arrangement, to fund the additional or changed governance structures proposed and ultimately fund infrastructure. A brief discussion of types of funding required follows:

- **Funding the implementation of the governance changes** – Implementing the WALGA model would require funding to be allocated to develop and enact legislation to establish the 'new' Waste Authority. In addition, there are likely to be costs associated with establishing the new regional local governments; although, these are unlikely to be significant.

- **Funding the on-going governance structures** – There is not likely to be significant change associated with the amount of funding required to maintain the governance structures in the model beyond the amount of funding that is currently allocated for these purposes. There may be some savings associated with reducing the number of regional local governments.

- **Funding infrastructure and land** – Under this model, it is proposed that a larger portion of the levy is hypothecated towards funding infrastructure and land for waste management purposes. If the Waste Authority can work with the WAPC and DoP to reserve land (sites and buffers) for waste management facilities, and the three regional councils can achieve improved economies of scale and more consistent waste streams, this should provide additional drivers to attract investment from the commercial sector to establish waste management facilities.

6.2.1.5 Summary

A summary of the strengths and weaknesses of the WALGA model are summarised in Table 12.

Table 12: Strengths and weaknesses of the WALGA model (model 2)

Strengths	Weaknesses
• Consistency between state strategy/targets/objectives and regional delivery plans should assist with improving outcomes • Creates one central agency, the Waste Authority, with responsibility for developing and delivering waste management policy • Delineates role of DER and Waste Authority – limits opportunity for conflict of interest • Consolidation of number of regional local governments should improve the economies of scale and potentially attract investment in infrastructure • Coordinated and consistent waste streams improve efficiency of waste processing, improve diversion rates and could potentially attract investment in infrastructure • Limited intervention in the waste market, which would be attractive to commercial entities	• Does not consider the waste system as a whole – is focused solely on MSW. However this can be resolved by having the Waste Authority develop policy and measures that cover the other waste streams • Preserves the relative monopoly that local government has over MSW and could limit commercial entrants to the market. However, it does not exclude private sector participation; for example, through public-private partnership arrangements • Currently, local governments are not driven by commercial imperatives and this could lead to inefficiencies in processing and collection • Local government borrowing restrictions influence regional local government funding capability and these will continue to exist unless amendments are made to the LG Act to resolve this

The WALGA model could be implemented relatively quickly and at relatively low cost (compared to other models). However, issues around the voluntary nature of regional local governments and the barriers that this poses to funding waste infrastructure facilities need to be addressed - potentially through legislative change. This model focuses on the MSW waste stream and complementary approaches would be required to drive diversion of C&I and C&D waste from landfills. It should be noted that this model is strongly supported by the local government sector.

6.3 Model 3: State government agency to control waste streams

Under this model a government business enterprise would be established to own and process all waste (MSW and non-MSW) produced in the region. It would process waste according to government policy to meet recycling and landfill diversion targets. Two variations of this model were considered:

- Model 3A - The agency would own the waste and own the facilities and be responsible for processing the waste.

- Model 3B - The agency would own the waste and allocate it to commercial, local government and regional local government facilities to be processed or disposed. The agency would invite tenders from various types of facilities to process waste. The agency would not own any facilities itself, relying on existing and new facilities provided by local governments, regional local government and commercial entities.

These two variations are explored in the following sections.

6.3.1 Model 3A – Waste Corporation ownership model

Essential services, such as water and electricity, are managed and provided by state-owned corporations. Similarly under model 3A, it is proposed that a government business enterprise 'Waste Corporation' would be established to manage waste in the region. It would own the waste and direct it to facilities for processing in accordance with the state government's waste management policies.

Figure 19 provides a diagrammatic representation of model 3A and a discussion of the roles of the various key entities within this model follows.

6.3.1.1 Waste regulators

Under this model the state government takes on the key regulatory roles with local government assuming a more operational status. It should be noted that there is potentially a conflict of interest inherent in the State Government regulating waste streams and facilities that it owns.

Role of state government

The key state government entity in this model is the Waste Corporation, a government business enterprise created primarily to manage waste collection and processing in the region. The Waste Corporation would be established under legislation and be accountable to the Minister for Environment to deliver its services in a commercial manner. Surplus funds generated by Waste Corporation would be invested in capital works, to secure land and to establish facilities required for future waste management. Waste Corporation would have a similar corporate structure to other current government enterprises, such as the Water Corporation and Western Power. It would be governed by an independent board of directors appointed by the Minister for Environment. A Chief Executive Officer would be responsible for the day-to-day operation of the organisation. A number of committees could be established to support the board in relation to relevant technical, policy and operational matters.

A key task for the Waste Corporation would be to negotiate the transfer of waste collection contracts and acquire facilities from current owners (local government and commercial entities). An option for collecting C&I waste would be to use a C&I precinct based approach in which the region is divided into a number of waste precincts and contracted out to collection entities (including, for example, local government). It would set waste collection and processing standards and direct waste flows in a manner that is consistent with the waste strategy for the region. Waste Corporation could choose to either run waste processing facilities itself or via contract to the commercial sector. It would implement these standards via medium- and long-term contracts with commercial entities that would run collection and processing activities in its behalf.

To ensure that the future waste infrastructure needs of the region are met, the Waste Corporation would implement the WRIP. It would, in partnership with DoP and the WAPC, ensure that strategic

sites are reserved through the planning system for infrastructure purposes and acquired when necessary (see process set out in section 3.3).

Another key role for the state government would be to oversee and regulate pricing for waste services, including collection and processing. This function would be performed by the Economic Regulation Authority (ERA) each year during the state budget process. The ERA currently performs this function for entities such as the Water Corporation and Western Power, to ensure that an efficient service is delivered at a fair price.

Under this model, DER would be responsible for developing overall waste policy and strategy for the state and for setting key future objectives. It would continue to administer the levy funds, which it would be able to allocate to Waste Corporation for the purposes of securing sites and establishing facilities if required. The levy funds could also be allocated to other stakeholders (stakeholders and commercial entities) to implement measures that encourage waste diversion from landfill.

DER would retain responsibility for developing and enforcing regulation related to managing the environmental impact of waste facilities. As there would be effectively one entity ‘operating’ (either by itself of via contract) all waste facilities, there may be opportunities to streamline regulatory processes.

The Waste Authority would not exist under this model.

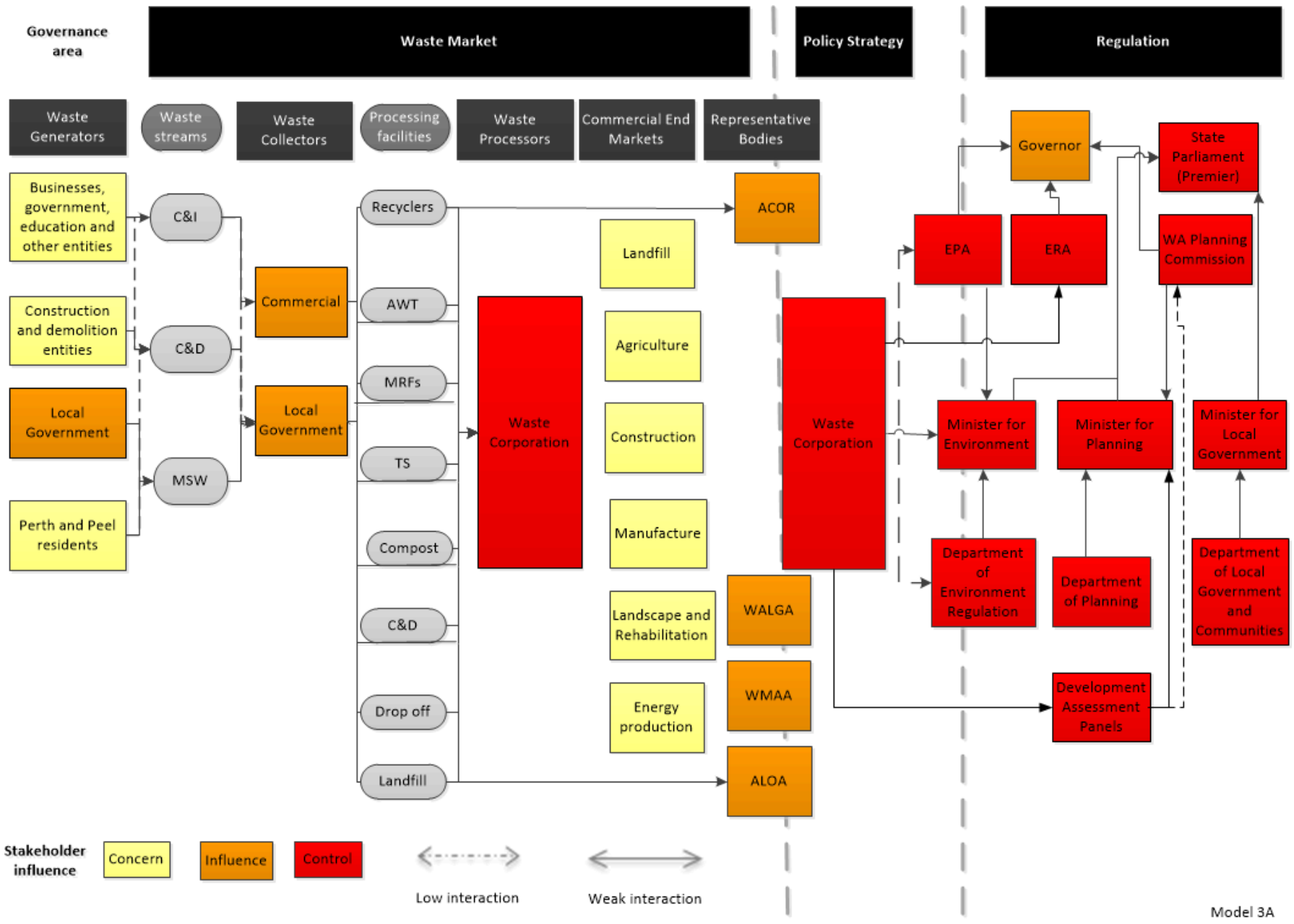

Figure 19: Model 3A – Waste Corporation ownership model

While assuming control of the waste stream and running or directing collection and processing would allow the state government to dictate outcomes, and potentially optimise resource recovery, there are a number of implementation issues associated with setting up a government monopoly over waste.

Creating a state government monopoly over waste to the exclusion of the commercial sector could cause significant market distortions and result in suboptimal provision of an essential public service. Well-established economic theory predicts than even an efficiently operating monopoly will deliver higher prices than a competitive market. Economic theory also states that the absence of competition means that monopolies tend to operate less efficiently than firms in a competitive market, meaning that costs of production will also be higher.

Creation of a monopoly would attract ACCC oversight and may require significant legislative reform. The State Government would need to demonstrate that the monopoly was justified by the resulting public good.

Existing contracts for supply of waste are generally long-term. Transferring these could be a lengthy and complex process, which could present significant operational and financial risks to the Government.

There is likely to be significant stakeholder opposition to this model as a significant amount of investment has already been committed towards providing collection and processing services and infrastructure.

It could be argued that the state government has other levers available to it to facilitate improved waste management at a reduced cost; for example, legislative, policy and program levers.

Implementation of this model would be a lengthy process and would potentially cause significant disruption to the current waste management system.

There are also issues associated with using a C&I based precinct model across the region. These are discussed in section 6.3.2.2.

These issues would need to be considered in further detail and consulted on if this model were to be pursued.

Role of regional local government

With the state government assuming responsibility for collecting and processing waste, there is no role for regional local government under this model. Therefore, from a waste management perspective, there would be no reason for regional local governments to exist in their current form. Waste Corporation would need to negotiate the transfer of ownership of any existing waste facilities with regional local government, including terms for novation or compensation. This is likely to be met with strong resistance from the sector.

Role of local government

Local government will continue to play a key role in delivering waste avoidance and reduction programs to their communities under this model. Depending on its operational model, Waste Corporation could contract local government to continue (through contracts with the private sector or using its own resources) to collect MSW from its communities in a manner that is consistent with the waste strategy for the region.

6.3.1.2 Waste collectors and processors

Under this model, Waste Corporation would assume responsibility for waste collection and processing in the region. Existing collection and processing contracts would need to be transferred to Waste Authority via negotiation. The Waste Corporation could either choose to provide these services itself or by contracting them out to either local government or commercial entities to be conducted according to its specifications.

If effective education campaigns around source separation are implemented, in combination with improved source separation practices, waste-derived products generated under this model (such as recyclables and source-separated organics) would be more consistent. This should provide more attractive products to existing end markets and potentially encourage the development of new markets.

6.3.1.3 Potential funding sources under model

The Waste Corporation would benefit from obtaining debt finance through WATC (i.e. attractive terms as a result of access to the state's credit rating, guarantee provided by the state government and relatively low overheads) to fund the initial purchase and development of facilities, subject to competitive neutrality. It should be noted that a significant investment from the State Government is required in the model: this is likely to increase state debt.

The following potential funding sources are available under this model:

- **Rates** – Rates for local government would be affected by the waste disposal charges set by the Waste Corporation; but, ideally, the rates charges should not increase significantly under this model, due to increased economies of scale,. This model is unlikely to achieve an optimal role for markets and, therefore, it is unlikely to minimise the cost of the waste service.

- **Sale of goods and services** – The Waste Corporation would charge users of the waste service directly for the collection and processing of waste. The Waste Corporation would set the fees and the ERA would oversee the pricing. Assuming efficient management of the waste, the level of fees should provide sufficient funds for the Waste Corporation to operate. The commercial sector is likely to reduce its involvement in the waste market as the Waste Corporation would control waste much more closely. This would include the ownership and operation of processing facilities.

- **Grants** – The Waste Corporation would compete with all the other state entities to secure any available grants. Overall, this would be unlikely to provide a significant amount of funding.

- **Waste levy** – Funds from the WARR Account could be directed to the Waste Corporation for the purposes of purchasing existing waste collection and purchasing contracts, and also to secure sites and establish infrastructure for future waste management needs. It should be noted that the viability of the levy as a funding source may reduce in the longer term if the levy reduces as a result of the region meeting its diversion targets.

- **Other sources** – The MRIF could be used as a source of additional funding. This would require an amendment to the Metropolitan Region Town Planning Scheme Act 1959 to include waste processing facilities in the definition of special uses. However, it is unlikely

that the MRIF would be used to purchase land for a government business enterprise that could raise its own funds.

6.3.1.4 Funding requirements

Funding will be required for the following under this model:

- **Funding the implementation of the governance changes** – The costs to establish the Waste Corporation and other complementary mechanisms are likely to be substantial. Costs would also be incurred for renegotiating existing commercial, regional local government and local government collection and processing contracts.

- **Funding the ongoing governance structures** – There would be ongoing costs associated with managing collection and processing contracts, as well as operational costs associated with Waste Corporation's day-to-day activities.

- **Funding infrastructure and land** – This model requires significant capital funding to procure all the existing waste processing facilities, secure sites and establish new infrastructure for future needs. It is unlikely that the waste levy and fees would be sufficient to fund the acquisition of the facilities and land. This would likely require the Waste Corporation to raise debt funding or request grant funding from the State Government. The level of control exerted by the Waste Corporation over the waste market should enable it to raise debt through WATC or from private lenders. Any request for grant funding from the State Government would be considered in light of other competing demands.

6.3.1.5 Summary

A summary of the strengths and weaknesses of the Waste Corporation ownership model is provided in Table 13.

Table 13: Strengths and weaknesses of the Waste Corporation ownership model (model 3A)

Strengths	Weaknesses
• Provides an integrated approach to waste planning and strategy delivery across the three waste streams • Potential for increasing collection efficiencies through rationalised collection precincts based on material streams • Generates improved economies of scale through standardised collection of waste and ability to direct waste streams • Enables strategic siting of facilities for future needs • Provides additional options for funding the provision of infrastructure and land (Waste Corporation surplus could be used to fund required infrastructure and	• Likely to increase state debt • There would likely be strong resistance from the commercial sector and local government • Significant capital and ongoing investment required from state government with the potential to adversely impact the state's credit rating • Potential for lack of agreement to transfer ownership of existing processing and collection contracts • Owning all waste (including C&I and C&D) waste might not be practical nor feasible • Potential requirement to compensate current owners of collection and

Strengths	Weaknesses
land) • Consistency of collection and processing with state strategy and policy directions should enable the achievement of the state's waste management goals	processing services • Cost of renegotiating contractual arrangements could be significant • Lack of competition and free market drivers could potentially stifle innovation • Could present significant operational risk to government (potential lack of expertise within one organisation to manage and operate the facilities and collection contracts) • Removes commercial market restricting investment by the commercial sector • Implementation process would be lengthy and complex • There is a conflict of interest as a result of the state government regulating collection and processing facilities/infrastructure that it owns and operates.

While the Waste Corporation ownership model allows the state government to control the waste stream and dictate collection and processing outcomes, there are a number of implementation issues associated with this model, including: trade practices considerations, the complexity associated with negotiating existing contracts, the level of investment required from the state government and the operational risks to government from assuming responsibility for collection and processing. Importantly, by creating a state government monopoly over waste and removing competition, this model is unlikely to optimise efficiency and outcomes; and it is likely to incur increased costs for the State Government. Consultation revealed that this model is likely to be opposed by existing participants in the sector that have invested significantly in collection and processing infrastructure. Consultation also revealed the view that the State Government was not best placed to own or operate waste and recycling facilities.

6.3.2 Model 3B – Waste Corporation operation model

Model 3B differs from model 3A in that while Waste Corporation would still own the waste it would not own waste processing facilities. It would invite tenders to process waste and, based on the outcome of the tender process, allocate waste to facilities owned and operated by local government, regional local government or the private sector to be processed or disposed.

Figure 20 provides a diagrammatic representation of model 3B and a discussion of the roles of the various key entities within this model follows.

6.3.2.1 Waste regulators

The State Government retains its role as primary regulator under this model with local government assuming a more operational role.

Role of state government

Under this model the Waste Corporation would still be responsible for negotiating the transfer of waste collection contracts from local governments and the relevant commercial entities. While waste collection infrastructure would still be owned and operated by commercial entities and local governments, waste collection would occur under contract to the Waste Corporation in a manner consistent with overarching state government policy and strategy for waste management. As per model 3A, the collection of waste from the C&I sector could occur using a C&I precinct-based model.

The Waste Corporation would tender out contracts for processing the collected waste. The processing infrastructure would be owned by local governments, regional local governments and commercial entities. This would make this model a lower cost option to implement compared to option 3A. Waste processors would be required by contract to process and dispose of waste in a manner consistent with overarching state government policy and strategy for waste management

It is anticipated that improved source separation and aggregated waste streams would allow the state government to provide certainty of supply to processors, which would create favourable conditions for investment.

As in model 3A, to ensure that the future waste infrastructure needs of the region are met, the Waste Corporation would implement the WRIP in partnership with DoP and the WAPC; ensure that strategic sites are reserved through the planning system for infrastructure purposes; and ensure that sites are acquired, when necessary.

Under this model, DER would retain responsibility for developing overall waste policy and strategy for the State, which would set directions for the future and key objectives. It would continue to administer the levy funds which it would be able to allocate to Waste Corporation for the purposes of securing sites and establishing facilities if required. The levy funds could also be allocated to other stakeholders (local government and commercial entities) to implement measures that encourage waste diversion from landfill. DER would retain responsibility for developing and enforcing regulation related to managing the environmental impact of waste facilities.

The Waste Authority would not exist under this model.

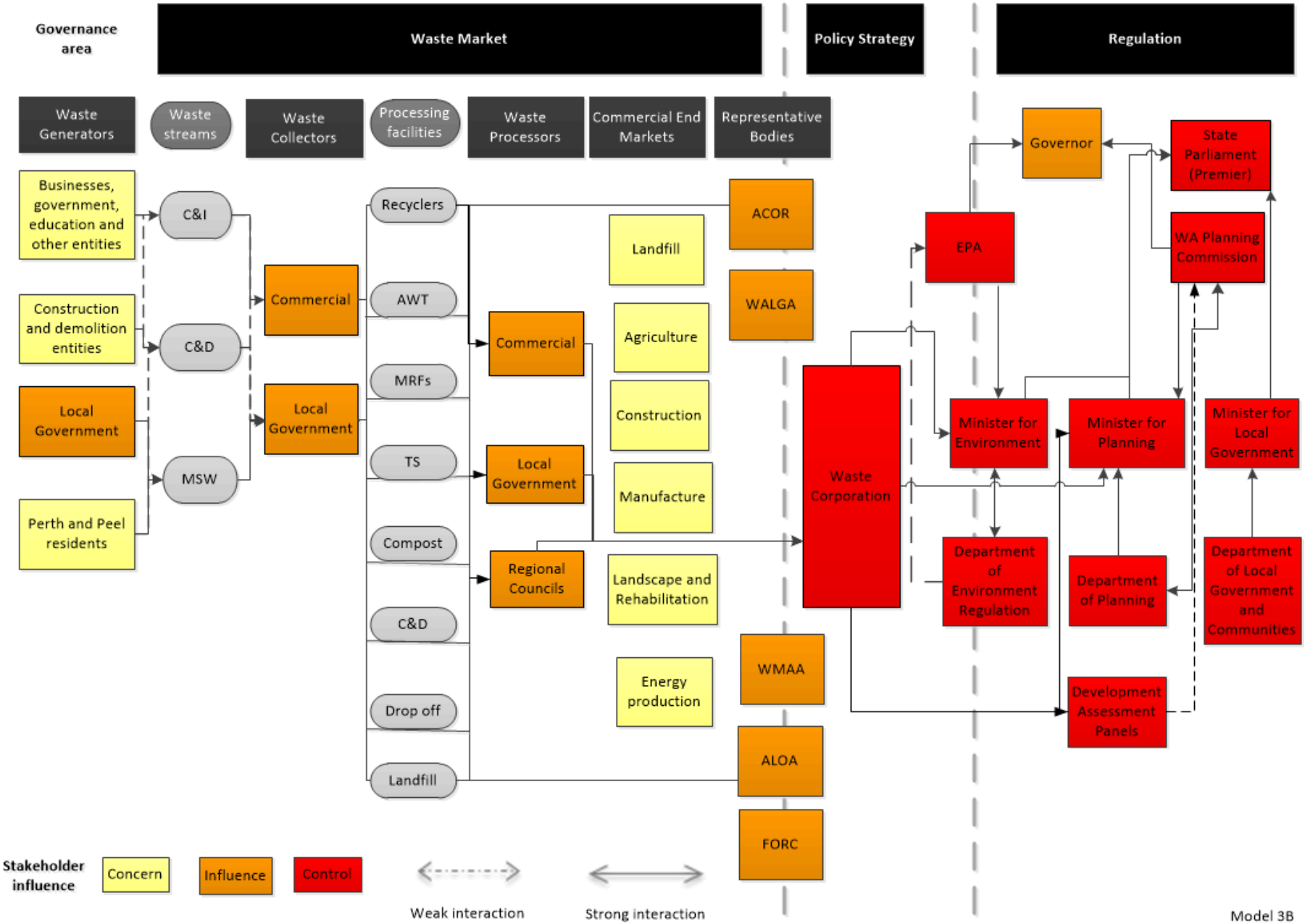

Figure 20: Model 3B – Waste Corporation operation model

Role of regional local government

Unlike model 3A, under this model regional local governments could still exist to own and run processing facilities under contract to the Waste Corporation. However, an assessment of the financial efficiency of this would need to be undertaken to ensure that this was a viable option.

Role of local government

Local government would continue to play a key role in delivering waste avoidance and reduction programs to their communities under this model. Local government would still provide collection services to its community; although, this occur under contract to the Waste Corporation.

6.3.2.2 Waste collectors and processors

Waste collection and processing infrastructure would still be owned and operated by commercial entities, local governments and regional local governments however they would all operate under contract to the Waste Corporation.

There is a range of implementation issues associated with this governance model, particularly around the practicality of implementing a precinct collection model for all three waste streams. The following would need to be considered when determining whether this model should be implemented:

- The complexity associated with determining viable collection catchments given the different types of waste to be collected
- The likelihood that larger companies will monopolise the market and whether special conditions/provisions would be required to allow smaller, local companies to be competitive
- Diverse and challenging nature of C&I waste stream (i.e. completely different compositions of mixed waste, different bin infrastructure required due to volumes of waste generated and storage limitations)
- Companies with national operations would have existing national contracts for collection and would likely not support this model
- The different types of collection infrastructure required and the need to service different types of commercial entities at different frequencies could make the collection model not as efficient as initially considered.

While the C&I precinct model may be appropriate for particular waste streams or areas, it is unlikely to be acceptable to the waste industry if implemented across the entire Perth metropolitan and Peel regions as it could create significant market distortions. For instance, the pricing structure for each precinct would effectively be public, as all businesses within the precinct would be aware of the pricing. This would set a precedent for pricing in any other precincts that are being tendered. To successfully win the tenders, larger companies may engage in price-undercutting, which may become unsustainable or advantage larger companies. If this system were introduced, there would need to be thought given to mechanisms to manage these issues.

It should be noted that these issues would apply equally to Models 3A and 3B, if a precinct collection model were introduced.

Model 3B is likely, however, to improve planning for infrastructure. Under model 3B, the Waste Corporation would be responsible for implementing a WRIP for the region and working with the planning agencies to secure sites for future infrastructure purposes. Its ability to control and direct the waste stream and direct processing outcomes should assist the state to achieve its waste management objectives and targets. Under this model, the commercial sector still has a role to play in delivering collection and processing services. By being able to guarantee security of waste supply and source-separated waste streams, Waste Corporation should be able to encourage increased investment in processing facilities in the region.

6.3.2.3 Potential funding sources under the model

The Waste Corporation would benefit from obtaining debt finance through WATC (i.e. attractive terms as a result of access to the state's credit rating, guarantee provided by the state government and relatively low overheads). The Waste Corporation's ability to directly levy rates from users of the services and take a long-term view of the waste market should enable it to raise debt and therefore increase debt funding to finance waste infrastructure and land.

The following potential funding sources are available under this model:

- **Rates** – Rates for local governments would be affected by the waste collection and processing charges agreed to by the Waste Corporation. However, the rates charges should not increase significantly under this model, due to increased economies of scale. Under this model, there is still a role for the commercial sector in waste processing. Competitive pricing of services to secure Waste Corporation contracts could, therefore, potentially deliver services at reduced cost.

- **Sale of goods and services** – The Waste Corporation would set collection and processing fees, and charge users for these services. Any surplus could be directed towards funding the purchase of land for future needs.

- **Grants** – The Waste Corporation would compete with all the other state entities to secure any available grants. Overall, this would be unlikely to be a significant source of funding.

- **Waste levy** – Funds from the WARR Account could be directed to the Waste Corporation for the purposes of purchasing existing waste collection and purchasing contracts, as well as land for future infrastructure needs.

- **Other sources** – The MRIF could be used as a source of additional funding. This would require an amendment to the Metropolitan Region Town Planning Scheme Act 1959 to include waste processing facilities in the definition of special uses. However, it is unlikely that the MRIF would be used to fund land purchases where there was an alternative source of funding.

6.3.2.4 Funding requirements

Funding will be required for the following under this model:

- **Funding the implementation of the governance changes** – Given the scale of governance changes required, there are likely to be significant costs associated with establishing the model. Costs would include those to establish the Waste Corporation and those associated transferring existing commercial, regional local government and local government collection and processing/disposal contracts.

- **Funding the ongoing governance structures** – There would be ongoing costs associated with managing collection and processing contracts and operational costs associated with Waste Corporation's day-to-day activities.

- **Funding infrastructure and land** – This model does not require the significant capital investment to establish waste processing facilities that would be required under model 3A. However, funding would be required to enable Waste Corporation to reserve suitable sites for establishing waste facilities in the future and purchasing this land, if necessary.

6.3.2.5 Summary

A summary of the strengths and weaknesses of the Waste Corporation operation model are summarised in Table 14.

Table 14: Strengths and weaknesses of the Waste Corporation operation model (model 3B)

Strengths	Weaknesses
• State Government role in securing suitable sites for future infrastructure should provide certainty to the market and encourage investment • Security of supply of waste stream and improved economies of scale of waste should encourage investment in processing facilities • Precinct approach to collection could increase efficiency and minimise collection transport distances • Requirement for collection and processing to occur consistent with state strategy and policy directions should enable the achievement of the state's waste management goals • Provides additional options for funding the purchase of strategic sites for future use (Waste Corporation surplus could be used to secure sites)	• Potential for resistance from the commercial sector • Facility operators would not have control over their waste supply • Owning all waste (including C&I and C&D) waste might not be practical or feasible • Complexity of providing collection services across the three waste streams using a precinct model • Increased cost for the State Government including those associated with setting up Waste Corporation and costs associated with collecting and processing waste and costs associated with negotiating existing contractual arrangements • Potential for lack of agreement to transfer ownership of existing collection contracts • Cost of renegotiating contractual arrangements could be significant • Non-compulsory nature of regional local governments and the associated barriers to funding waste infrastructure remain • Companies with national operations would have existing national contracts for collection and would likely not support this model

The Waste Corporation operation model allows the State Government to control the waste stream. It could dictate collection and processing outcomes at a reduced cost to model 3A, as it does not involve the State Government owning processing infrastructure. There are, however, a number of implementation issues associated with this model. These include the complexity of establishing a cost-effective collection system that is sophisticated enough to operate across all waste streams and the costs associated with the state government taking over collection and processing contracts. Consultation on this model revealed that it is likely to be opposed by existing participants in the sector who have invested significantly in collection and processing infrastructure.

6.4 Model 4: State government agency to plan waste infrastructure

Under this model, a new state government agency would be established to undertake a central planning and decision-making role in relation to waste management. The agency would determine the waste disposal and recycling infrastructure requirements for the region. It would also review and make recommendations for the approval (or not) new waste infrastructure project proposals. It would undertake this approval role with reference to the WRIP, which would identify the number and types of facilities needed, and approximately where they could be located. Three variations have been explored under this model:

- Model 4A - The agency would have a purely planning and approval role.
- Model 4B - In addition to the planning and approval role, to facilitate more efficient processing of waste, the agency would develop measures that would coordinate and standardise local government waste and recycling collection services across the region. It would direct local governments to participate in aggregated processing arrangements and collection system uptake. It will also develop and implement measures to improve waste management outcomes from the C&I and C&D waste streams.
- Model 4C - In addition to performing the above two roles, the agency would also develop and, where necessary, manage selected strategic sites that host waste and recycling facilities. The agency would be effectively the waste facilities' landlord, and charge commercial leases for waste processing on the site for such strategic sites.

These three variations are explored in this section.

6.4.1 Model 4A – Waste Planning Authority model

Under model 4A, the State Government would take on the role of planning for the future infrastructure needs of the region.

Figure 21 provides a diagrammatic representation of the Waste Planning Authority (WPA) model and a discussion of the roles of the various key entities within this model follows.

6.4.1.1 Waste regulators

A new state government agency would be established under this model to lead strategic planning of waste infrastructure.

Role of the state government

A new authority, the WPA, would be established to work with key stakeholders, including the commercial sector and local governments, to determine the waste infrastructure needs of the Perth

metropolitan and Peel regions. The WPA would review proposals for the establishment of the new waste facilities in the region and it would make recommendations to the government on whether the proposals were compatible with the WRIP. The WPA would have a similar standing to the WAPC and the EPA when making recommendations on the approval of new facilities. The WPA's approval of waste facility proposals would not replace approval processes by either the EPA or the WAPC. Facilities approved as consistent with the WRIP would still be required to go through the relevant planning and environmental approvals processes. A key role for the WPA would be to work with the DoP, WAPC and local governments to ensure a consistent and streamlined approval process for waste facilities.

The DER would be responsible for licensing waste facilities and assessing compliance against licence conditions. It would also be responsible for developing legislation and policies that reduce the environmental impacts of waste facilities. It would continue to develop waste management strategy, policy and implement projects and programs that encourage improved waste management outcomes. Under this model, DER would be responsible for collecting and managing the landfill levy funds.

The Waste Authority would not exist under this model and its current functions would be transferred to the WPA.

Role of regional local governments and local governments

The role of regional local governments and local governments would remain unchanged from their current role under this model.

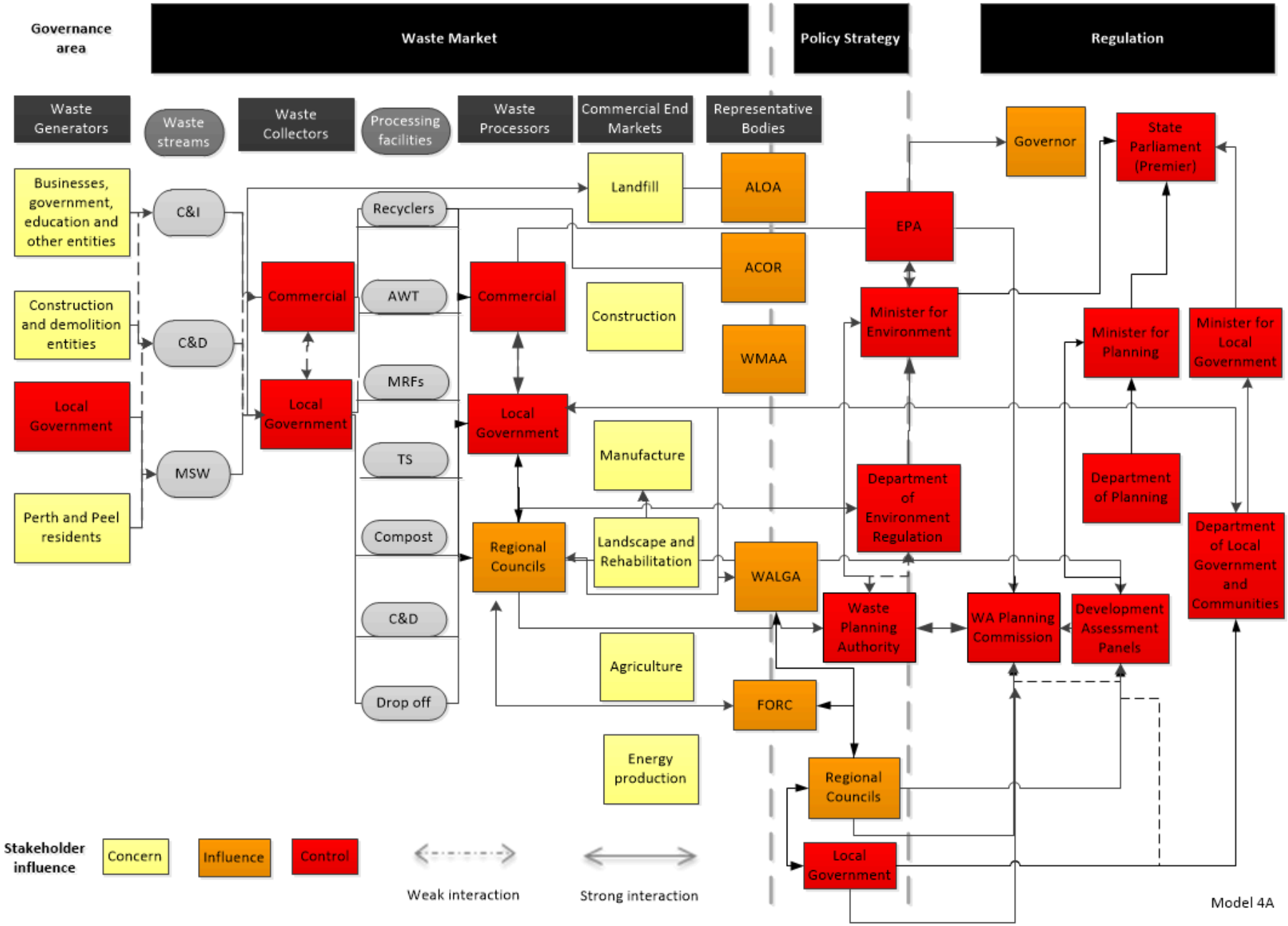

Figure 21: Model 4A – Waste Planning Authority model

6.4.1.2 Waste collectors and processors

The role of waste collectors and processors would remain unchanged under this model. It is likely that the development of an improved and consistent planning process and the implementation of the WRIP would facilitate investment in waste processing facilities.

The implementation of the WRIP by the WPA should facilitate improved delivery of infrastructure within the region. Commercial entities as well as local governments and regional local governments would have access to information on the infrastructure requirements for the region, as well as information on strategic sites deemed suitable to support the required infrastructure. The consultation process on the governance models revealed that there are a number of problems with the current planning and approvals process in relation to waste facilities; including, inconsistencies in the process, a lack of clarity and guidance on requirements and inefficiencies in the process – all causing significant delays. Through working with DoP, the WAPC and local governments to ensure consistency of and streamline the infrastructure approvals process, the WPA should be able to address some of these issues and remove existing barriers to investment in infrastructure in the region.

The WPA's ability to disallow facilities that are inconsistent with the WRIP would allow the State Government to ensure that only facilities that are compatible that will enable it to meet its waste management outcomes are installed in the region. Regardless of this, this model is unlikely to have a significant impact on the ability of the region to improve waste management outcomes to meet the Waste Strategy targets, because it focuses solely on the planning issues associated with waste infrastructure development and does not take an integrated approach to waste management. It does not address the major barriers at each phase of the waste cycle (generation, collection, processing and disposal).

6.4.1.3 Potential funding sources under model

The establishment of the WPA to undertake the waste infrastructure planning and approval is unlikely to have an impact on the ability of the public or commercial sector's ability to raise debt finance, or the mechanisms by which this is undertaken.

The following potential funding sources are available under this model:

- **Rates** – Under this model, local governments would continue to levy rates on their communities to recoup the cost of providing the waste collection and processing costs. It is likely that there would continue to be resistance to raising rates, whether they are a separate waste charge or part of general rates.

- **Sale of goods and services** – This is unlikely to be a source of funding under this model as there would be no change in the goods and services offered by the local governments or any new goods or services provided by the WPA. The commercial sector is likely to continue its opportunistic involvement in the sector and to consider opportunities as they arise, bearing in mind the need to be profitable.

- **Grants** – The WPA would compete with all the other entities requesting grants from the State Government for funding.

- **Waste levy** – There is the opportunity to increase the landfill levy and/or the level of hypothecation for waste management purposes through this model.

6.4.1.4 Funding requirements

Funding will be required for the following under this model:

- **Funding the implementation of the governance changes** – There would be some costs associated with the establishment of the WPA.
- **Funding the ongoing governance structures** – Additional costs would be required for the WPA to develop and implement its approval process, and to perform its day-to-day functions.
- **Funding infrastructure and land** – The State Government does not purchase infrastructure or land under this model.

6.4.1.5 Summary

A summary of the strengths and weaknesses of the WPA model is presented in Table 15.

Table 15: Strengths and weaknesses associated with the WPA model (model 4A)

Strengths	Weaknesses
• Facilitates improved strategic planning for waste infrastructure • Provides opportunities to improve current planning process and remove existing barriers to investment • Minimal government intervention in the market is likely to be viewed favourably by the commercial sector	• Does not take an integrated approach to waste management; therefore, unlikely to significantly improve waste management outcomes • No powers to influence or control waste streams or influence waste service providers. • Potential for lack of coordination, duplication and conflict with the WAPC and DoP in relation to planning matters • Potential for lack of coordination, duplication and conflict with EPA and DER in relation to approval process • Non-compulsory nature of regional local governments and the associated barriers to funding waste infrastructure remain

While the Waste Planning Authority model allows the State Government to ensure that waste infrastructure for future needs are adequately planned for, it is unlikely to facilitate the achievement of the Waste Strategy targets, as it does not take an integrated approach to managing waste generated in the region. This shortcoming was noted in consultation.

6.4.2 Model 4B: Waste Planning and Policy Authority model

Model 4B builds on model 4A. Under this model, a state government agency will be established that would have all the functions of the Waste Planning Authority; in addition, it would have the responsibility for developing and implementing policy and other measures to improve collection and processing outcomes across the three waste streams.

Figure 22 provides a diagrammatic representation of the Waste Planning and Policy Authority (WPPA) model. A discussion of the roles of the various key entities within this model is provided in the following sections.

6.4.2.1 Waste regulators

Role of state government

A new state government authority, the WPPA, would be established to determine the waste disposal and recycling infrastructure requirements for the region. The WPPA would review and make recommendations for the approval (or not) of new waste infrastructure project proposals, with reference to the WRIP. It would also work with DoP, the WAPC and local governments to improve the planning processes that relate to waste infrastructure. In addition, the new agency would develop measures to coordinate and standardise MSW collection services across the region, and direct local governments to participate in aggregated processing arrangements and co-operative collection systems. By doing this, the WPPA would be able to ensure that regional local governments and local governments managed their waste in a manner consistent with the State's strategy and policy directions. Aggregation of local government MSW waste volumes could provide a viable amount, which the private sector could piggy-back on. The agency would also develop policy and programs that would facilitate improved waste management outcomes for the C&I and C&D waste streams (for example, restrictions on types of waste that can be disposed of in landfill, levy regulation, market development policies and measures etc.). This would include standards for collection. It would also include co-ordination of consistent messaging and engagement of the waste sector and the community.

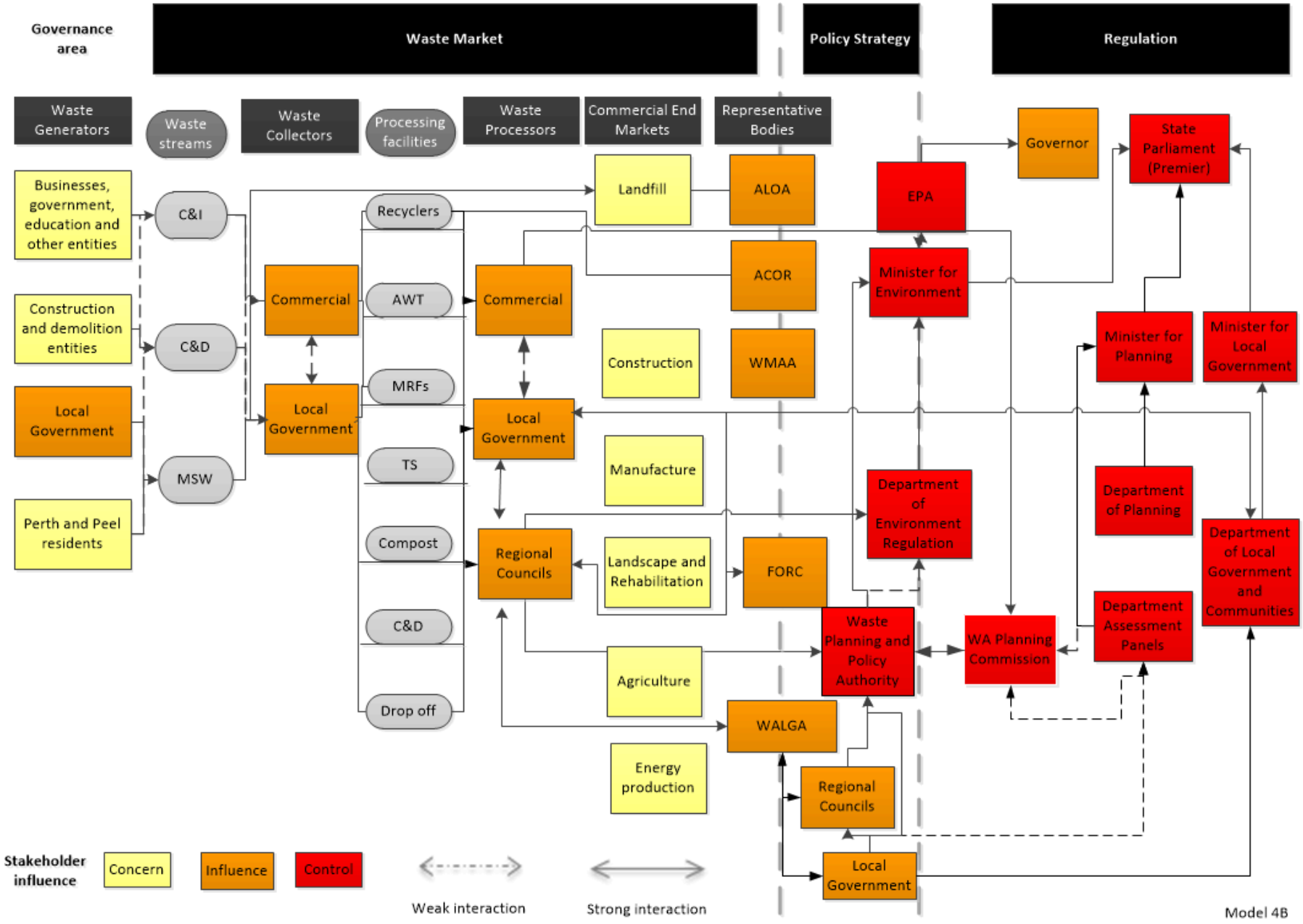

Figure 22: Model 4B: Waste Planning and Policy Authority model

Under this model, DER would retain the regulatory and policy development functions related to managing the environmental impact of waste facilities. However, the responsibility for developing waste management policy more broadly and setting state policy directions, strategy and targets would be transferred to the WPPA.

The Waste Authority would not exist under this model and its current functions would be transferred to the WPPA.

Role of regional local governments and local governments

The role of regional local governments and local governments would remain unchanged from their current role under this model.

6.4.2.2 Waste collectors and processors

The role of waste collectors and processors would remain unchanged under this model. It is likely that the development of improved and consistent planning process, and implementation of the WRIP, would facilitate investment in waste processing facilities. Waste collectors and processors would also be required to comply with any relevant policy and regulatory measures introduced by the WPPA.

Consultation revealed that there was a general lack of clarity around the roles of DER and the Waste Authority under the existing governance framework. Model 4B provides a clear separation of regulatory functions relating to the direct environmental impacts of waste facilities (DER) and the policy, planning and program delivery relevant to waste management more generally (WPPA). In addition to facilitating the improvement of strategic planning for waste facilities, this model also provides an opportunity to develop clear policy drivers that are consistent with delivering waste diversion from all waste streams. This model would allow the commercial sector to continue to operate in the market with limited government control over waste flows (compared to model 3A and 3B); this would allow the commercial sector to pursue business opportunities as it sees fit.

6.4.2.3 Potential funding sources under model

The establishment of the WPPA to undertake waste infrastructure planning and approval is unlikely to have an impact on the ability of the public or commercial sector's ability to raise debt finance or the mechanisms by which this is undertaken.

The following potential funding sources are available under this model:

- **Rates** – Under this model, the local governments would continue to levy rates on their communities to recoup the cost of providing the waste collection and processing costs. It is likely that there would continue to be resistance to raising rates, whether they are a separate waste charge or part of general rates.

- **Sale of goods and services** – This is unlikely to be a source of funding under this model, as there would be no change in the goods and services offered by the local governments or any new goods or services provided by the WPPA. The commercial sector is likely to continue its opportunistic involvement in the sector and to consider opportunities as they arise, bearing in mind the need to be profitable.

- **Grants** – The WPPA would compete with all the other entities requesting grants from the State Government for funding.

- **Waste levy** – There is an opportunity to increase the landfill levy and/or the level of hypothecation for waste management purposes through this model.

6.4.2.4 Funding requirements

Funding will be required for the following under this model:

- **Funding the implementation of the governance changes** – There will be costs associated with the establishment of the WPPA.
- **Funding the ongoing governance structures** – Additional costs would be required for the WPPA to develop and implement its approval process and to perform its day-to-day functions. Additional funding would be required in order for WPPA to carry out its additional functions (as compared to model 4A)
- **Funding infrastructure and land** – The State Government does not purchase infrastructure or land under this model.

6.4.2.5 Summary

A summary of the strengths and weaknesses of the WPPA model is presented in Table 16.

Table 16: Strengths and weaknesses of the WPPA model (model 4B)

Strengths	Weaknesses
• Facilitates improved strategic planning for waste infrastructure • Takes an integrated approach to waste management that considers measures to improve planning for waste facilities as well as improving waste collection, processing and disposal outcomes • Regulatory certainty and the identification of suitable sites for infrastructure could provide incentives for investment • Creates more certainty for markets by standardising collection systems • Encourages consistency between state and regional waste and infrastructure planning and waste management	• Non-compulsory nature of regional local governments and the associated barriers to funding waste infrastructure remain • There is no guarantee that the free market will deliver the infrastructure necessary to meet the waste diversion targets.

The WPPA model allows the State Government to influence collection and processing outcomes, and to implement measures that will assist it to achieve the Waste Strategy targets. In addition, this model facilitates improved strategic planning for waste infrastructure. This model was well received in consultation.

6.4.3 Model 4C: Waste Planning, Policy and Procurement Authority

Model 4C builds on model 4A and model 4B. Under this model a state government agency, the Waste Planning, Policy and Procurement Authority (WPPPA) would be established, which would have all the functions of the Waste Policy and Planning Authority, plus it would have the responsibility for planning, acquiring and (if required) managing new strategic sites to host waste and recycling facilities.

Figure 23 provides a diagrammatic representation of the WPPPA model and a discussion of the roles of the various key entities within this model follows.

6.4.3.1 Waste regulators

Role of state government

Under this model, the WPPPA would

- develop a WRIP that identifies the waste disposal and recycling infrastructure requirements for the region
- review and make recommendations for the approval (or not) new waste infrastructure project proposals with reference to the WRIP
- work with DoP, the WAPC and local governments to improve and streamline the planning processes that relate to waste infrastructure
- develop measures to coordinate and standardise MSW collection services across the region and direct local governments to participate in aggregated processing arrangements and collection system uptake
- develop policy and programs that would facilitate improved waste management outcomes for the C&I and C&D waste streams
- identify and procure new strategic sites to host waste and recycling facilities, with the assistance of the WAPC. The agency would prepare management plans for each site, allocating various portions for different complementary waste facilities, which can develop over time. It would also provide the necessary service infrastructure. It would be effectively the waste facilities' landlord, and would charge commercial leases for various waste processing facilities on the site.

The key features of the WPPA model (see section 6.4.2) would apply to the WPPPA model. Under this model and in reference to the WRIP, the WPPPA would both identify strategic sites for future infrastructure development purposes, as well as currently existing sites that are of strategic value. The WPPPA would secure these sites potentially via public purpose reservation under the relevant regional planning schemes (see section 3.3). The WPPPA would lease new strategic sites through commercial arrangements for the purposes of waste processing. The WPPPA could choose to develop waste precincts in which multiple entities might own and operate waste facilities under leasing arrangements with WPPPA. The WPPPA would need to ensure that waste precincts that it controls and leases are well planned and operated in order to maximise opportunities and benefits, and minimise potential risks and disadvantages.

As with model 4B, under this model, DER would retain the regulatory and policy development functions related to the managing the environmental impact of waste facilities. The responsibility for developing waste management policy more broadly and setting state policy directions, strategy and targets will be transferred to the WPPPA.

The Waste Authority would not exist under this model and its current functions would be transferred to the WPPA.

Role of regional local governments and local governments

The role of regional local governments and local governments would remain unchanged under this model.

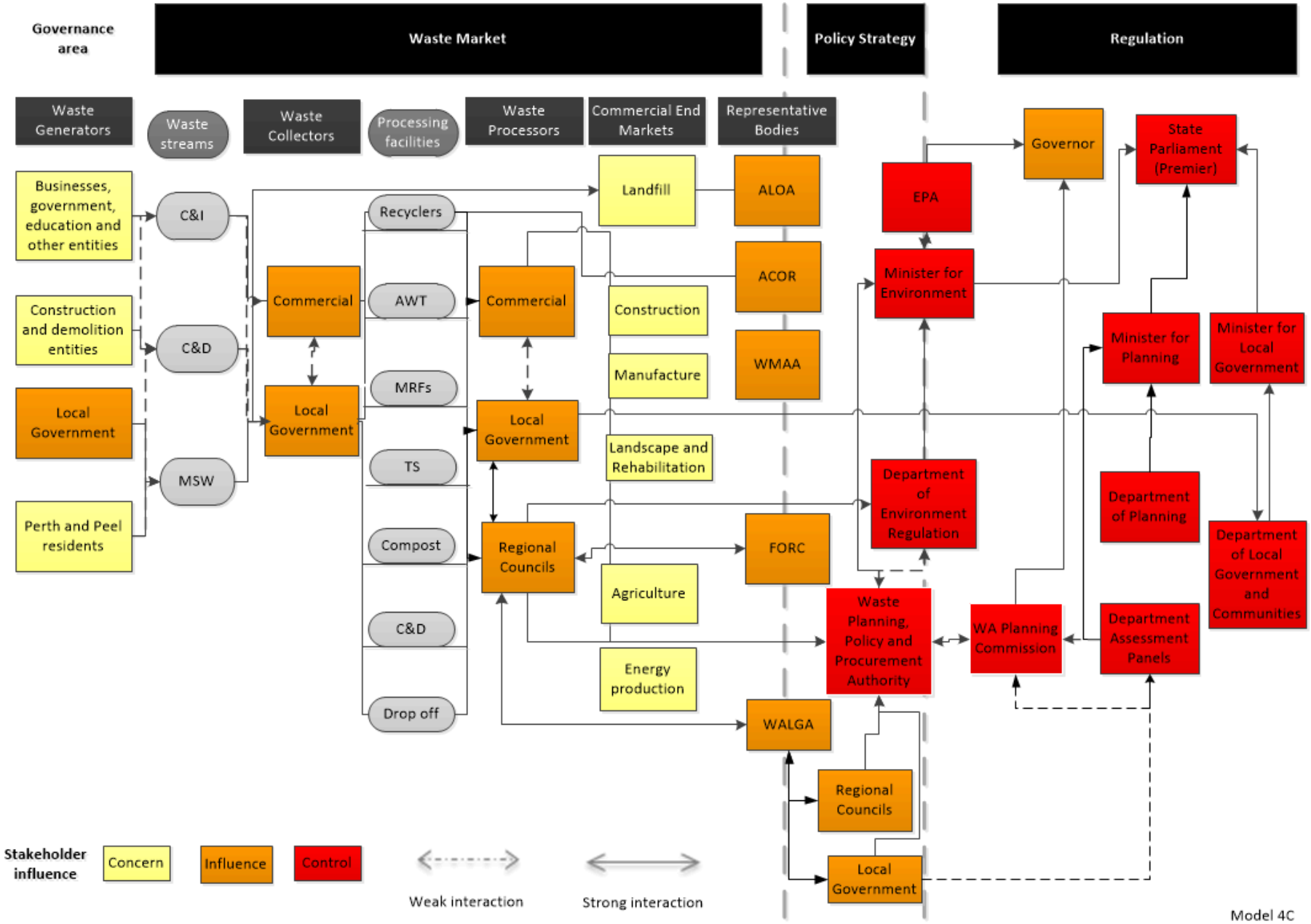

Figure 23: Model 4C: Waste Planning, Policy and Procurement Authority

6.4.3.2 Waste collectors and processors

The role of waste collectors and processors would remain unchanged under this model; although, both would need to provide their services in a manner consistent with WPPPA policy.

Under this model, WPPPA would make available strategic sites for waste infrastructure development purposes. It would ensure that the sites are appropriately zoned and reserved for waste management purposes, relieving the private sector of the some of the requirements of the current approval process (for example, proponents would not have to identify a site and demonstrate that the site was suitable, if they chose to develop on a WPPPA owned site). This could improve the efficiency of approval processes and reduce the risks and associated costs for commercial entities or regional local governments seeking to establish waste facilities. It should be noted that commercial entities would not be precluded from developing infrastructure on non-WPPPA sites subject to the normal planning and environmental approval processes.

As with model 4B, in addition to facilitating the improvement of strategic planning for waste facilities, this model also provides an opportunity to develop clear policy drivers that are consistent with delivering waste diversion from all waste streams. Such policy may improve the quality and demand for waste and recyclable products and facilitate market development. This model would allow the commercial sector to continue to operate in the market with limited government control over waste flows (compared to model 3A and 3B) allowing the commercial sector to pursue business opportunities as it sees fit.

It should be noted that this model was very favourably received during the consultation.

6.4.3.3 Potential funding sources

Local governments and regional local governments would continue to obtain finance through the WATC and the absence of increasing revenue to repay the debt or of market structures to support the repayment of debt, the relatively low level of existing debt financing is likely to continue. The availability of suitable sites for infrastructure purposes and clear and consistent policy directions are likely to encourage more commercial sector debt finance.

The following potential funding sources are available under this model:

- **Rates** – Under this model, the local governments would continue to levy rates on their communities to recoup the cost of providing the waste collection and processing costs. It is likely that there would continue to be resistance to raising rates, whether they are a separate waste charge or part of general rates. This model could achieve an optimal or improved role for markets and, therefore, minimise or reduce the cost of the waste service.

- **Sale of goods and services** – This is unlikely to be a source of funding under this model as there would be no change in the goods and services offered by the local governments or any new goods or services provided by the WPPPA. The commercial sector is likely to continue its opportunistic involvement in the sector and to consider opportunities as they arise, bearing in mind the need to be profitable.

- **Grants** – The WPPPA would compete with all the other entities requesting grants from the state government for funding.

- **Waste levy** – There is an opportunity to increase the waste levy and the level of hypothecation for waste management purposes through this model.

- **Other sources** –The WPPPA would receive revenue from leasing the secured sites to facility operators and potentially other symbiotic businesses looking to locate adjacent to the waste processing facility. Private capital would be the most likely source funding for establishing infrastructure under this model.

6.4.3.4 Potential funding requirements

Funding will be required for the following under this model:

- **Funding the implementation of the governance changes** – There will be costs associated with establishing WPPPA.

- **Funding the ongoing governance structures** – Additional costs would be required for the WPPPA to perform its day-to-day functions.

- **Funding infrastructure and land** – Additional funding for the purposes of purchasing strategic sites will be required under this model if MRIF funds were not allocated by WAPC. It is unlikely that this will be able to be covered by the 25% of the waste levy allocated for waste management purposes. It is likely that additional funding would be required and the funds in the WARR Account could potentially fill this gap. A potential process for funding the acquisition of strategic sites is set out in section 3.3.4.3. The most substantial cost would be the capital cost for new infrastructure, which is estimated to be between $1-4 billion over the next 35 years.

6.4.3.5 Summary

A summary of the strengths and weaknesses of the WPPPA model is presented in Table 17.

Table 17: Strengths and weaknesses of the WPPPA model (model 4C)

Strengths	Weaknesses
• Facilitates improved strategic planning for waste infrastructure • Secures strategic sites and buffers for future waste management purposes • Through contractual arrangements with facility owners, the State Government could direct processing outcomes • Provides opportunities to develop waste processing precincts and develop industrial ecology • Provides more attractive investment opportunities by providing access to suitable sites for waste facilities • Creates more certainty for markets by controlling waste stream and influencing	• The state would be required to allocate funding to purchase strategic sites. This could potentially increase state debt • This model will take time to fully implement, as processes to secure sites could be lengthy • Non-compulsory nature of regional local governments and the associated barriers to funding waste infrastructure remain • There is likely to be strong resistance from current facility owners to transfer the ownership of strategic sites to the state government

waste service providers • Provides a flexible approach by encouraging proponents of waste facilities to establish these on WPPPA sites, but does not preclude establishment of infrastructure on other sites subject to the relevant approval outcomes • Takes an integrated approach to waste management that considers measures to improve planning for waste facilities as well as improving waste collection, processing and disposal outcomes and is likely to improve waste management outcomes • Encourages consistency between state and regional waste and infrastructure planning and waste management	

As with model 4B, the WPPPA model allows the State Government to influence collection and processing outcomes, and implement measures that will assist it to achieve the Waste Strategy targets. In addition, this model facilitates improved strategic planning for waste infrastructure and by making suitable sites available for infrastructure development purposes; this model is likely to encourage additional commercial investment. It should be noted that this model is likely to cost the State Government more to implement than model 4A or 4B as it requires the state to purchase sites for the development of infrastructure. This model was well received in consultation.

6.5 Model 5: Entity to coordinate waste management

This model involves transitioning from the existing waste management governance model to a model that sees a Statutory Metropolitan Waste Management Group (SMWMG) established to coordinate and oversee contracting for municipal solid waste services in the Perth metropolitan and Peel regions. Under this model, the Waste Authority would oversee the SMWMG and retain responsibility for developing state-wide waste management and recycling policy. The Waste Authority's strategy would cover all three waste streams and all stages of the waste management process.

This model could be phased-in in the following manner:

- Model 5A – In the first phase, a Voluntary Metropolitan Waste Management Group would be established to oversee management of MSW

- Model 5B – In the second phase, a Statutory Metropolitan Waste Management Group would be established to oversee MSW management in the region.

6.5.1 Model 5A: Voluntary Metropolitan Waste Management Group model

During the first phase of the model, the WALGA model (model 2) would be implemented and the Waste Authority would assume the roles of the WPPPA (model 4B) in addition to the current roles it is responsible for performing.

A new Voluntary Metropolitan Waste Management Group (VMWMG) would be established under the auspices of the Waste Authority to work with regional local governments to align their waste management and infrastructure plans with those of the state government.

6.5.1.1 Waste regulators

Role of the state government

In addition to the roles it currently is responsible for performing, the Waste Authority would

- co-ordinate the implementation of the WRIP
- facilitate new waste infrastructure project proposals for the Perth metropolitan and Peel regions where these are consistent with WRIP
- develop a comprehensive waste management plan for the Perth metropolitan and Peel regions that incorporates a broad range of waste management initiatives
- request the three regional local governments (established under the WALGA model) to develop waste management plans to complement the regional plan and approve these for implementation
- provide incentives for local government participation in the VMWMG by making funding for infrastructure or other waste management purposes contingent on membership and consistency with the WRIP
- secure systems sites with appropriate buffers that are suitable for waste infrastructure purposes through the planning system
- develop policy and measures to encourage diversion from the C&I and C&D waste streams.

The VMWMG would comprise representatives of the State Government, regional councils and the waste industry. The VMWMG would work with regional local governments to develop regional plans that are compatible with the Waste Strategy and the WRIP.

Under this model, DER would retain its current regulatory and policy development functions related to the managing the environmental impact of waste facilities. However, the responsibility for developing waste management policy more broadly and setting state policy directions, strategy and targets would be transferred to the Waste Authority.

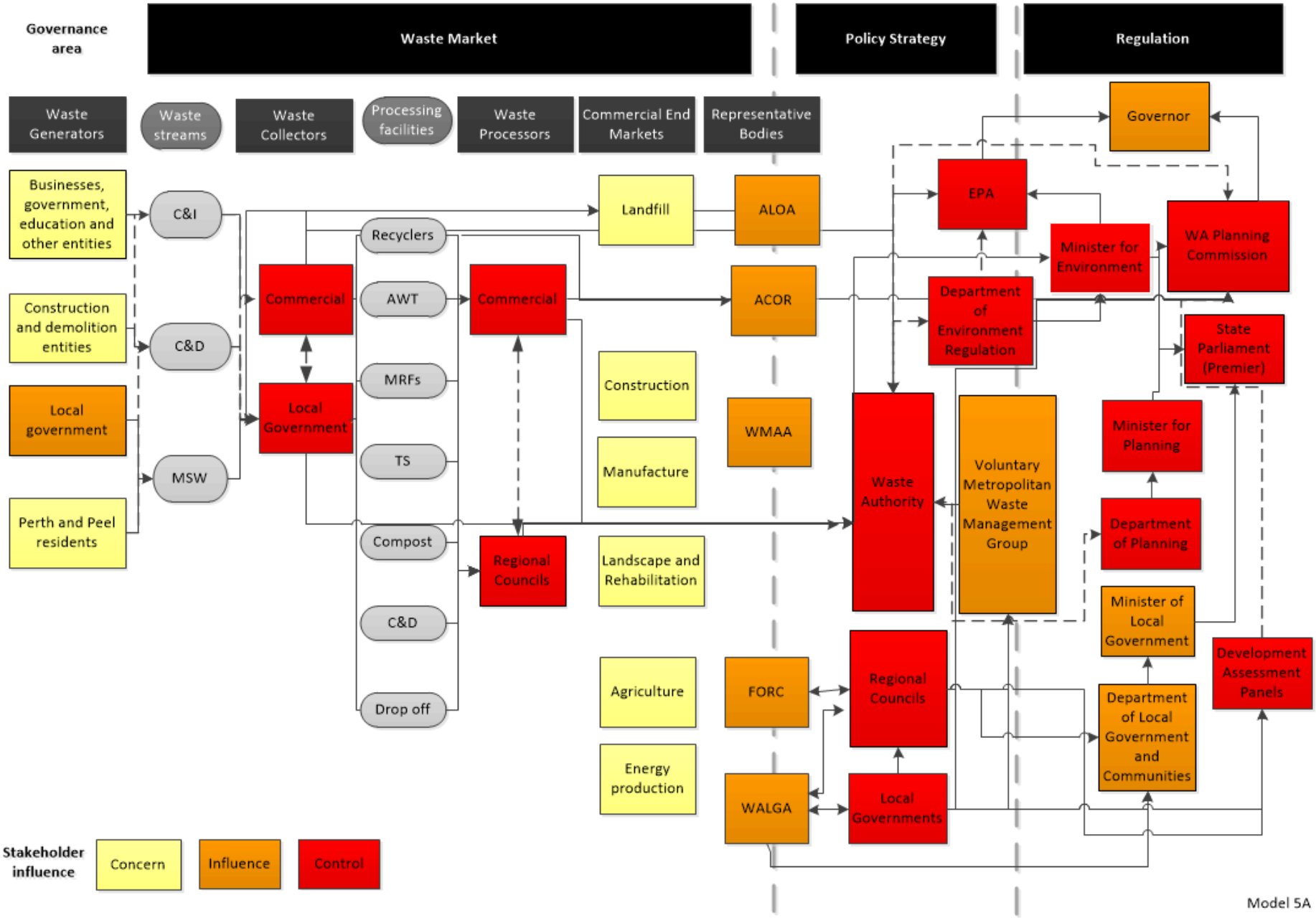

Figure 24: Model 5A: Voluntary Metropolitan Waste Management Group model

Role of regional local governments

The three regional local governments (as established under the WALGA Vision model) would be responsible for developing and implementing regional waste and infrastructure plans that are consistent with the WRIP and the overarching waste management plan for the Perth metropolitan and Peel regions. The plans developed by the regional local governments would be approved by the Waste Authority. The three regional local governments could run their own collection (on behalf of local government members) and processing services; although, these would need to be consistent with the overarching direction set by the Waste Authority.

Role of local governments

Where appropriate, individual local governments would continue to provide waste collection services and implement waste management community initiatives. However, local governments would be encouraged to combine collection contracts to achieve economies of scale and consistency of service delivery. This could be achieved by regional councils co-ordinating collection contracts on behalf of their member councils.

6.5.1.2 Waste collectors and processors

The role of waste collectors and processors would remain unchanged under this model although both would need to provide their services in a manner consistent with VMWMG direction.

One of the key benefits of this model is that it largely takes advantage of existing strengths and structures within the current governance framework. As the VMWMG is a voluntary body, legislative change is not required to establish it and financial incentives, such as funding for infrastructure development being contingent on membership, could be used to encourage participation and consistent policy development. However, the regional local government experience has indicated that collaborative contractual arrangements can be time consuming; and the issue of member withdrawal and the issues associated with these remains.

The funding sources and funding requirements under this model are comparable with those under the SMWMG model discussed in the next section (see section 6.5.2), albeit with additional funding required to establish the SMWMG.

6.5.1.3 Summary

A summary of the strengths and weaknesses of the VMWMG model is presented in Table 18.

Table 18: Strengths and weaknesses of the VMWMG model (model 5A)

Strengths	Weaknesses
• Encourages consistency between state and regional waste and infrastructure planning • Takes advantage of existing waste management knowledge and expertise • Introduces the concept of local governments working together to drive outcomes for the entire Perth	• Challenges associated with membership of regional local governments remain and voluntary arrangements are likely to result in incomplete participation unless amendments are made to the LG Act to resolve this • Challenges associated with negotiating agreements remain • Long-term certainty of waste supply is

Strengths	Weaknesses
metropolitan and Peel regions • Improves economies of scale and scope by reducing the number of regional local governments, albeit not significantly • Should be reasonably well accepted by local government stakeholders • Provides a mechanism for securing sites and buffers for infrastructure purposes, which provides certainty to local governments and the private sector and makes investment in these sites attractive	not guaranteed due to reasons set out above

The VMWMG model encourages co-operative arrangements to manage waste in the region and capitalises on existing expertise within the local government and commercial sector to achieve this. This model does not represent a significant change from existing arrangements andshould be able to be implemented quickly without legislative change or significant investment. However, the model does not resolve the issues associated with the voluntary nature of regional local government memberships and could entrench current inefficiencies and barriers associated with infrastructure development processes. Amendments to the Local Government Act 1995 could potentially resolve this issue. While the governance structures proposed under this model are largely focussed on delivering improved outcomes from the municipal solid waste stream, the model does provide opportunities through the various waste management plans to implement measures to improve outcomes across all three waste streams.

6.5.2 Model 5B: Statutory Metropolitan Waste Management Group model

If the voluntary arrangements were ineffective, the SMWMG could be established to plan and co-ordinate waste management services on behalf of the local governments in the region.

6.5.2.1 Waste regulators

Role of state government

The SMWMG would

- develop and implement a statutory waste plan that is consistent with the Waste Strategy and the WRIP
- facilitate joint procurement of efficient and sustainable resource recovery and residual waste disposal services for all member councils
- help build the capacity and knowledge of councils and their communities of best practice waste minimisation, particularly regarding the opportunities and options available for improved services and infrastructure.

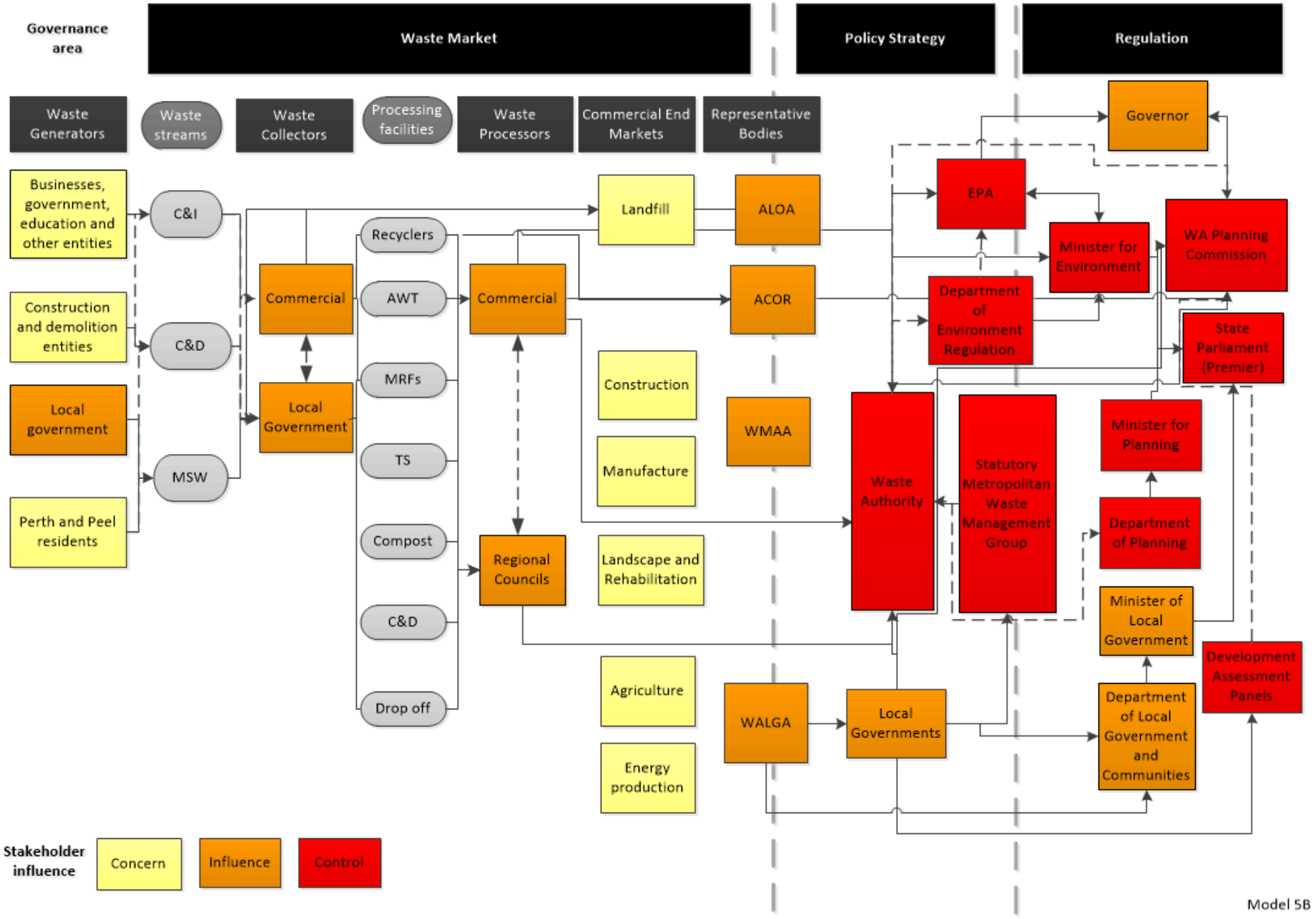

Figure 25: Model 5B: Statutory Metropolitan Waste Management Group model

The SMWMG would be established under the WARR Act, which would be amended to require local governments to become members of the group. The SMWMG would be governed by board of directors. Half the board members would be representatives from the local governments in the Perth metropolitan and Peel regions, with the remaining board members appointed by the Minister for Environment based on their relevant skill set and experience. The board would be supported by working groups comprised of technical experts in areas such as waste management technologies, waste management practices, procurement and financial management. The SMWMG would not run facilities it would only contract for their operation either with private industry or local governments.

The role of the Waste Authority under this phase of the model would be to

- develop and co-ordinate the implementation of a statutory state-wide waste management and recycling plan, policies and measures that cover all three waste streams and all stages of the waste management process
- co-ordinate the implementation of the WRIP
- where consistent with the WRIP, facilitate new waste infrastructure project proposals for the Perth metropolitan and Peel regions
- ensure that strategic sites for installing waste management facilities are secured for waste management purposes under the planning system
- approve the SMWMG's waste plans
- manage and disperse funds from the WARR Account including for infrastructure planning and development
- promote community awareness and understanding of resource efficiency, waste avoidance and resource recovery
- make recommendations to the Minister for the Environment on matters relating to waste management and the WARR Act.

DER would retain the regulatory and policy development functions related to the managing the environmental impact of waste facilities. However, the responsibility for developing waste management policy more broadly and setting state policy directions, strategy and targets will be transferred to the Waste Authority.

Role of regional local governments

Under this model, regional local governments would compete with the private sector to secure contracts to process or dispose of waste in the region.

Role of local governments

Each local government would continue to deliver waste and recovery education programs to its community and collect waste on behalf of the SMWMG.

6.5.2.2 Waste collectors and processors

The role of waste collectors and processors would remain unchanged under this model; although, both would need to provide their services in a manner consistent with SMWMG direction.

The key benefit of this model is that it ensures that regional waste plans are aligned with state strategy and direction. Through taking a regional approach, the SMWMG will be able to ensure standardisation of collection systems, facilitate the development of economies of scale and scope and the set directions for processing. This should provide certainty for investment by the commercial sector and local government. The model, however, is likely to be resisted by regional local governments. Legislative change will be required to establish the SMWMG and the arrangements around facilities currently owned and operated by regional local governments will need to be resolved.

6.5.2.3 Potential funding sources under model

The following potential funding sources are available under this model:

- **Rates** – Under this model, the local governments would continue to levy rates on their communities to recoup the cost of providing the waste collection and processing costs. It is likely that there would continue to be resistance to raising rates, whether they are a separate waste charge or part of general rates. This model could achieve an optimal or improved role for markets and, therefore, minimise or reduce the cost of the waste service

- **Sale of goods and services** – This is unlikely to be a source of funding under this model as there would be no change in the goods and services offered by the local governments or any new goods or services provided by the SMWMG or Waste Authority. The commercial sector is likely to continue its opportunistic involvement in the sector and to consider opportunities as they arise bearing in mind the need to be profitable

- **Grants** – The Waste Authority and the SMWMG would compete with all the other entities requesting grants from the state government for funding. Under this model the SMWMG would provide managed supply grants to local governments if local governments were to participate in the SMWMG's infrastructure procurement processes

- **Waste levy** – There is an opportunity to use WARR Account funds for waste management purposes through this model.

The procurement of strategic sites with the correct zoning and buffer protection would encourage the private sector to raise debt finance. Local governments and regional local governments would continue to obtain finance through the WATC and the absence of increasing revenue to repay the debt or of market structures to support the repayment of debt, the relatively low level of existing debt financing is likely to continue. The availability of sites for infrastructure purposes and clear and consistent policy directions are likely to encourage more commercial sector debt finance.

6.5.2.4 Potential funding requirements

Funding will be required for the following under this model:

- **Funding the implementation of the governance changes** – There will be costs associated with establishing SMWMG and transferring roles currently held by DEC to the Waste Authority

- **Funding the ongoing governance structures** – Additional costs would be required for the SMWMG and the Waste Authority to perform their day-to-day functions.

- **Funding infrastructure and land** – Additional funding for the purposes of purchasing strategic sites will be required under this model. It is possible that this will be able to be covered by the 25% of the waste levy allocated for waste management purposes.

6.5.2.5 Summary

A summary of the strengths and weaknesses SMWMG model is presented in Table 19.

Table 19: Strengths and weaknesses of the SMWMG model (model 5B)

Strengths	Weaknesses
• Encourages consistency between state and regional waste and infrastructure planning • Takes advantage of existing knowledge and skill sets in relation to waste management • Improves economies of scale and scope by reducing the number of regional local governments, albeit not significantly • Should be reasonably well accepted by local government stakeholders • Securing sites and buffers for infrastructure purposes provides certainty to local governments and the public sector and makes investment in these sites an attractive proposition	• Challenges associated with negotiating agreements remain • Legislative change required to implement this model could mean long implementation timeframes • This model fails to harness the existing expertise of regional local governments

The SMWMG model provides opportunities to achieve economies of scale in both collection and processing by consolidating waste streams and through joint procurement approaches. It aligns regional waste plans with the WRIP and the State's Waste Strategy; and mandatory local government membership resolves the existing commitment issues. The model requires legislative change, which could be lengthy to implement. While the governance structures proposed under this model are largely focussed on delivering improved outcomes from the MSW stream, the model does provide opportunities to implement measures to improve outcomes across all three waste streams. It is likely to be resisted by regional local governments, which have already invested significant funds in waste processing infrastructure.

6.6 Model 6: Full Commercial Access model

This model involves minimal involvement from state and local governments and full commercial access to all the waste streams for collection and processing purposes. The exclusive right of local governments to collect (or contract another organisation to collect) MSW, currently legislated in the WARR Act, is removed. The State Government is primarily involved in setting minimal licensing

and compliance standards for the waste sector and allows the market to determine how waste is collected and processed in compliance with these standards. The State would have a limited role in planning for future infrastructure needs. It would provide information on suitable sites for infrastructure; although, it would be up to the private and local government sectors to establish waste management facilities. Given the market-driven approach of this model, the waste levy would be set at a level commensurate with the cost of the externalities associated with disposal to landfill. That is, the levy would reflect the environmental and social costs of landfilling. It should be noted, however, that there are significant barriers to and issues associated with determining the environmental and social costs of landfilling that generally result in the underestimation of the possible impacts of landfills and, subsequently, their environmental and social cost, if not economic cost.

It should be noted that this model has not been the subject of targeted or public consultation.

Figure 26 provides a diagrammatic representation of the Full Commercial Access model and a discussion of the roles of the various key entities within this model follows.

6.6.1 Waste regulators

Role of state government

Under this model, the State Government would

- regulate the environment impacts of waste facilities under the EP Act, undertake auditing and enforce compliance
- regulate the health impacts of waste facilities under the relevant public health regulation and enforce compliance against these
- provide general information about suitable strategic sites for establishing future waste management infrastructure
- reduce local government involvement in the determination of development applications for waste facilities.
- facilitate the development of markets
- provide information and encourage community behavior change

It is not proposed that any new governance agencies be established under this plan; rather, existing functions and agencies be rationalized, if possible. Under this model the two primary state government regulators would be the DER and Department of Health. DER would develop regulation related to the environmental impacts of waste facilities and enforce compliance against these, and would have primary responsibility for undertaking strategic planning for future waste management and developing and implementing community behavior change initiatives. The Department of Health would be responsible for regulating the health impacts of waste facilities under this model.

The Waste Authority would cease to exist under this model, with its functions being transferred to the DER.

Role of regional local governments

As noted previously, regional local governments currently own a number of waste processing and disposal facilities. Under this model regional local governments would not have an exclusive right to process MSW generated within their member councils' local government areas, but would compete with the private sector to secure contracts to process or dispose of any waste in the region. If regional local governments were to function on a level playing field to commercial entities, the option of obtaining debt funding from WATC at preferential rates and with preferential conditions should be removed. In addition, regional local governments should be permitted to borrow against their own assets.

Alternatively, regional local governments would cease to exist, with the assets owned by each regional council sold to the private sector and the proceeds distributed to member councils.

Role of local governments

Local governments could contract out MSW and public event collection to the private sector and enter into joint procurement processes (run by the state government) to contract out processing or disposal services.

As the exclusive right for local governments to collect MSW waste would be removed, many local governments may not be able to achieve the economies of scale that the current arrangement provides. Therefore, many local governments may choose to not collect MSW waste, leaving residents to make their own arrangements with private collection companies.

6.6.2 Waste collector and processors

Waste collectors and processors would provide their services in a manner that is consistent with the state's environmental, health and licence requirements. They would charge customers either directly or via local governments for their services.

There are a number of issues associated with implementing such a model. Commercial entities are driven by commercial goals in the delivery of their products and services. Therefore, while economic theory suggests that taking a market-driven approach should deliver efficiencies and a reduction in costs, this could occur at the expense of waste and environmental management and social outcomes. For example, taking a least cost approach to waste management could result in disposal, for example in landfills, being the cheapest option and resulting in the region being unable to meet its Waste Strategy targets. Under this model, there is no certainty as to whether the region will be able to meet its Waste Strategy targets.

In addition, the lack of co-ordination or control from state or local government in this model presents risks to the delivery of services; for instance, if a commercial entity is unable or unwilling to meet its commitments.

Under this model, waste collection and processing rates would be set by commercial entities and charged directly to customers. While these rates could better reflect the true cost of waste management, they could potentially vary from region to region depending on the service provider. There could also be equity issues associated with low income earners being unable to pay commercial rates for an essential service. Market drivers (for example, commodity market prices etc.) are more likely to impact on costs for services under this model and be passed on to users of the service.

The state government under this model is responsible for planning for the future infrastructure needs of the region. However, given its limited governance role, it will be unable to guarantee that the infrastructure provided by the private sector will be able to meet the needs of the region in the future.

6.6.3 Potential funding sources under model

The private sector would continue to raise debt finance and use returns from the sale of goods and services to finance its activities. The state government would rely on levy funds to provide its services.

Currently the state government uses 25% of the waste levy for waste management purposes (via the Waste Authority). Under this model, the levy is set to reflect the cost of the externalities associated with disposal to landfill. Using a purely economic approach, this is unlikely to reflect the true environmental and social cost of landfilling. Using this approach could reduce the revenue available to the state to be used for waste management purposes.

The following potential funding sources are available under this model:

- **Rates** – As the commercial sector and regional local governments are likely to provide most waste management services, local governments will be unable to charge waste rates at current levels and therefore funding from this source is likely to be reduced
- **Sale of goods and services** – This source of funding is likely to decrease for local governments due to the outsourcing of waste management services. Some charges could be passed on if waste management was undertaken by regional local governments. This is unlikely to be a source of funding for state governments. The commercial sector is likely to continue its opportunistic involvement in the sector and to consider opportunities as they arise bearing in mind the need to be profitable
- **Grants** – The state government could provide grants to participants in the sector to encourage improved waste management outcomes. However, this will result in the State Government increasing its debt liability.
- **Waste levy** – There is an opportunity to use WARR Account funds for waste management purposes through this model. However, as discussed above, the revenue would potentially decrease over time, if diversion rates increase.

Potential funding requirements

Funding would be required for the following under this model:

- **Funding the implementation of the governance changes** – There will not be significant costs incurred under this model as the model sees the State Government's involvement in waste management decrease
- **Funding the on-going governance structures** – Funding requirements are unlikely to vary significantly from current requirements due to the reduced involvement of the State Government in waste management
- **Funding infrastructure and land** – Additional funding for the purposes of purchasing strategic sites will be required under this model. However, this would be funded by the private sector.

6.6.4 Summary

A summary of the strengths and weaknesses of the Full Commercial Access model is presented in Table 20.

Table 20: Strengths and weaknesses of the Full Commercial Access model (model 6)

Strengths	Weaknesses
• Relatively low cost model to implement as significant change is not required from present and state government role is further reduced • Likely to be supported by some commercial entities • Could potentially drive competition and increase the efficiency of waste management • Could potentially drive diversion; although, this is not certain • Could allow for passing on the true cost of waste management to customers and encourage positive behaviour change • The approval process for establishing waste facilities could be streamlined under this model	• Model is very unlikely to achieve the Waste Strategy outcomes • Commercial operational imperatives could result in suboptimal waste management outcomes (waste is processed/disposed of in the cheapest possible way rather than in the most environmentally sensitive manner) • Is unlikely to guarantee that the infrastructure needs of the region will be met in the future in a manner that is environmentally and socially sensitive • Waste rates could be volatile if they are set by the private sector with no oversight or regulation by government • Cost of MSW collection is likely to increase, resulting in an increase for residents, due to loss of economies of scale • Could potentially present equity issues as low income users of waste management services might not be able to afford to pay commercial rates for these • Collection service provision to residents is likely to be ad hoc and inconsistent • Fully privatised MSW collection would result in an increase in heavy traffic on residential streets. • Reduced funding for state and local government could make ensuring collection and processing contingencies expensive • This model is likely to be resisted strongly by regional local governments and local governments, which currently provide waste management services to their residents • Legislative change is required to establish this model

While implementing the Full Commercial Access model could theoretically deliver waste management outcomes efficiently, current experience shows that this approach is unlikely to deliver the Waste Strategy targets without some level of state government intervention. In addition, commercial imperatives to increase profit margins could result in least cost processing and disposal options being preferred over more environmentally sensitive options. The model also poses a number of financial (revised levy unlikely to cover costs of purchasing strategic sites, likely to increase state debt) and operational risks to the State Government. From an infrastructure planning perspective, there is no guarantee that this model will provide environmentally appropriate infrastructure solutions to meet the region's needs of the future.

It should be noted that this model has not been tested in the targeted consultations sessions or the SWIP public forums.

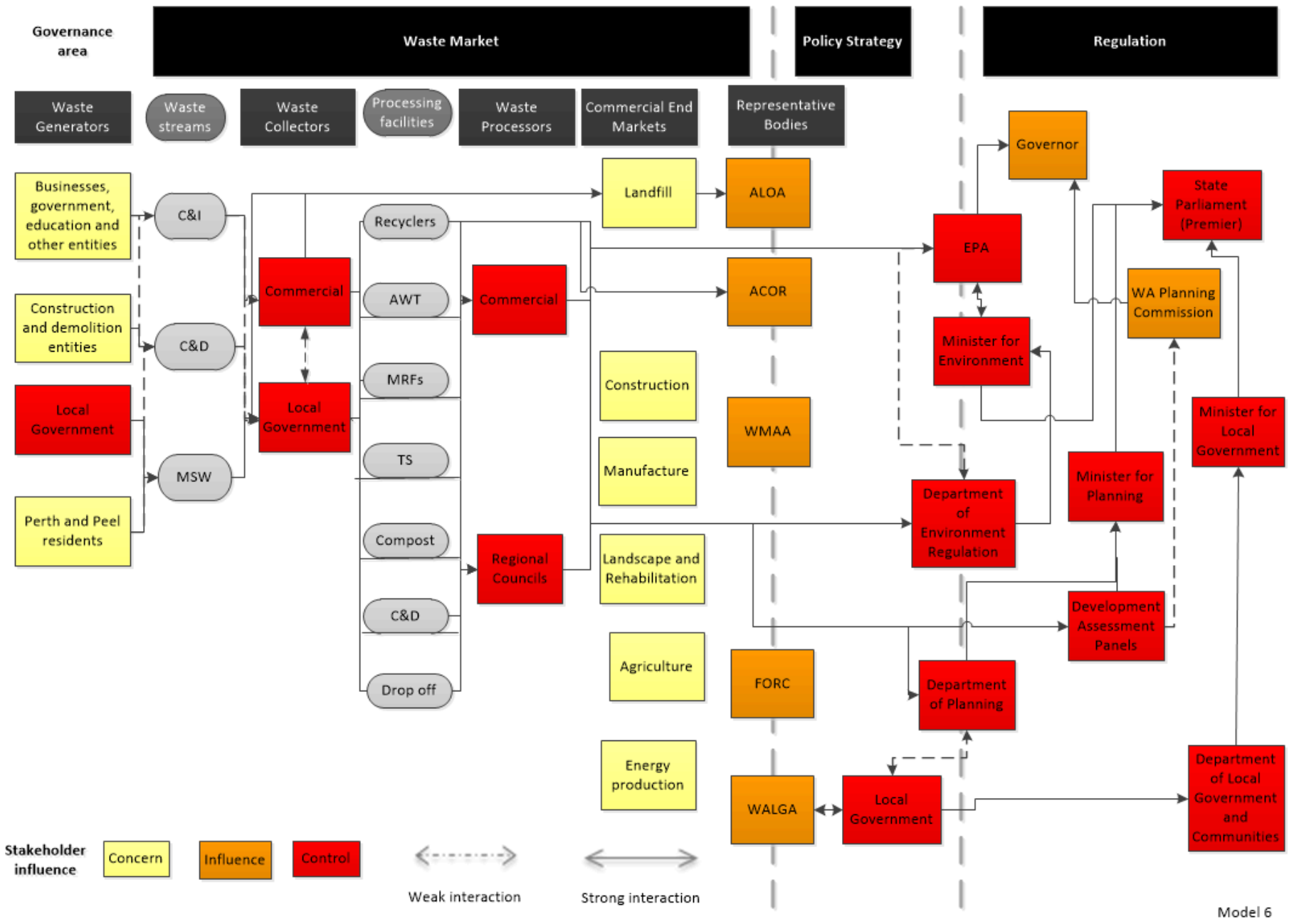

Figure 26: Model 6 - Full Commercial Access model

6.7 Governance model summary

It would appear that there is no single governance option that is likely to resolve all the issues associated with the current governance structure; nor is there an option that is likely to meet all of the State Government's waste management goals or allow for optimised strategic infrastructure planning without imposing some risks and costs. Each of the governance options have strengths, but also some weaknesses. To illustrate this, Appendix 3 provides a summary of the likely performance of each of the models against the criteria identified in section 6.1. In general, the models that involve an increased level of control and intervention from the State Government appear to be those that are likely to provide more certainty around the region meetings its Waste Strategy targets. These models, however, are likely to cost more to implement and are likely to be met with some resistance from stakeholders. The models where the State Government has a lower level of intervention are those that are likely to be less expensive to implement and are likely to be met by less resistance from stakeholders. However, it would appear that these models are less likely to deliver the Waste Strategy targets.

Prior to the State Government deciding to implement a new governance model for the waste sector, careful consideration would need to be given to what was the desired waste management and planning outcomes, and what are acceptable costs. This should in part determine which of the governance options might be most appropriate to deliver these. Regardless of the model chosen, further detailed investigation would be required to identify and resolve implementation issues, to determine the likely outcomes and determine implementation costs and risks.

Finding 7

The SWIPWG expressed a general preference for the establishment of a separate Waste Planning, Policy and Procurement Authority, which could, where necessary, manage State land for waste plan for waste precincts, but which would not control MSW services nor own/operate waste facilities, but which could co-ordinate waste flows.

The SWIPWG considered that it is important that any such Authority is separate from the environmental regulation agency.

7 Examples of integration of siting, waste management technology and governance models

This section draws on the information reported above to develop a range of different examples of integrated waste management systems that could be implemented under the oversight of the State Government. Each Example consists of different types of waste facilities, sites and governance arrangements. For each Example, an estimate has been made of the overall capital cost of the processing infrastructure required.

Six Examples are presented in this section:

1. **Example 1** – The State Government only plans for MSW waste. The preferred processing for mixed waste is MBT to produce CLO (as per Option 1 described in section 4.3.2 above). All households have access to source-separation collection services, but only 60% mixed waste is processed through a MBT.
2. **Example 2** - The State Government only plans for MSW waste. The preferred processing for mixed waste is MBT to produce CLO. Only 75% households have access to each recycling collection service, including mixed waste to a MBT, with the remainder disposed directly to landfill. Residuals from MRFs and MBTs are processed in a thermal W2E.
3. **Example 3** - The State Government oversees planning for MSW waste only. Planning for and establishment of MSW infrastructure is the responsibility of three regional councils. Each regional council adopts a different system.
4. **Example 4** – The State Government plans for MSW, C&I and C&D waste. The preferred processing for mixed waste is MBT to produce RDF, which is then processed in a thermal W2E plant (as per Option 2 described in section 4.3.3).
5. **Example 5** - The State Government plans for MSW, C&I and C&D waste. The preferred processing for mixed waste is in a thermal W2E plant (as per Option 3 described in section 4.3.4).
6. **Example 6** - The State Government plans for MSW, C&I and C&D waste. The preferred processing for mixed waste is MBT to produce CLO (as per Option 1 described in section 4.3.2).

The tonnages used in the modelling of these Examples are those projected to be generated in 2020 and 2050, using the WAPC's "band C" population projections (Western Australian Planning Commission, 2012).

A number of existing sites have been identified as having potential to either form the basis of a waste precinct or at least be maintained as a waste site into the long term, as discussed in section 5. In addition, a number of general locations in industrial areas (or identified as potential industrial areas in the EELS) have been identified as potentially suitable for waste facilities should new sites for waste precincts be required. Potential locations for waste processing infrastructure are listed under each Example description below. These locations are for demonstration purposes only. It is acknowledged that the Examples don't consider all existing waste processing facilities, especially those processing C&I and C&D waste.

To determine the amount of infrastructure required for each of the Examples, the models used in section 4.3 above have been adjusted so that the waste diversion targets are only just met, with the exception of Example 3, in which it is assumed all the MSW in the areas covered by the regional council is processed according to the system used by that regional council, which results in diversion rates higher than the targets. It is also assumed that the population growth is according to band C in the WAPC's population projections and a medium level of source-

separation is achieved. It should be noted that Shire of Boddington is included in the area modelled, despite it not being part of the Perth or Peel regions.

The assumptions listed in section 4.3 above apply to the Examples discussed below.

More details on the modelling outcomes for each Example are presented in Appendix 8A.

7.1 Example 1 – MSW only, MBT to CLO

Under this option, the State Government would plan for MSW waste only.

The State government would oversee the development of waste infrastructure precincts, primarily to accommodate infrastructure to process MSW. Precincts could be accessed by the private sector to build infrastructure to process C&I and C&D waste, but MSW infrastructure would have priority. The capacity requirements and land requirements given below only consider the requirements to process MSW.

For Example 1, it is assumed that 60 per cent of the domestic waste collected through the kerbside system is processed through a MBT to produce CLO, as per the MSW stream in the flow chart for Option 1 (see Figure 34 in Appendix 5). The rest of the mixed waste is disposed directly to landfill. This reflects a situation where not all councils have access to an AWT to process their mixed waste.

For Example 1, it is assumed that 100 per cent access to and participation in the separate green waste / food waste kerbside collection service. The food and garden waste collected in the “third bin” would be processed in an enclosed composting facility. While there are currently few local governments with a “3-bin” system, almost all metropolitan and Peel local governments have a 2-bin system. Other capital cities have a high percentage of households with a 3-bin system. Therefore, it is not unrealistic that all local governments in the Perth and Peel regions could have a 3-bin system, with food waste collected in the green waste bin.

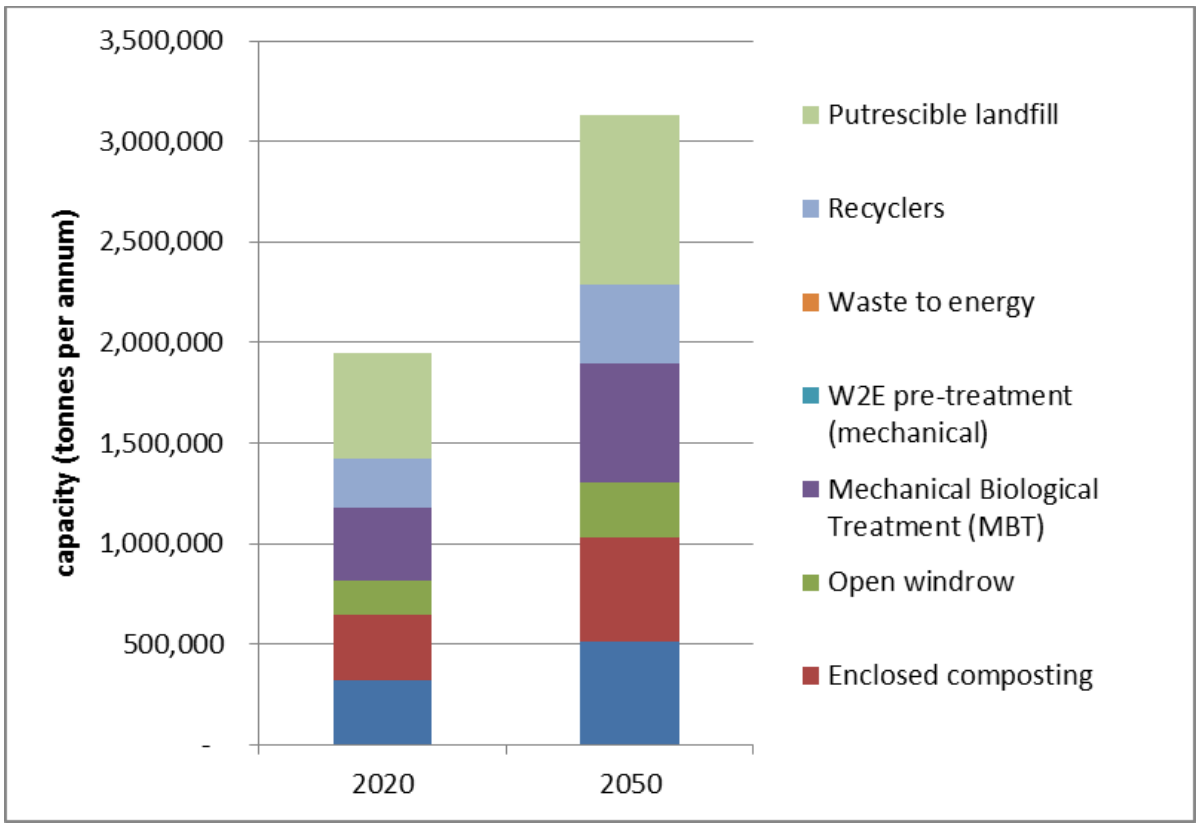

Figure 27: Processing capacity requirements for Example 1

As can be seen from Table 65, the processing capacity required is roughly 300 ktpa for each of the technology categories of MRF, MBT and enclosed composting. The putrescible landfill requirement for the residual MSW waste is about 0.5 Mtpa.

A nominal allocation of facilities to existing and potential new sites is as presented in Table 21 below. Maps of these facilities are presented in Figure 40 and Figure 41 in Appendix 8.

The estimated total land requirement for Example 1 is 23-105 hectares for 2020 and 29-200 ha in 2050.

The total capital cost for the above infrastructure is estimated to be approximately $445 million for 2020 and $716 million for 2050 (in current dollars).

An *initial* assessment of this Example is that the best governance structure to deliver this infrastructure would be:

- A waste planning and approval authority, which maintains a waste infrastructure plan for MSW waste infrastructure.
- A single “regional council” or statutory waste management agency that covered the entire Perth and Peel area. The reason for this is to remove boundaries and allow waste from any area to be processed by any facility. It also allows for the aggregation of waste to achieve economies of scale.
- Single regional council or statutory waste management agency to establish and operate waste precincts with the support of landfill levy funds.

This governance model equates to model 5B in section 6.5.2.

It is estimated that approximately 64 per cent of MSW would be diverted from landfill under this option. It should be noted that there would be no centralised planning for infrastructure for C&I and C&D waste and no single entity responsible for ensuring that sufficient infrastructure for these waste streams is built. As such, waste diversion targets for C&I and C&D are unlikely to be met under this example unless other substantial drivers are created for these sectors.

Table 21: Example 1 facility location by processing capacity (tpa)

	2020						2050					
SITES	MRF	Enclosed composting	MBT/CLO	MBT/RDF	W2E	Enclosed C&D	MRF	Enclosed composting	MBT/CLO	MBT/RDF	W2E	Enclosed C&D
Balcatta Recycling Centre												
Bayswater TS & MRF	40						80					
Canning	80	70	80				120	70	120			
EMRC Red Hill									120			
JRF (Jim) McGeough RRF			55					55				
Woodman Point								100				
Hazelmere	70						90					
Neerabup	70	70	100				90	80	120			
Bayswater II		70						70				
Kwinana / Lattitude 32	70	70	140				140	80	150			
MKSEA												
Nambeelup												
Pinjar South												
Welshpool / Kewdale		70						70	90			
TOTAL	330	350	375	0	0	0	520	525	600	0	0	0

7.2 Example 2 – MSW only, MBT to CLO, MRF and MBT residuals to W2E

Under this option the State Government would only plan for MSW waste.

The State government would oversee the development of waste infrastructure precincts, primarily for infrastructure to process MSW. Precincts could be accessed by the private sector to build infrastructure to process C&I and C&D waste, but MSW infrastructure would have priority. The capacity requirements and land requirements given below only consider the requirements to process MSW.

This Example assumes 75 per cent of the domestic garbage collected is processed through this "system". The remainder is disposed directly to landfill. This is based on an assumption that not all local governments would implement all aspects of the system. For example, only 75 per cent of households acress perth and Peel would have access to or participate in a co-mingled kerbside collection service.

The mixed waste collected through the kerbside system is processed through a MBT to produce CLO, which is sent to a compost market. Hence, the CLO is counted in the amount of waste diverted from landfill, as is the moisture lost during processing. The food and garden MSW waste collected in the "third bin" would be processed through enclosed composting.

The main difference between this Example and the previous one is that, in this Example, MRF fines and MBT residuals that would otherwise be disposed to landfill are processed through a W2E facility. As such, additional material is diverted from landfill. The residuals from the W2E facility are disposed to landfill.

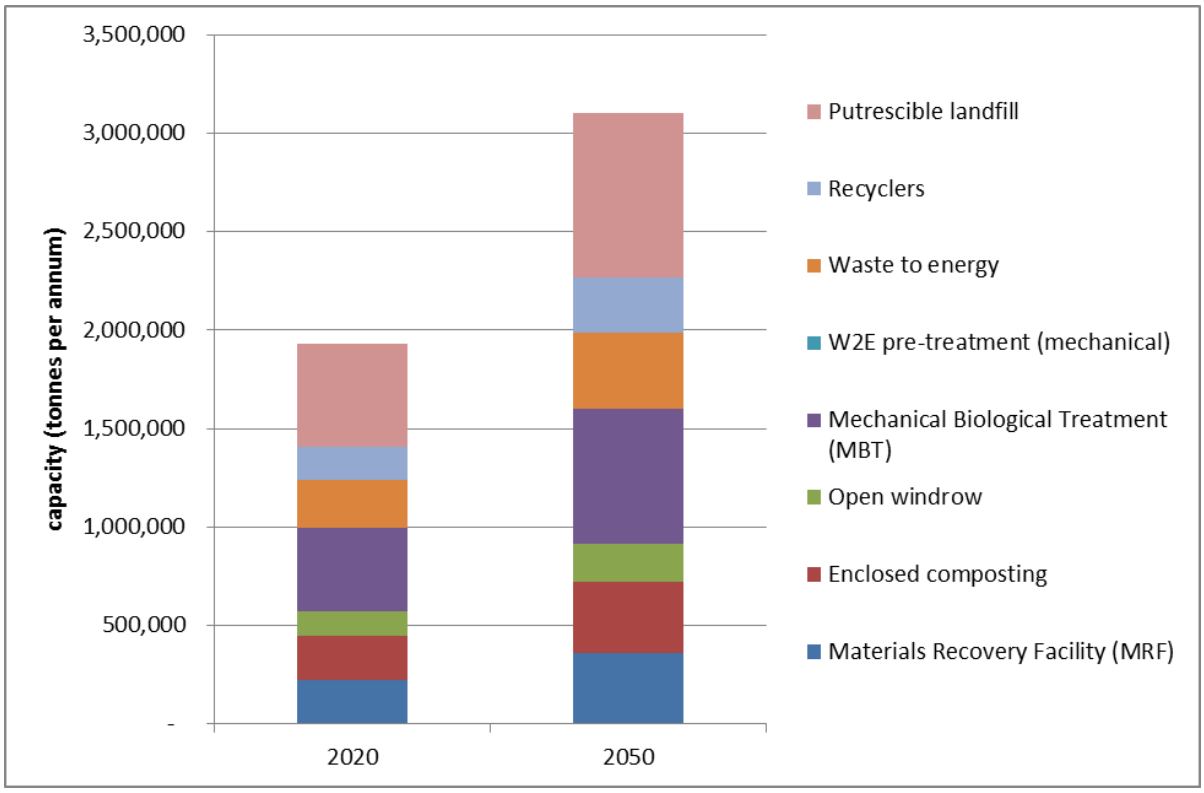

Figure 28: Processing capacity requirements for Example 2

As shown on the map in Appendix 8, a nominal allocation of facilities to existing and potential new sites is as per Table 22 below.

The estimated total land requirement for this Example is 22-95 hectares for 2020 and 21-104 hectares by 2050.

The total capital cost for the above infrastructure is estimated to be approximately $670 million in 2020 and $1.1 billion.

An *initial* assessment of this Example is that the best governance structure to deliver this infrastructure would be:

- A waste planning and approval authority, which maintains a waste infrastructure plan for MSW waste infrastructure.
- A single "regional council" or statutory waste management agency that covered the entire Perth and Peel area to manage domestic waste collection and processing. The reason for this is to remove boundaries and allow waste from any area to be processed by any facility. It would also allow aggregation of waste to achieve economies of scale.
- Single regional council or statutory waste management agency to establish and operate waste precincts with the support of landfill levy funds.

This governance model equates to Model 5B: Statutory Metropolitan Waste Management Group model in section 6.5.

It is estimated that approximately 64 per cent of MSW would be diverted from landfill under this Example's system.

The inclusion of a waste-to-energy plant to treat MRF and MBT residuals makes meeting the waste diversion targets easier, but at a greater overall capital cost of the entire system. This may be offset by a lower residual disposal cost for the MRFs and MBT plants, depending on the gate fee for the waste-to-energy plant relative to landfill gate fees.

Table 22: Example 2 facility location by processing capacity (tpa)

	2020						2050					
SITES	MRF	Enclosed composting	MBT/CLO	MBT/RDF	W2E	Enclosed C&D	MRF	Enclosed composting	MBT/CLO	MBT/RDF	W2E	Enclosed C&D
Balcatta Recycling Centre												
Bayswater TS & MRF	40						80					
Canning	80	80	80				120	80	80			
EMRC Red Hill												
JRF (Jim) McGeough RRF			50						50			
Woodman Point												
Hazelmere												
Neerabup	60	80	100				80	80	100			
Bayswater II		80						80				
Kwinana / Lattitude 32	60		200		250		80		200		250	
MKSEA												
Nambeelup												
Pinjar South												
Welshpool / Kewdale												
TOTAL	240	240	430	0	250	0	360	240	430	0	250	0

7.3 Example 3 – MSW only, three regional councils with different systems

Under this option, it is assumed that there would be three regional councils.

The population estimates for each region are given in Table 23.

Table 23: Example 3 estimated population per Regional Council area

Regional Council	Population 2020	% est.	Population 2050	% est.
Region A	809,500	37	1,268,251	36
Region B	587,400	27	913,505	26
Region C	803,700	36	1,358,549	38
total	***2,200,600***		***3,540,305***	

Under this option the State Government would facilitate planning for MSW waste facilities only. Planning for MSW infrastructure would be conducted by regional councils. It is assumed that all MSW is processed within the region in which it is generated, i.e. each regional council must establish enough processing capacity within its region to treat all the MSW generated in that region.

The State government would facilitate the development of waste infrastructure precincts by regional councils, primarily for the establishment of MSW infrastructure. Precincts could be accessed by the private sector to build facilities that process C&I and C&D waste, but MSW infrastructure would be given priority.

It is assumed that a “3-bin” kerbside collection system would be rolled out across the Perth and Peel regions. The food and garden waste collected in the “third bin” would be processed through enclosed composting.

It is assumed that each of the 3 regional councils adopts a different technology for processing mixed waste:

- Region A adopts a MBT to CLO system (see Figure 34 in Appendix 5)
- Region B adopts a MBT/RDF to W2E system (see Figure 35 in Appendix 5)
- Region C adopts a direct to W2E system (see Figure 36 in Appendix 5)

It is assumed that all residents have full access to the system implemented in their region, and that they fully participate in all the services.

The estimated total land requirement for this Example is 29-129 hectares for 2020 and 39-252 hectares in 2050.

The total capital cost for the above infrastructure is estimated to be approximately $830 million in 2020 and $1.3 billion by 2050. A breakdown by regional council is presented below.

	Estimated capital cost ($mill) 2020	**Estimated capital cost ($mill) 2050**
Region A	225	347
Region B	290	444
Region C	315	542
TOTAL	***830***	***1332***

As indicated above, it is anticipated that, under this Example, the infrastructure would be developed by 3 regional councils. This would be a version of the “WALGA” model, which equates to governance model 2 in section 6.2.

Under this example, the diversion rates for each region are estimated to be

- Region A – 73%
- Region B – 76%
- Region C – 83%.

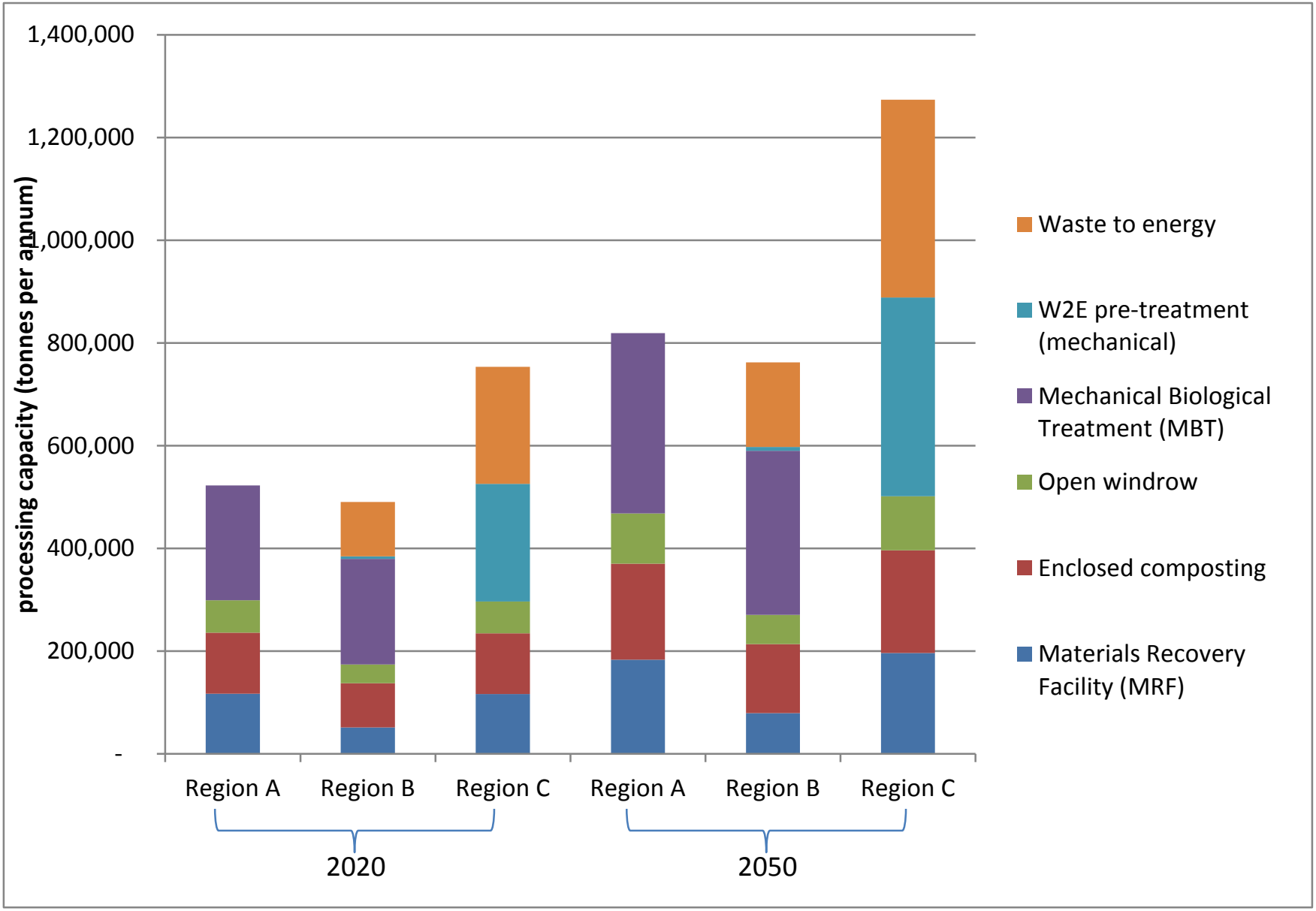

Figure 29: Example 3 processing capacity requirements

Table 24: Example 3 facility location by processing capacity (tpa)

	2020						2050					
SITES	MRF	Enclosed composting	MBT/CLO	MBT/RDF	W2E	Enclosed C&D	MRF	Enclosed composting	MBT/CLO	MBT/RDF	W2E	Enclosed C&D
Balcatta Recycling Centre												
Bayswater TS & MRF	60						80					
Canning	120	60					120	80				
EMRC Red Hill					110						170	
JRF (Jim) McGeough RRF			50					50				
Woodman Point		60						60				
Hazelmere								50		100		
Neerabup	120	60	80				120	80	180			
Bayswater II		50		110				50		110		
Kwinana / Lattitude 32					250		80	80			400	
MKSEA		60		110				60		110		
Nambeelup												
Pinjar South		60	120				80	60	180			
Welshpool / Kewdale												
TOTAL	300	350	250	220	360	0	480	570	360	320	570	0
Region A	120	120	250	0	0	0	200	190	360	0	0	0
Region B	60	110	0	220	110	0	80	160	0	320	170	0
Region C	120	120	0	0	250	0	200	220	0	0	400	0

7.4 Example 4 – All streams, MBT/RDF to W2E

Under this option, the State Government would plan for MSW, C&I and C&D waste facilities.

This Example assumes implementation across Perth and Peel of a “3-bin” kerbside collection for both the MSW and C&I sectors (with food waste included in the organics bin system), drop-off facilities plus vergeside collections for green waste and hard waste for residents.

The State government would oversee the development of waste infrastructure precincts, which could be accessed by local government or the private sector to build facilities that process MSW, C&I and C&D waste. Sites within a precinct would be allocated in accordance with the precinct’s management plan and a WRIP.

The Example assumes putrescible mixed waste (garbage) from both MSW and C&I is processed through a MBT to produce RDF, which is then processed through a W2E facility. The food and garden waste collected in the “third bin”, from both MSW and C&I waste streams, would be processed through enclosed composting.

It is assumed that 85% MSW, 80% C&I and 85% C&D waste is processed through the “system” as depicted in Figure 35 in Appendix 5. The rest is disposed directly to landfill.

The estimated total land requirement for this Example is 59-277 hectares for 2020 and 67-473 hectares by 2050.

The total capital cost for the above infrastructure is estimated to be approximately $2.7 billion for 2020 and $4.3 billion for 2050.

It is anticipated that for this level of investment to occur over a short time period would require significant intervention by the State Government. Therefore, to ensure that the waste diversion targets are met for all three waste streams, the Government would need to implement a governance model that gives it a large degree of control, such as governance model 3A or B, as described in section 6.3.

Alternatively, the Government could choose a governance model that has a large degree of control over MSW only and implement a range of complementary measures designed to steer C&I and C&D waste towards recycling facilities, such as governance model 5B, as described in section 6.5.2. However, this approach is less likely to result in the waste diversion targets for C&I and C&D being met.

If the infrastructure and systems in this Example are implemented, the diversion rates for each waste stream are estimated to be

- MSW – 66%
- C&I – 69%
- C&D – 74%.

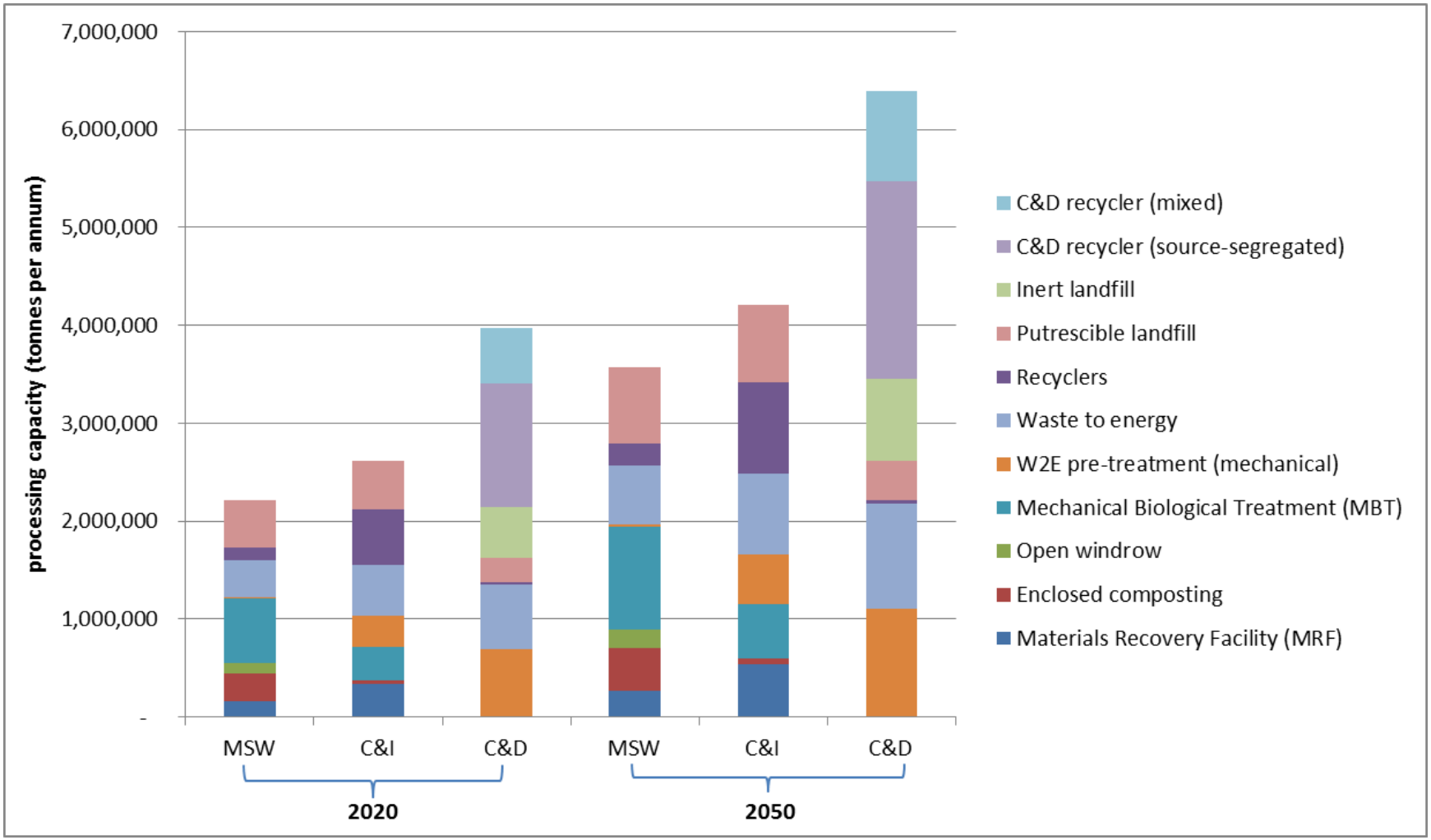

Figure 30: Processing capacity requirements for Example 4

Table 25: Example 4 facility location by processing capacity (tpa)

	2020						2050					
SITES	MRF	Enclosed composting	MBT/CLO	MBT/RDF	W2E	Enclosed C&D	MRF	Enclosed composting	MBT/CLO	MBT/RDF	W2E	Enclosed C&D
Balcatta Recycling Centre	60						60					
Bayswater TS & MRF	40						80					
Canning	80	60		170		150	120	70		200		300
EMRC Red Hill					400					200	750	200
JRF (Jim) McGeough RRF		50						50				
Woodman Point		60		170				100		200		
Hazelmere	80					300	120					300
Neerabup	80	60		170	400	150	120	100		200	600	300
Bayswater II		60		170		300		80		200		300
Kwinana / Lattitude 32	80	60		170	400	300	150	100		200	600	300
MKSEA												300
Nambeelup				170	400	300				200	600	300
Pinjar South										200		300
Welshpool / Kewdale	80					300	150					300
TOTAL	500	350	0	1020	1600	1800	800	500	0	1600	2550	2900

7.5 Example 5 – All streams, direct to W2E

Under this option, the State Government would plan for MSW, C&I and C&D waste facilities.

This Example assumes implementation across Perth and Peel of a “3-bin” kerbside collection for both the MSW and C&I sectors (with food waste included in the organics bin system), drop-off facilities plus vergeside collections for green waste and hard waste for residents.

The State government would oversee the development of waste infrastructure precincts, which could be accessed by local government or the private sector to build facilities that process MSW, C&I and C&D waste. Sites within a precinct would be allocated in accordance with the precinct’s management plan and a WRIP.

The Example assumes all putrescible mixed waste (garbage) from both MSW and C&I is processed through a W2E facility, with some mechanical pre-treatment that recovers some metals. The food and garden waste collected in the “third bin”, for both the MSW and C&I waste stream, would be processed through enclosed composting.

It is assumed that 75 per cent MSW, 80 per cent C&I and 85 per cent C&D waste is processed through the “system”, as depicted in Figure 36 in Appendix 5. The rest is disposed directly to landfill. This assumes that not all councils will implement all services, and that not all businesses will participate in the services available. However, it does assume a high level of participate by businesses in source-separated recycling services.

The estimated total land requirement for this Example is 53-237 hectares for 2020 and 54-412 hectares for 2050.

The total capital cost for the above infrastructure is estimated to be approximately $2.5 billion in 2020 and $4.1 billion in 2050.

It is anticipated that for this level of investment to occur over a short time period would require significant intervention by the State Government. Therefore, to ensure that the waste diversion targets are met for all three waste streams, the Government would need to implement a governance model that gives it a large degree of control, such as governance model 3A or B, as described in section 6.3.

Alternatively, the Government could choose a governance model that has a large degree of control over MSW only and implement a range of complementary measures designed to steer C&I and C&D waste towards recycling facilities, such as governance model 5B, as described in section 6.5.2. However, this approach is less likely to result in the waste diversion targets for C&I and C&D being met.

If the infrastructure and systems in this example are fully implemented, the diversion rates for each waste stream are estimated to be

- MSW – 64%
- C&I – 72%
- C&D – 74%.

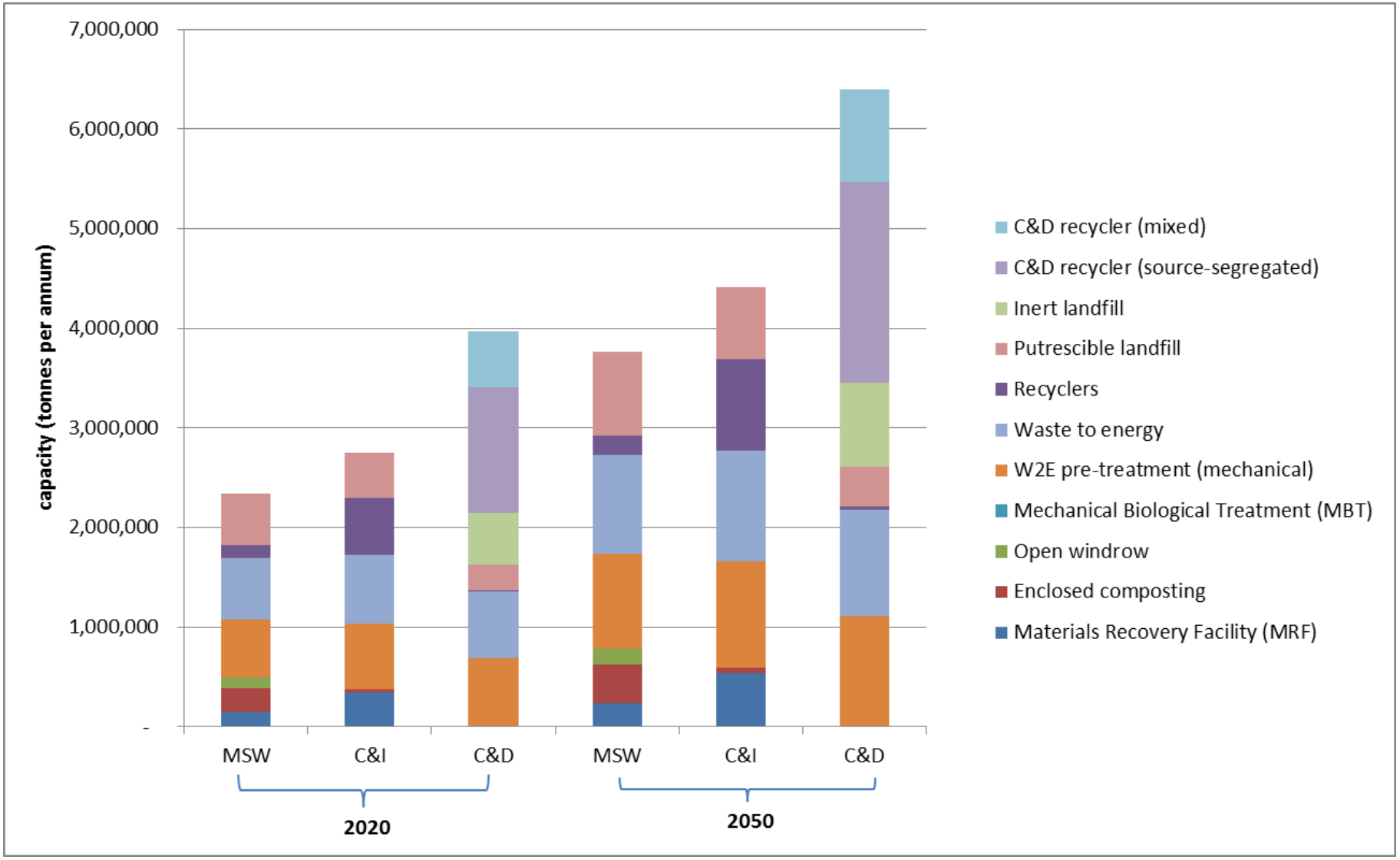

Figure 31: Processing capacity requirements for Example 5

Table 26: Example 5 facility location by processing capacity (tpa)

	2020						2050					
SITES	MRF	Enclosed composting	MBT/CLO	MBT/RDF	W2E	Enclosed C&D	MRF	Enclosed composting	MBT/CLO	MBT/RDF	W2E	Enclosed C&D
Balcatta Recycling Centre	40						60					
Bayswater TS & MRF	40						80					
Canning	80	70				300	120	100				300
EMRC Red Hill					500						650	300
JRF (Jim) McGeough RRF		50						50				
Woodman Point		50						100				
Hazelmere	80					200	120					300
Neerabup	80	80			300	200	120	100			650	300
Bayswater II					300	300					600	500
Kwinana / Lattitude 32	80	50			500	300	150	50			650	300
MKSEA						200						300
Nambeelup					500	200					650	300
Pinjar South						200						200
Welshpool / Kewdale	80					200	130	50				200
TOTAL	480	300	0	0	2100	2100	780	450	0	0	3200	3000

7.6 Example 6 – All streams, MBT to CLO

Under this option, the State Government would plan for MSW, C&I and C&D waste facilities.

This Example assumes implementation across Perth and Peel of a “3-bin” kerbside collection for both the MSW and C&I sectors (with food waste included in the organics bin system), drop-off facilities plus vergeside collections for green waste and hard waste for residents.

The State government would oversee the development of waste infrastructure precincts, which could be accessed by local government or the private sector to build facilities that process MSW, C&I and C&D waste.

The Example assumes all putrescible mixed waste (garbage) from both MSW and C&I is processed through a MBT facility to produce CLO. The food and garden waste collected in the “third bin”, for both the MSW and C&I waste stream, would be processed through enclosed composting.

It is assumed that 75 per cent MSW, 80 per cent C&I and 85 per cent C&D waste is processed through the “system”, as depicted in Figure 34 in Appendix 5. The rest is disposed directly to landfill.

The estimated total land requirement for this Example is 50-248 hectares for 2020.

The total capital cost for the above infrastructure is estimated to be approximately $0.9 billion in 2020 and $1.5 billion in 2050.

For this level of investment to occur over a short time period would require less intervention by the State Government than Example 4 and Example 5. However, it would still require significant measures, either intervention or alternative policy measures to ensure the infrastructure was established within the short timeframe.

If the infrastructure and systems in this Example are fully implemented, the diversion rates for each waste stream are estimated to be

- MSW – 65%
- C&I – 58%
- C&D – 74%

MBT producing CLO as a sole mixed waste processing option is unlikely to result in the waste diversion target for C&I being met.

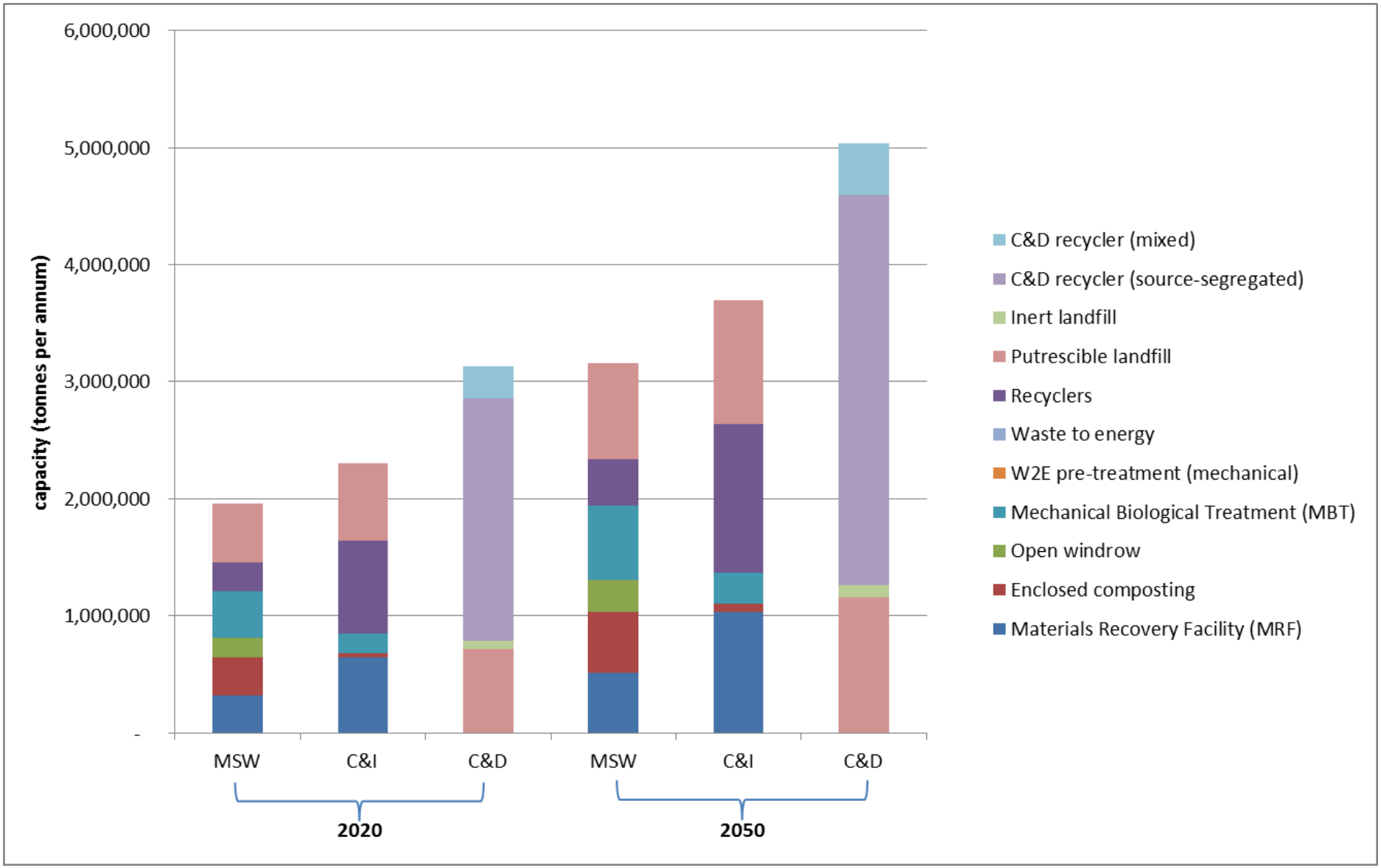

Figure 32: Processing capacity requirements for Example 6

Table 27: Example 6 facility location by processing capacity (tpa)

	2020						2050					
SITES	MRF	Enclosed composting	MBT/CLO	MBT/RDF	W2E	Enclosed C&D	MRF	Enclosed composting	MBT/CLO	MBT/RDF	W2E	Enclosed C&D
Balcatta Recycling Centre	60						80					
Bayswater TS & MRF	80						120					
Canning	120	70	100			300	150	100	150			350
EMRC Red Hill												300
JRF (Jim) McGeough RRF		50						50				
Woodman Point		100	100					150	180			300
Hazelmere	120	50	100			300	150	100	150			350
Neerabup	80	80	140			200	150	100	170			350
Bayswater II	120					300	150					400
Kwinana / Lattitude 32	80					300	150					400
MKSEA	120					300	150					350
Nambeelup						200	150		100			350
Pinjar South	120	50	140			200	150	100	170			350
Welshpool / Kewdale	80					200	150					350
TOTAL	980	400	580	0	0	2300	1550	600	920	0	0	3850

7.7 Summary of Examples

At this stage, it is difficult to determine which of the above waste management "Examples" would be the most appropriate for the Perth and Peel regions. There are a number of policy questions that need to be resolved and further financial assessment to be conducted, prior to making a decision.

However, from the work conducted to date, there are a number of findings that can inform the policy decisions.

As discussed in section 3.3.4, a number of existing waste facility sites have been identified as having potential to either form the basis of a waste precinct or at least be maintained as a waste site in the long term. In addition, a number of general locations assessed as potentially suitable for the development of industrial-type waste facilities through the Stage 1 assessment process (see section 5.4) have been identified should new sites for waste precincts be required. These areas are zoned industrial under the MRS/PRS, potential industrial areas identified in the EELS, or sites owned and nominated by the Water Corporation for potential co-location.

Table 71 and Table 72 present a summary of the sites identified as potential waste precincts or long-term waste sites and the land available at those sites. The tables also include a comparison of the amount of land available with the requirements of each Example.

The modelling work highlights that, whichever technology is chosen, significant investment in infrastructure would be required within a short timeframe if the waste diversion targets in the Waste Strategy are to be met. At present, there is no clear mechanism for how this can be achieved. Therefore, the State Government should commence detailed planning and implementation of appropriate measures as soon as possible.

Finding 8

Establishing sufficient waste processing capacity within the Perth metropolitan and Peel regions to process the waste generated within those regions and to meet the waste diversion targets is possible, and can be achieved with multiple technology and siting choices. However, this is likely to be difficult to achieve by 2020.

The State Government and the waste industry should commence actively planning for and implement measures necessary to establish the waste and recycling infrastructure needed for 2050 to ensure sufficient sites and capital are secured.

8 Findings

A summary of the findings is presented below.

Findings		Page
Finding 1	The current waste and recycling infrastructure capacity is not sufficient to process the projected amounts of waste necessary to meet the waste diversion targets in the Waste Strategy. It is unlikely that the infrastructure needed to meet the waste diversion targets would be established in the short to medium term under the current governance arrangements.	52
Finding 2	Waste management activities could be better integrated into the State's planning system using existing mechanisms. In particular, defining waste facilities in the Model Scheme Text, development of a state planning policy for waste facilities and reserving strategic sites for waste management purposes under the Western Australian Planning Commision's region planning schemes could remove significant barriers to establishment of waste processing infrastructure.	81
Finding 3	The WARR Account could provide a source of funding for the acquisition of waste facility strategic sites reserved for public purposes use under the region planning schemes, and compensation of site owners, subject to adequate WARR Levy funds being available for this purpose. Acquired strategic sites would be made available on a leasehold basis to waste manaegemnt operators to ensure long-term security for sites.	81
Finding 4	Some kind of mixed putrescible waste processing will be required to meet the waste diversion targets. In addition, maximising source separation of recyclables will be important for minimising the capital cost of the processing infrastructure.	91
Finding 5	The grouping of waste facilities in precincts or co-location sites can have many potential benefits. This type of industrial development is broadly supported by the WAPC and Department of Planning. Waste facility precincts and co-location sites should be well planned, designed and operated, and should incorporate required buffers to maximise advantages and minimise potential disadvantages.	102
Finding 6	A broad 'first pass' preliminary assessment of 93 industrial, potential industrial and Water Corporation nominated areas in the Perth metropolitan and Peel regions found that 57 areas were potentially suitable for the development of industrial-type waste facilities. These potentially suitable areas should be used as a basis for further investigation and identification of sites for the development of waste precincts / co-location sites in Perth and Peel.	110

Findings		Page
Finding 7	The SWIPWG expressed a general preference for the establishment of a separate Waste Planning, Policy and Procurement Authority, which could, where necessary, manage State land for waste plan for waste precincts, but which would not control MSW services nor own/operate waste facilities, but which could co-ordinate waste flows. The SWIPWG considered that it is important that any such Authority is separate from the environmental regulation agency.	162
Finding 8	Establishing sufficient waste processing capacity within the Perth metropolitan and Peel regions to process the waste generated within those regions and to meet the waste diversion targets is possible, and can be achieved with multiple technology and siting choices. However, this is likely to be difficult to achieve by 2020. The State Government and the waste industry should commence actively planning for and implement measures necessary to establish the waste and recycling infrastructure needed for 2050 to ensure sufficient sites and capital are secured.	184

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Standard planning provisions and policies in other states:

- **Victoria:** Victorian Planning Provisions – planningschemes.dpcd.vic.gov.au/vpps/
- **NSW:** Standard Instrument – Principal Local Environmental Plan – www.planning.nsw.gov.au/standard-instrument
- **NSW:** State Environmental Planning Policy (Infrastructure) 2007 –www.legislation.nsw.gov.au
- **SA:** South Australian Planning Policy Library Version 6.0 – www.sa.gov.au
- **SA:** South Australian Planning Policy Library Terminology List – www.sa.gov.au
- **Tasmania:** Planning Directive No. 1 – The Format and Structure of Planning Schemes – www.planning.tas.gov.au
- **Tasmania:** Tasmanian State Policies and planning directives – www.planning.tas.gov.au
- **QLD:** Queensland State Planning Policy 5/10 – Air, Noise and Hazardous Materials 2010 – www.dlg.qld.gov.au/statewide-planning/queensland-planning-provisions.html

10 Glossary

Aerobic digestion: A type of alternative waste treatment facility where mechanical and biological treatment of mixed waste is used. Aerobic processes (or a combination of aerobic and anaerobic processes) are used to break down the organic fraction of mixed waste to produce low-grade compost. Recyclable waste is separated and recycled, residual waste is disposed of to landfill (see mechanical biological treatment).

Alternative waste treatment (AWT): Technology designed to recover resources from the waste stream. Solid waste may be treated by mechanical, thermal or biological (aerobic or anaerobic) processes and converted into energy or useful by-products (e.g. compost) (see waste-to-energy facility, aerobic digestion, anaerobic digestion, mechanical biological treatment).

Anaerobic digestion: A type of alternative waste treatment facility where mechanical and biological treatment of mixed waste is used. Anaerobic processes are used to break down the organic fraction of mixed waste to produce methane (which can be harvested to produce electricity/heat) and a compost-like material. Recyclable waste is separated and recycled, residual waste is disposed of to landfill (see mechanical biological treatment).

'Clean' materials recovery facility (clean MRF): A facility where source-separated recyclable waste is sorted and separated into different material types for recycling (see dirty MRF).

Clinical waste: Waste generated by medical, nursing, dental, veterinary, pharmaceutical or other related activity which is poisonous or infectious, likely to cause injury to public health, or contains human tissue or body parts.

Commercial and industrial waste (C&I waste): Solid waste generated by the business sector, state and federal government entities, schools and tertiary institutions.

Construction and demolition waste (C&D waste): Solid waste from residential, civil and commercial construction and demolition activities.

Construction and demolition materials (C&D materials): the component of the construction and demolition waste stream comprising asphalt, concrete, bricks, clay, fines, rubble and soil.

'Dirty' materials recovery facility (dirty MRF): A facility where mixed waste is sorted to separate recyclable and non-recyclable waste (see clean MRF).

Drop-off facility: A facility operated by a local government or regional council which allows residents to deliver small volumes of solid waste (from domestic or small-scale commercial sources).

E-waste: End of life televisions, computers (laptop and desktop) and computer peripherals (including printers, keyboards, mice, and speakers).

Hazardous waste: Component of the waste stream which by its characteristics poses a threat or risk to public health, safety or the environment (includes substances which are toxic, infectious, mutagenic, carcinogenic, teratogenic, explosive, flammable, corrosive, oxidising and radioactive).

Inert waste: Waste which is non-hazardous and non-biodegradable.

Landfill: A site used for disposal of solid material (i.e. is 'spadeable' – see solid waste) by burial in the ground that is licensed as a landfill under the *Environmental Protection Act 1994*.

Materials recovery facility (MRF): Plant and equipment for sorting and pre-processing materials from the waste stream for resource recovery (see dirty MRF, clean MRF).

Mechanical biological treatment: A type of alternative waste treatment technology where mixed waste is treated mechanically (to separate recyclable materials and contaminants from organic waste) and biologically (aerobic and/or anaerobic digestion processes convert organic waste into energy or useful by-products such as compost) (see Aerobic Digestion, Anaerobic Digestion).

Municipal solid waste (MSW): Solid waste generated from domestic (household) premises and local government activities.

Organic waste: Waste of animal or vegetable origin, consisting of hydrocarbons and their derivatives. This may include materials such as food waste, garden trimmings, forestry residuals (e.g. sawdust, bark), straw and animal bedding, manure, timber, paper and cardboard, and oils from grease traps.

Putrescible waste: Component of the waste stream likely to become putrid (i.e. decompose/decay).

Radioactive waste: Waste which gives off or is capable of giving off radiant energy in the form of particles or rays, as in alpha, beta and gamma rays, at levels exceeding standards defined by the Radiological Council of Western Australia.

Recycling: A set of processes (including biological) that convert solid waste into useful materials or products, net of contaminants/residuals disposed.

Recycling facility: A facility where solid waste is recycled or where solid waste is processed (e.g. decontaminated, shredded, sorted, baled and/or aggregated) for recycling.

Solid waste: Waste products or materials that are 'spadeable' (capable of being moved by a spade at normal temperatures).

Transfer station: A facility which acts as a temporary aggregation and storage point for bulk quantities of solid waste, before it is transported to a waste processing facility or landfill.

***Waste and Resource Recovery Act 2007* (WARR Act):** The overarching legislation that governs waste management in WA. The primary objectives of the WARR Act are to contribute to sustainability, the protection of human health and the environment, and is also provides for the statutory establishment and functions of the Waste Authority, which include the development of a waste strategy for WA.

Waste and Resource Recovery Levy (WARR Levy): Under the *Waste and Resource Recovery Regulations 2008* all licensed landfills in the Perth metropolitan region (and those that receive waste generated in the Perth metropolitan region) must pay a levy on waste disposed of to landfill, and must report the type and amount of waste disposed of to the Department of Environment Regulation.

Waste facility co-location: Two or more waste facilities are accommodated at a single site, where all the facilities are owned/managed/operated by the site owner.

Waste precinct: An area (which may be sub-divided into smaller sites) that accommodates two or more waste processing facilities which are owned/managed/operated by separate entities, which may be independent of the site owner.

Waste-to-energy facility: A type of alternative waste treatment technology where waste is treated thermally (through the process of incineration, gasification or pyrolysis) to produce heat, which is used to generate electricity. The residual ash may be recycled or disposed of to landfill.

11 Acronyms

ABS	Australian Bureau of Statistics
ACCC	Australian Competition and Consumer Commission
AWT	Alternative waste treatment
C&D	Construction and demolition
C&I	Commercial and industrial
COAG	Council of Australian Governments
CLO	Compost-like organics
DAP	Development Assessment Panel
DEC	Department of Environment and Conservation
DER	Department of Environment Regulation (formerly DEC)
DLGC	Department of Local Government and Communities
DMA	Decision-making authority
DoP	Department of Planning
DPC	Department of Premier and Cabinet
EELS	Economic and Employment Lands Strategy: non-heavy industrial
EP Act	Environmental Protection Act 1986
EPA	Environmental Protection Authority
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
GBRS	Greater Bunbury Region Scheme
ICC	Infrastructure Co-ordination Committee
Levy Regulations	*Waste Avoidance and Resource Recovery Levy Regulations 2008*
LG Act	Local Government Act 1995
LPS	Local Planning Scheme
MBT	Mechanical biological treatment
MGB	Mobile garbage bin
MRIF	Metropolitan Region Improvement Fund

MRIT	Metropolitan Region Improvement Tax
MNES	Matter of national environmental significance
MST	Model Scheme Text
MRF	Materials recovery facility
MRS	Metropolitan Region Scheme
MSW	Municipal solid waste
PP	Public Purpose
PRS	Peel Region Scheme
RRF	Resource recovery facility
SMRC	Southern Metropolitan Regional Council
SMWMG	Statutory Metropolitan Waste Management Group
SWIPWG	Strategic Waste Infrastructure Planning Working Group
VMWG	Voluntary Metropolitan Waste Management Group
WAPC	Western Australian Planning Commission
WARR Act	*Waste Avoidance and Resource Recovery Act 2007*
WARR Account	Waste Avoidance and Resource Recovery Account
WARR Levy Act	*Waste Avoidance and Resource Recovery Levy Act 2007*
WARR Regulations	*Waste Avoidance and Resource Recovery Regulations 2008*
WALGA	Western Australian Local Government Association
WAPC	Western Australian Planning Commission
WATC	Western Australian Treasury Corporation
WPA	Waste Planning Authority
WPPA	Waste Planning and Policy Authority
WPPPA	Waste Planning, Policy and Procurement Authority
WRIP	Waste and Recycling Infrastructure Plan for the Perth and Peel Regions

Appendix 1 - Waste Generation Rates

Table 28: Waste Generation, Landfill and Recycling Rates, Perth Metropolitan Region, 2010/11-2011/12

Total Waste Generation: Perth Metropolitan Region (Recycling + Landfill = Total Waste Generation)

	Perth Metro Population	MSW Generation (tonnes)	C&I Generation (tonnes)	C&D Generation (tonnes)	Total Generation (tonnes)	MSW Generation (tonnes per capita)	C&I Generation (tonnes per capita)	C&D Generation (tonnes per capita)	Total Generation (tonnes per capita)
2010/11	1,742,700	1,201,293	1,132,162	2,503,352	4,836,807	0.69	0.65	1.44	2.78
2011/12	1,784,800	1,104,452	1,402,221	2,237,296	4,743,970	0.62	0.79	1.25	2.66
AVERAGE OF 2010/11 AND 2011/12						0.65	0.72	1.35	2.72

Recycling: Perth Metropolitan Region

	Perth Metro Population	MSW Recycled (tonnes)	C&I Recycled (tonnes)	C&D Recycled (tonnes)	Total Recycled (tonnes)	MSW Recycled (tonnes per capita)	C&I Recycled (tonnes per capita)	C&D Recycled (tonnes per capita)	Total Recycled (tonnes per capita)	MSW Recycled Rate (% of total generation)	C&I Recycled Rate (% of total generation)	C&D Recycled Rate (% of total generation)	Total Recycled Rate (% of total generation)
2010/11	1,742,700	465,841	354,585	909,692	1,730,118	0.27	0.20	0.52	0.99	39%	31%	36%	36%
2011/12	1,784,800	429,679	556,432	1,049,183	2,035,295	0.24	0.31	0.59	1.14	39%	40%	47%	43%
AVERAGE OF 2010/11 AND 2011/12						0.25	0.26	0.55	1.07	39%	36%	42%	39%

Landfill: Perth Metropolitan Region

	Perth Metro Population	MSW Landfilled (tonnes)	C&I Landfilled (tonnes)	C&D Landfilled (tonnes)	Total Landfilled (tonnes)	MSW Landfilled (tonnes per capita)	C&I Landfilled (tonnes per capita)	C&D Landfilled (tonnes per capita)	Total Landfilled (tonnes per capita)	MSW Landfill Rate (% of total generation)	C&I Landfill Rate (% of total generation)	C&D Landfill Rate (% of total generation)	Total Landfill Rate (% of total generation)
2010/11	1,742,700	735,452	777,577	1,593,660	3,106,689	0.42	0.45	0.91	1.78	61%	69%	64%	64%
2011/12	1,784,800	674,773	845,789	1,188,113	2,708,675	0.38	0.47	0.67	1.52	61%	60%	53%	57%
AVERAGE OF 2010/11 AND 2011/12						0.40	0.46	0.79	1.65	61%	64%	58%	61%

Sources: Department of Environment Regulation Solid Waste Database (2014)

Appendix 2 -Existing waste and recycling infrastructure

Table 29: Putrescible landfills receiving waste generated in the Perth metropolitan and Peel regions

Landfill	Location (suburb, local government)	Planning region/ sub-region	Managed by
Tamala Park Waste Disposal Facility	Mindarie City of Wanneroo	Metro – North West	Mindarie Regional Council
Red Hill Waste Management Facility	Gidgegannup City of Swan	Metro – North East	Eastern Metropolitan Regional Council
Henderson Waste Recovery Park	Henderson City of Cockburn	Metro – South West	City of Cockburn
Millar Road Landfill Facility	Baldivis City of Rockingham	Metro – South West	City of Rockingham
Armadale Landfill and Recycling Facility	Brookdale City of Armadale	Metro – South West	City of Armadale
Shale Road Landfill (South Cardup)	South Cardup Shire of Serpentine-Jarrahdale	Metro – South West	SITA
Buller Road Refuse Site	Waroona Shire of Waroona	Peel	Shire of Waroona
Old Quarry Road Landfill	Northam Shire of Northam	Wheatbelt	Shire of Northam
Stanley Road Waste Management Facility	Australind Shire of Harvey	Southwest	Bunbury Harvey Regional Council
Banksia Road Landfill	Crooked Brook Shire of Dardanup	Southwest	Trans Pacific Industries (TPI)

Table 30: Inert landfills receiving waste generated in the Perth metropolitan and Peel regions

Landfill	Location (suburb, local government)	Planning region/ sub-region	Managed by
Atlas RRF and Inert Landfill	Mirrabooka City of Stirling	Metro – Central	Atlas Pty Ltd
Lefroy Road Quarry Landfill	Beaconsfield City of Fremantle	Metro – Central	City of Fremantle
Cell 6*	Lansdale City of Wanneroo	Metro – North West	Non-Organic Disposals
Quinn's Quarry Landfill	Neerabup City of Wanneroo	Metro – North West	RCG Technologies
Eclipse Wanneroo Road Landfill	Neerabup City of Wanneroo	Metro – North West	Eclipse Resources
Northsands Resources Nowergup	Nowergup City of Wanneroo	Metro – North West	Brodan (WA) Pty Ltd
Hazelmere Inert Landfill	Hazelmere City of Swan	Metro – North East	Bronzewing Investments Pty Ltd
Mathieson Road Transfer Station and Inert Landfill	Chidlow Shire of Mundaring	Metro – North East	Shire of Mundaring
Eclipse Abercrombie Road Landfill	Postans Town of Kwinana	Metro – South West	Eclipse Resources
Moltoni Bibra Lake Rivers Regional Council and	Bibra Lake City of Cockburn	Metro – South West	Moltoni Corporation

Landfill	Location (suburb, local government)	Planning region/ sub-region	Managed by
Landfill			
Wastestream Management Landfill	Kwinana Beach Town of Kwinana	Metro – South West	Wastestream Management
Tim's Thicket Septage and Inert Waste Disposal Facility	Dawesville City of Mandurah	Peel	City of Mandurah/TPI
Corio Road Transfer Station	Ravenswood Shire of Murray	Peel	Shire of Murray
Peel Resource Recovery Landfill	Australind Shire of Harvey	Southwest	Peel Resource Recovery Pty Ltd
Instant Waste Management Landfill	Toodyay Shire of Toodyay	Wheatbelt	Opal Vale Pty Ltd
Buckingham Road Inert Landfill	Jelcobine Shire of Brookton	Wheatbelt	STEG Pty Ltd
Lightrange Landfill (not shown in Figure 8)	Meekatharra Shire of Meekatharra	Midwest	Lightrange Pty Ltd

* Not currently landfilling inert waste. Anticipated to landfill inert waste in the future.

Table 31: Transfer stations in the Perth metropolitan and Peel regions

	Transfer station	Location (suburb, local government)	Planning region/sub-region	Managed by
Putrescible	Bayswater Transfer Station and MRF	Bayswater City of Bayswater	Metro – Central	TPI
	Balcatta Recycling Centre	Balcatta City of Stirling	Metro – Central	City of Stirling
	SITA Welshpool Transfer Station	Welshpool City of Canning	Metro – Central	SITA
	JFR (Jim) McGeough RRF and DiCom	Shenton Park City of Nedlands	Metro – Central	Western Metropolitan Regional Council
	Perthwaste Bibra Lake Transfer Station	Bibra Lake City of Cockburn	Metro – South West	Perthwaste
	Perthwaste POC Transfer Station	Bibra Lake City of Cockburn	Metro – South West	Perthwaste
	Waste Management Centre	Meadow Springs City of Mandurah	Peel	City of Mandurah/TPI

	Transfer station	Location (suburb, local government)	Planning region/sub-region	Managed by
Inert Waste (Types 1, 2 or 3), other recyclable materials and/or Type 1 Special Waste	Advance Waste Disposal	Malaga City of Swan	Metro – North East	Advance Waste Disposal Pty Ltd
	Brajkovich Demolition and Salvage	Henderson City of Cockburn	Metro – South West	Brajkovich Demolition and Salvage Pty Ltd
	Coastal Waste Management	Rockingham City of Rockingham	Metro – South West	Southerly Ocean Pty Ltd
	Eclipse Flynn Drive	Carramar City of Wanneroo	Metro – North West	Eclipse Resources
	Eco Resources Recycling Transfer Station	Hope Valley Town of Kwinana	Metro – South West	Eco Resources Pty Ltd
	Ennis Ave Recycling and Storage Facility	Rockingham City of Rockingham	Metro – South West	City of Rockingham
	Instant Waste Management Transfer Station	Bayswater City of Bayswater	Metro – Central	Opal Vale Pty Ltd
	Jandakot Transfer Station	Jandakot City of Cockburn	Metro – South West	Westmore Corporation Pty Ltd
	Matera Waste Recycling Facility	Postans Town of Kwinana	Metro – South West	Matera 3 Pty Ltd
	Naval Base Recycling Transfer Station	Naval Base Town of Kwinana	Metro – South West	Eco Resources Pty Ltd
	Perth Bin Hire	Bayswater City of Bayswater	Metro – Central	Jack Kailis
	Pericho Investments Building Development	Welshpool City of Canning	Metro – Central	Brajkovich Demolition and Salvage Pty Ltd
	Pinjarra Resource Recovery Centre	Ravenswood Shire of Murray	Peel	Resource Recovery Solutions Pty Ltd
	Pinjarra Transfer Recycling Station	Pinjarra Shire of Murray	Peel	Peel Resource Recovery Pty Ltd
	Ranford Rd Waste Transfer Station	Canning Vale City of Canning	Metro – Central	City of Canning
	Redoak Corporation and West Bins	Malaga City of Swan	Metro – North East	Redoak Corporation and West Bins
	Schutz DSL (Australia)	South Fremantle City of Cockburn	Metro – South West	Schutz DSL (Australia) Pty Ltd
	Sims Australia Transfer Station	Wangara City of Wanneroo	Metro – North West	Simms Australia Pty Ltd
	Waste Care WA	Bayswater City of Bayswater	Metro – Central	Resource Recovery Solutions Pty Ltd
	Welshpool Central Waste	Welshpool City of Canning	Metro – Central	Wastestream Management Pty Ltd

Table 32: Material recovery facilities processing MSW and C&I waste generated in the Perth metropolitan and Peel regions

MRF	Location (suburb, local government)	Planning region	Managed by
Wangara MRF	Wangara City of Wanneroo	Metro – North	City of Wanneroo
Bayswater Transfer Station and MRF	Bayswater City of Bayswater	Metro – Central	TPI
Visy MRF	Kewdale City of Belmont	Metro – Central	Visy
Amcor MRF	Canning Vale City of Canning	Metro – Central	Amcor
Maddington MRF	Maddington City of Gosnells	Metro – South East	TPI
Waste Management Centre	Meadow Springs City of Mandurah	Peel	City of Mandurah/TPI
Perthwaste Bunbury MRF	Picton City of Bunbury	Southwest	Perthwaste

Table 33: Alternative waste treatment facilities in the Perth metropolitan and Peel regions

Resource recovery facility	Location (suburb, local government)	Planning region/sub-region	Managed by
JFR (Jim) McGeough RRF**	Shenton Park City of Nedlands	Metro – Central	Anaeco AWT Operations Pty Ltd
Neerabup RRF	Neerabup City of Wanneroo	Metro – North West	Mindarie Regional Council
SMRC Regional Resource Recovery Centre	Caning Vale City of Canning	Metro – Central	Southern Metropolitan Regional Council

** Currently undergoing commissioning.

Table 34: Co-located waste facilities in Perth and Peel

			Waste Facilities								
	Facility Name	**Operator**	**Drop-off facility**	**Green waste mulching**	**Putrescible landfill**	**Putrescible transfer station**	**Materials Recovery Facility (MRF)**	**AWT facility**	**Inert landfill**	**Inert transfer station**	**C&D materials processing**
Local Government	Stanley Rd Waste Management Facility	Bunbury Harvey Regional Council	X	X	X						
	Armadale Landfill and Recycling Facility	City of Armadale	X	X	X						
	Roleystone Green Waste Facility	City of Armadale	X	X							
	Ranford Rd Waste Transfer Station	City of Canning	X	X		X					
	Henderson Waste Recovery Park	City of Cockburn	X		X						
	Tim's Thicket Septage & Inert Waste Disp. Facility	City of Mandurah/ Transpacific Cleanaway	X						X		
	Waste Management Centre	City of Mandurah/ Transpacific Cleanaway	X	X		X	X				
	Millar Rd Landfill and Recycling Facility	City of Rockingham	X	X	X						
	Collier Park Waste Transfer Station	City of South Perth	X	X							
	Balcatta Recycling Centre	City of Stirling	X			X					
	Wangara Recycling Centre	City of Wanneroo	X	X							
	Red Hill Waste Management Facility	Eastern Metropolitan Regional Council	X	X	X			X			
	Tamala Park Waste Disposal Facility	Mindarie Regional Council	X		X						
	Mathieson Rd Transfer Station and Inert Landfill	Shire of Mundaring	X						X		
	Buller Rd Refuse Site	Shire of Waroona	X		X						
	SMRC Regional Resource Recovery Centre	Southern Metropolitan Regional Council	X	X			X	X			
	JFR (Jim) McGeough Resource Recovery Facility	Western Metropolitan Regional Council	X	X		X		X			
Private Industry	Carramar Resource Industries	Carramar Resource Industries		X					X		X
	Eclipse Abercrombie Rd (Postans) Landfill	Eclipse Resources		X					X		
	Cell 6	Non Organic Disposals							X		X
	Eclipse Flynn Drive (Carramar)	Eclipse Resources		X						X	
	Bayswater Transfer Station and MRF	Transpacific Industries				X	X				

Appendix 3 - Summary planning and approvals information

Table 35: Industry types described in *Guidance for the Assessment of Environmental Factors No. 3 – Separation Distances between Industrial and Sensitive Land Uses* (Environmental Protection Authority, 2005), with their associated buffer distances and related waste facilities

Industry (as described in EPA *Guidance for the Assessment of Environmental Factors 2005*)	DER licence category	Impacts					Buffer distance to sensitive land uses	Waste facility types where these licences are typically held (some facilities may hold more than once licence)*
		Gaseous	Noise	Dust	Odour	Risk		
Composting facility	67A		X	X	X		150m-1,000m depending on type of facility and organic waste	Composting facilities AWT: MBT
Crushing of building material	13		X	X			1,000m	C&D material processors Landfill (inert)
Scrap metal recycling works	45, 47		X	X	X		300-500m	Licensed e-waste and scrap metal recyclers
Screening works (for C&D materials)	12, 70		X	X			500m	C&D material processors Landfill (inert)
Used tyre storage – general, recycling	56, 57	X	X	X	X	X	100-200m if stored 500-1,000m if crumbed, granulated or shredded	Drop-off facilities (if tyres are accepted) Tyre recyclers
Waste disposal – Class I landfill	63		X	X			150m	Landfill (inert)
Waste disposal – Class II and III landfill	64, 89		X	X	X		500m OR 150m depending on sensitive land use	Landfill (putrescible)
Waste disposal – waste depot	62		X	X	X		200m	Transfer stations Drop-off facilities C&D material processors Landfill (inert) Licensed e-waste and scrap metal recyclers
Waste disposal – resource recovery plant	60, 61A, 67		X		X	X	case by case	Composting facilities AWT: MBT

***** Only the types of facilities which currently exist in Perth and Peel are included in this table (i.e. waste-to-energy facilities, 'dirty' MRFs are not included).

Table 36: Definitions of industry and essential services used in WAPC policies/strategies and legislation, and how waste facilities may be considered under these definitions

Definition	Source	Comment
Industry means premises used for the manufacture, dismantling, processing, assembly, treating, testing, servicing, maintenance or repairing of goods, products, articles, materials or substances and includes premises on the same land used for - (a) the storage of goods (b) the work of administration or accounting (c) the selling of goods by wholesale or retail or (d) the provision of amenities for employees, incidental to any of those industrial operations.	*Economic and Employment Lands Strategy: non-heavy industrial*	Waste facilities could be considered industry, as they may dismantle, process, treat, and/or store materials or substances (i.e. waste).
General Industry: An industry other than cottage, extractive, light, mining, rural or service industry. This is the main zone that applies to most industrial areas. It provides for manufacturing industry, the storage and distribution of goods and associated uses which by the nature of their operations should be separated from residential areas.	Model Scheme Text (Appendix B, *Town Planning Regulations 1967*) as referenced in *Statement of Planning Policy 4.1 State Industrial Buffer Policy (Amended)*	The EELS lists “disposal, recycling” under activities which are included within the definition of general industry.
Light Industry: An industry: (a) in which the processes carried on, the machinery used, and the goods and commodities carried to and from the premises do not cause any injury to or adversely affect the amenity of the locality and (b) the establishment or conduct of which does not, or will not, impose an undue load on any existing or proposed service for the supply or provision of essential services.		Waste facilities could potentially be considered light industry if it could be demonstrated that they did not emit noise, dust, odour, etc. that could adversely affect the amenity of the locality.
Heavy Industry: This land use category is only denoted by state government policy and expressed through its agencies. It does not appear as a specific zone in either the MRS or local planning schemes. Currently Perth’s only heavy industry site described through planning and economic development policy is the Kwinana industrial area.	*Economic and Employment Lands Strategy: non-heavy industrial*	Waste facilities are not considered land uses which require a Heavy Industry site.
Essential infrastructure includes infrastructure that has the potential to generate off-site emissions or risk and includes ports, major freight terminals, wastewater treatment plants, power generation facilities, power distribution terminals, electro-magnetic radiation impacts and substations, waste disposal sites and airports.	*Statement of Planning Policy 4.1 State Industrial Buffer Policy (Amended)*	Waste disposal is specified in this definition, but it is unclear whether this includes only landfills, or other types of waste facilities.

Table 37: Zoning/reservation of existing waste facilities accepting waste generated in Perth and Peel under the Metropolitan, Peel and Greater Bunbury Region Schemes and local planning schemes

Waste facility type	MRS/PRS/GBRS zoning	LPS zoning	
AWT Facility: Mechanical Biological Treatment	a) Industrial (2 facilities) b) Parks and Recreation (1 facility) c) Public Purpose (1 facility)	Industrial Development Mixed Business	
Inert Landfill (Category 63)	• Around half in Rural zone • Also Parks and Recreation, Industrial, Urban, Public Purpose	Special Purpose Industrial Development Urban Development General Rural	Industry Rural Resource Landscape Rural B Development
Putrescible Landfill (Category 64)	• Mainly Rural • Also Public Purpose	Public Purposes Rural 1 - General Farming	Rural Rural B Special Use
'Clean' Materials Recovery Facility	• Mainly Industrial • Also Urban and Public Purpose – Special Uses	General Industrial General Industry Industry	
Compost Facilities (mixed organics, green waste)	• Mainly either Rural or Industrial • Also Public Purpose, Urban Parks and Recreation	Industrial Development Urban Development General Industrial Mixed Business Rural Resource	Special Use Rural Rural B Public Purpose
Construction and demolition materials processors	Mainly Industrial	General Industry Industrial Development Urban Development	
Recyclers (e-waste, scrap metal, paper, glass, timber, plastic)	Industrial	General Industry Industry Light Industry Industrial Development	
Transfer stations (putrescible, inert, or mixed inert/ recyclable)	• Mainly Industrial • Also Rural, Urban, Public Purpose	Mixed Business Urban Development Industrial Development General Industrial	Light Industry Rural A Rural Industry General Industry
Drop-off facilities	Range of different zonings:** Industrial, Rural, State Forest, Parks and Recreation, Public Purpose	Public Purposes Rural 1-General General Purpose Mixed Business General Industrial General Rural	Industry Rural Farming Special Rural Special Use

** Almost all drop-off facilities in Perth and Peel are co-located with other facilities, so the zoning of drop-off facilities is generally determined by the facilities with which it is co-located.

Table 38: Extract from Town of Victoria Park Town Planning Scheme No. 1 zoning table

Zone	Residential	Residential/ Commercial	Office/ Residential	Local Centre	District Centre	Commercial	Industrial 1	Industrial 2	Special Use
Use Class	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Convenience Store, Service Station	X	X	X	AA	AA	AA	AA	AA	*Refer to provisions in Precinct Plan*
Hazardous Industry, Noxious Industry	X	X	X	X	X	X	X	X	
Light Industry	X	X	X	X	X	AA	P	P	
Single Bedroom Dwelling	AA	P	P	P	P	P	X	X	

Table 39: Explanation of symbols from Town of Victoria Park Town Planning Scheme No. 1 (to be cross referenced with Table 16)

'P'	means that the use is permitted by the Scheme.
'AA'	means that the use is not permitted unless the Council has granted planning approval.
'X'	means a use that is not permitted by the Scheme.

Table 40: Land use definitions from Town of Victoria Park Town Planning Scheme No. 1 (to be cross referenced with Table 16), with comparisons with Model Scheme Text land use definitions

Land Use	Land use definition given in Town of Victoria Park Town Planning Scheme No. 1	Land use definition given in Model Scheme Text
convenience store	means land and buildings used for the retail sale of convenience goods being those goods commonly sold in supermarkets, delicatessens and newsagents but including the sale of petrol and operated during hours which may include, but which may extend beyond normal trading hours and provide associated parking. The buildings associated with a convenience store shall not exceed 300m^2 gross leasable area.	means premises - a) used for the retail sale of convenience goods commonly sold in supermarkets, delicatessens or newsagents, or the retail sale of petrol and those convenience goods; b) operated during hours which include, but may extend beyond, normal trading hours; c) which provide associated parking; and d) the floor area of which does not exceed 300 square metres net lettable area.
hazardous industry	means an industry which, when in operation and when all measures proposed to minimise its impact on the locality have been employed (including measures to isolate the industry from existing or likely future development on other land in the locality), would pose a significant risk in relation to the locality, to human health, life or property, or to the biophysical environment. Examples of such industry include oil refineries and chemical plants but would generally exclude light, rural or service industries.	No definition given.

Land Use	Land use definition given in Town of Victoria Park Town Planning Scheme No. 1	Land use definition given in Model Scheme Text
light industry	means an industry - • in which the processes carried on, the machinery used, and the goods and commodities carried to and from the premises, will not cause any injury to, or will not adversely affect the amenity of the locality by reason of the emission of light, noise, electrical interference, vibration, smell, fumes, smoke, vapour, steam, soot, ash, dust, waste water or other waste products; and • the establishment of which will not, or the conduct of which does not, impose an undue load on any existing or proposed service for the supply or provision of water, gas, electricity, sewerage facilities, or any other like services.	means an industry - • in which the processes carried on, the machinery used, and the goods and commodities carried to and from the premises do not cause any injury to or adversely affect the amenity of the locality; • the establishment or conduct of which does not, or will not, impose an undue load on any existing or proposed service for the supply or provision of essential services.
noxious industry	means an industry which is subject to licensing as 'Prescribed Premises' under the *Environmental Protection Act 1986* (as amended).	No definition given.
service station	means any land or buildings used for the retail sale of petroleum products and motor vehicle accessories and for carrying out greasing, tyre repairs, minor mechanical repairs to motor vehicles but does not include a transport depot, panel beating, spray painting, major repairs or wrecking.	means premises used for - • the retail sale of petroleum products, motor vehicle accessories and goods of an incidental/convenience retail nature; and • the carrying out of greasing, tyre repairs and minor mechanical repairs to motor vehicles but does not include premises used for a transport depot, panel beating, spray painting, major repairs or wrecking.
single bedroom dwelling	has the same meaning given to it in the R Codes. (Note: Clause 2.2 of the R Codes defines "single bedroom dwelling" to mean a dwelling that contains a living room and no more than one other habitable room that is capable of use as a bedroom).	No definition given.

Table 41: <u>Potential</u> approvals required for development of different types of waste facilities in the Perth metropolitan and Peel regions (NOTE: this is <u>speculative</u> only – each facility would have to be considered on a case by case basis)

	Planning Approval	Assessment under EPBC Act	EPA Environmental Impact Assessment	DER Licence (Prescribed Premises)	Public Health Assessment
DMA	**Local government/ WAPC or DAP**	**Commonwealth Minister for the Environment**	**EPA**	**DER**	**WA Department of Health**
Landfill – putrescible (Category 64 or 89)	X	None of these waste facility types automatically require assessment under the EPBC Act. This assessment would only be required if the proposed facility was likely to impact a MNES (see section 2.1.4.2).	X	X	Public Health Assessments may be required if the *Public Health Bill 2008* is enacted. It is speculated that some waste facilities may require a Public Health Assessment however the exact mechanisms triggering this assessment are not yet known.
Landfill – Inert (Category 63)	X			X	
AWT – aerobic or anaerobic digestion	X		X	X	
AWT – waste-to-energy	X		X	X	
'Clean' MRF	X				
'Dirty' MRF	X		X	X	
Mixed organics composters (excludes AWT facilities)	X			X	
C&D materials processors	X			X	
'Other' recycler	X			X(1)	
Transfer stations (putrescible, inert, or recyclable)	X			X	
Drop-off facilities	X			X(1)	

(1) Depends on type of waste, quantity of waste, and type of processing/storage done on site.

Table 42: State planning policies currently in operation in WA (Source: www.planning.wa.gov.au)

State Planning Policy		Gazettal Date
1	*State Planning Framework Policy (Variation No. 2)*	February 2006
2	*Environment and Natural Resources Policy*	June 2003
2.1	*Peel-Harvey Coastal Plain Catchment Policy*	February 1992
2.2	*Gnangara Groundwater Protection*	August 2005
2.3	*Jandakot Groundwater Protection Policy*	June 1998
2.4	*Basic Raw Materials*	July 2000
2.5	*Agricultural and Rural Land Use Planning*	March 2002
2.6	*State Coastal Planning Policy (amended December 2006)*	June 2003
2.7	*Public Drinking Water Source Policy*	June 2003
2.8	*Bushland Policy for the Perth Metropolitan Region*	June 2010
2.9	*Water Resources*	December 2006
2.10	*Swan-Canning River System*	December 2006
3	*Urban Growth and Settlement*	March 2006
3.1	*Residential Design Codes (Variation 1)*	November 2010
3.2	*Aboriginal Settlements*	May 2011
3.4	*Natural Hazards and Disasters*	April 2006
3.5	*Historic Heritage Conservation*	May 2007
3.6	*Development Contributions for Infrastructure*	November 2009
4.1	*State Industrial Buffer Policy*	May 1997
4.2	*Activity Centres for Perth and Peel*	August 2010
4.3	*Poultry Farms Policy*	December 1998
5.1	*Land Use Planning in the Vicinity of Perth Airport*	February 2004
5.2	*Telecommunications Infrastructure*	March 2004
5.3	*Jandakot Airport Vicinity*	March 2006
5.4	*Road and Rail Transport Noise and Freight Considerations in Land Use Planning*	September 2009
6.1	*Leeuwin-Naturaliste Ridge Policy*	January 2003
6.3	*Ningaloo Coast*	August 2004
Draft policies		
3.7	*Planning for Bushfire Management*	May 2014
4.1	*State Industrial Buffer (Amended) (Draft)*	July 2009
5.1	*Land Use Planning in the Vicinity of Perth Airport*	October 2011
5.3	*Jandakot Airport Vicinity*	July 2013

Table 43: Comparison of the objectives of state planning policies related to waste management facilities

State	State Planning Policy (or equivalent) related to waste facilities	Objective
WA	SPP 4.1 State Industrial Buffer	The objectives of this policy are: a) To provide a consistent statewide approach for the definition and securing of buffer areas around industry, infrastructure and some special uses b) To protect industry, infrastructure and special uses from the encroachment of incompatible land uses c) To provide for the safety and amenity of land uses surrounding industry, infrastructure and special uses d) To recognise the interests of existing landowners within buffer areas who may be affected by residual emissions and risks, as well as the interests, needs and economic benefits of existing industry and infrastructure which may be affected by encroaching incompatible land uses. NOTE: this SPP does not specifically include all waste facility types (only 'waste disposal sites' are mentioned) however waste facilities may be assumed to be included under the definition for 'industry'.
VIC	Victorian Planning Provisions (VPP) State Planning Policy Framework Clause 19.03-5 Waste and Resource Recovery	To avoid, minimise and generate less waste to reduce damage to the environment caused by waste, pollution, land degradation and unsustainable waste practices. This clause of the VPP outlines the state's overarching approach to waste facilities, which local governments must include in their planning strategies and apply when making planning decisions. It includes a general encouragement of the development and efficient operation of resource recovery facilities and consideration and protection of buffers. It is relatively general, providing an overall approach rather than specific land-use planning guidance.
SA	South Australian Planning Policy Library Version 6.0	Objectives: 1. The orderly and economic development of waste management facilities in appropriate locations. 2. Minimisation of human and environmental health impacts from the location and operation of waste management facilities. 3. Protection of waste management facilities from incompatible development. This policy outlines the principles of development control which must be used when planning for waste facilities including detailed information covering issues such as site sizes, buffer distances, transport requirements, fencing, appropriate soil types, and other siting and operational matters.
TAS	No equivalent	n/a

QLD	State Planning Policy 5/10 – Air, Noise and Hazardous Materials 2010	This Policy seeks to complement the existing management framework by providing a more strategic focus on the location and protection of industrial land uses. The direction in this Policy ultimately seeks to ensure that planning instruments provide strategic direction about: • where industrial land uses should be located to protect communities and individuals from the impacts of air, noise and odour emissions, and the impacts from hazardous materials, and • how land for industrial land uses will be protected from unreasonable encroachment by incompatible land uses. Similarly to WA's SPP 4.1, this policy is primarily related to the establishment and protection of appropriate buffers between industrial land uses (including waste facilities) and sensitive land uses.
NSW	SEPP (Infrastructure) 2007	The aim of this Policy is to facilitate the effective delivery of infrastructure across the state by: a) improving regulatory certainty and efficiency through a consistent planning regime for infrastructure and the provision of services, and b) providing greater flexibility in the location of infrastructure and service facilities, and c) allowing for the efficient development, redevelopment or disposal of surplus government owned land, and d) identifying the environmental assessment category into which different types of infrastructure and services development fall (including identifying certain development of minimal environmental impact as exempt development), and e) identifying matters to be considered in the assessment of development adjacent to particular types of infrastructure development, and f) providing for consultation with relevant public authorities about certain development during the assessment process or prior to development commencing. This policy defines the types of waste facilities it covers, provides specific information about the land use zones where waste facilities are permitted, and gives guidance on determination of landfill development applications.

Table 44: Case study of State Planning Policy 5.2 Telecommunications Infrastructure

Case Study 1: State Planning Policy 5.2 Telecommunications Infrastructure

There are some similarities between telecommunications infrastructure and waste facilities, and *State Planning Policy 5.2 Telecommunications Infrastructure* (Western Australian Planning Commission, 2004) may provide a helpful basis for the development of a waste facility SPP. This state planning policy covers a wide range of planning matters for the development of a particular type of essential infrastructure and has accompanying guidelines which provide information on the location, siting, and design of telecommunications infrastructure.

The objectives of *State Planning Policy 5.2 Telecommunications Infrastructure* are to:

- facilitate the provision of telecommunications infrastructure in an efficient, cost-effective and environmentally responsible manner to meet community needs
- facilitate the development of an effective state-wide telecommunications network in a manner consistent with the economic, environmental and social objectives of planning in Western Australia as set out in the *Town Planning and Development Act 1928* and the *State Planning Strategy*
- assist community understanding of the issues involved in the design and installation of telecommunications infrastructure and provide opportunities for community input to decision making
- promote a consistent approach in the preparation, assessment and determination of applications for planning approval of telecommunications infrastructure
- minimise disturbance to the environment and loss of amenity in the provision of telecommunications infrastructure
- ensure compliance with all relevant health and safety standards in the provision of telecommunications infrastructure.

The structure and content of *State Planning Policy 5.2 Telecommunications Infrastructure* includes:

- **Citation:** this is a standard part of every SPP, which establishes which act the SPP has been made under and how it should be cited
- Introduction and background: this section includes:
    - A short history of telecommunications services in WA, to establish the context in which the SPP was created
    - A description of the infrastructure types which are covered under the SPP, to clarify its scope
    - A summary of the planning approvals process for telecommunications infrastructure.
- **Objectives:** a clear outline of the objectives of the SPP (this is an important part of every state planning policy)
- **Application:** clarification of the areas where this SPP applies
- **Policy Provisions:** this section includes:
    - Guiding principles for the location, siting and design of telecommunications infrastructure
    - Matters to be considered when determining planning applications
    - Information required to be submitted when lodging a planning application
    - A provision which empowers the WAPC to prepare more detailed guidelines for waste facilities, which are to be read in conjunction with the SPP
    - The way in which the SPP should be incorporated into Local Planning Schemes and taken into consideration by local governments.
- **Appendix:** contains definitions of all terminology used in the SPP.

In addition to the state planning policy for telecommunications infrastructure, the WAPC has

developed the *Guidelines for the Location, Siting and Design of Telecommunications Infrastructure,* which is intended to be read in conjunction with the SPP. *T*he structure of these guidelines includes:

- **Purpose of the guidelines:** a purpose statement which clarifies why these guidelines were developed, and their potential benefits
- **Application of the guidelines:** outlines when the guidelines should be used, where they apply, and which SPP they should be used in conjunction with
- **Who should use the guidelines:** clarifies who the guidelines are intended for (e.g. proponents, local governments) and when they should be consulted
- **Guiding principles for the location, siting and design of telecommunications infrastructure:** this section is based on the policy provisions of the SPP but addresses them in more specific detail. It outlines the overarching principles of the state in relation to the location, siting and design of telecommunications infrastructure, and also includes construction and operational issues
- **Design guidelines:** this section gives specific guidance on design issues (to ensure facilities do not have a negative impact on the amenity of their local area). It covers topics such as location integration, design and landscaping. It is intended to be used by proponents (in the design phase of their proposal, and when preparing applications) and decision-making authorities (when assessing applications)
- **Application and assessment procedures:** outlines what should be included by a proponent in a development application, and the matters that must be taken into consideration by decision-making authorities in determining the application
- **Consultation and notification procedures:** outlines when consultation/notification is required, who should undertake it, and who should be consulted/notified
- **Further reading:** lists any relevant acts, regulations, policies, plans etc.

SPP 5.2 provides an example of only one of the many possible ways that a state planning policy and guidelines for waste facilities could be structured. Further investigation is required to determine what kind of SPP would best suit the needs of the waste industry and decision-making authorities in Perth and Peel.

The development of a SPP and guidelines for waste facilities will require consultation and cooperation with the waste industry, local governments, the Department of Planning, the WAPC and the Waste Authority.

Table 45: Case study of reserving land through the MRS

Case Study 2: Yellagonga Regional Park

Background

Yellagonga Regional Park, in the Cities of Joondalup and Wanneroo, was established in 1989. The park covers 1,400ha, and includes 550ha of wetlands, several heritage listed buildings and seven listed Aboriginal heritage sites.

Ownership

The process of creating Yellagonga Regional Park began in 1975 when most of the lands that comprise the park were reserved as 'Parks and Recreation' under the Metropolitan Region Scheme. The area reserved for the park had already been subdivided into many lots, which were owned by private landholders, local government, and state government, with some unallocated crown land.

Since 1975 most of the private lands within the park have been acquired by state planning authorities through the Metropolitan Region Improvement Tax, or ceded free of cost to the Crown as a condition of subdivision. The majority of the park now owned by (or vested in) the Cities of Wanneroo or Joondalup, state government agencies (mainly the WAPC or Conservation Commission of WA), and the Yellagonga Board of Management.

There are still, however, some small properties within the park boundaries in private ownership. Until acquired by the WAPC these properties can be retained and used by their owners, but are protected under the Metropolitan Region Scheme by their 'Parks and Recreation' reservation. Park visitors are not able to access areas of private property until they are acquired by the WAPC.

Management

Planning the acquisition of lands for regional open space is the responsibility of the WAPC, however the WAPC is not the long term manager of these lands. All national parks, conservation parks, nature reserves, and other conservation reserves in Western Australia are vested in the Conservation Commission of WA, and managed on its behalf by the Department of Parks and Wildlife (formerly Department of Environment and Conservation).

The Conservation Commission of WA is responsible for having management plans prepared for all lands that are vested in it. The *Yellagonga Regional Park Management Plan 2003-2013* was prepared for the park by the Department of Conservation and Land Management and the Cities of Joondalup and Wanneroo, and its implementation is the ongoing responsibility of the Department of Parks and Wildlife (DPAW). The Cities of Joondalup and Wanneroo have also developed and implemented the ***Yellagonga Integrated Catchment Management Plan 2009-2014.***

The management plans cover all areas of the park except the properties which are still privately owned. These private properties may continue to be used for the purposes for which they were legally being used immediately before the reservation came into effect in 1975. When this land is eventually acquired by the WAPC, management will be in accordance with the management plans. The Cities of Wanneroo and Joondalup work in partnership with DPAW on the day-to-day management of the park (Department of Conservation and Land Management, 2000).

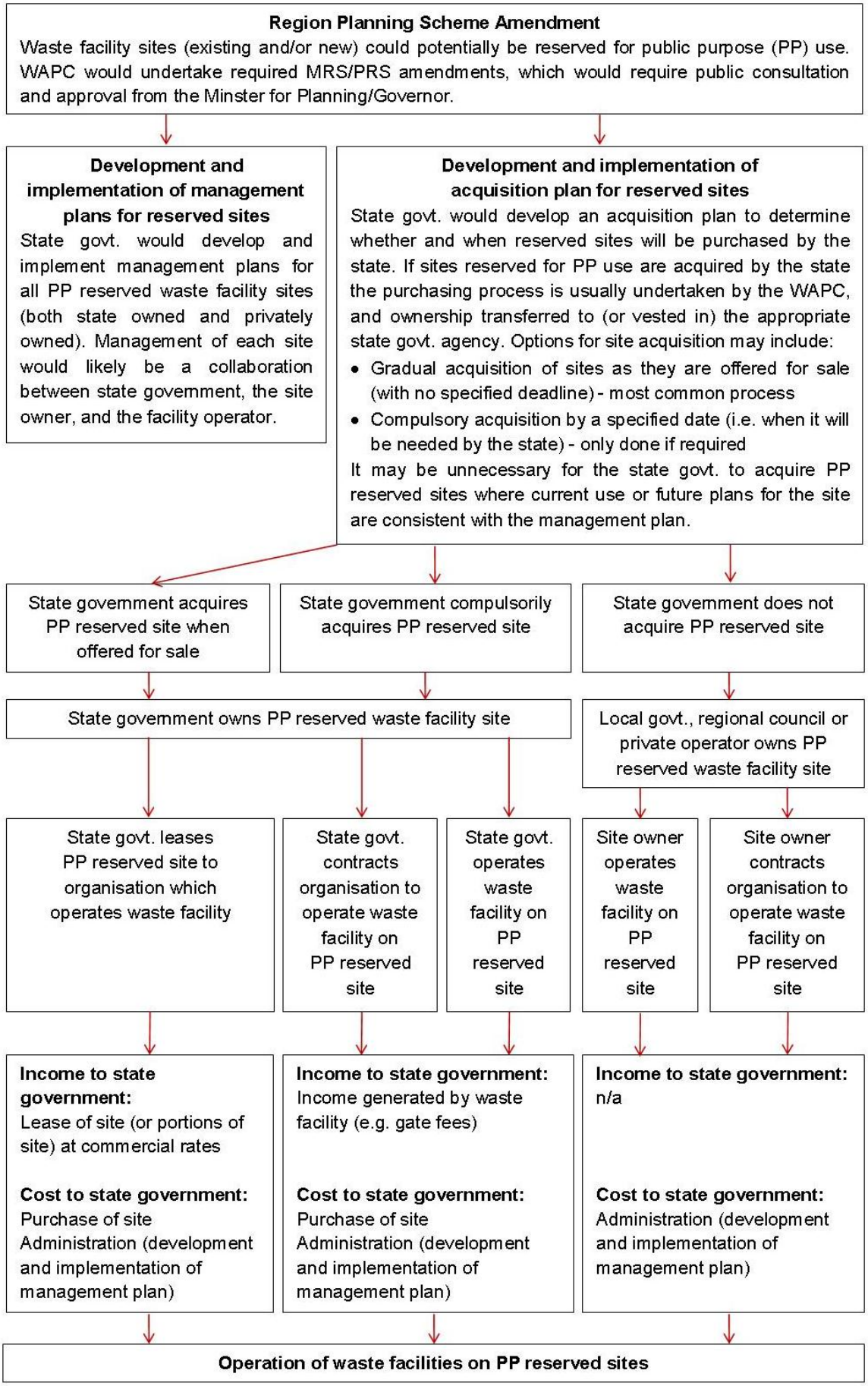

Figure 33: Flowchart of potential acquisition and management of reserved waste facility sites

Appendix 4 - Summary of assessment of technology categories

Table 46: Summary of assessment of source-separated waste collection / processing technologies

	Drop-off facilities	Transfer stations	MRFs	Composting (incl. AD)	C&D Recyclers
Ability to contribute to the waste diversion targets	Drop-off facilities provide greater flexibility to collect source-separated recyclables. However, it is anticipated that drop-off facilities will only make a minor contribution to the waste diversion targets.	Transfer stations do not directly contribute to diversion of waste from landfill. However, they could present opportunities to make the transport of source-separated material more efficient and the transport of sorted recyclables to market more efficient.	MRFs can make a substantial contribution to the waste diversion targets, provided suitable source-separate collections are in place. 'Clean' MRFs have a greater potential to divert waste from landfill than 'dirty' MRFs, which have a higher residual output and generally produce lower value recyclables due to the contamination.	Organic waste is a significant component in the MSW and C&I waste streams, and thus composting facilities have significant potential to contribute to the Waste Strategy landfill diversion targets, provided source-separated organics collection systems are put in place.	The C&D waste stream makes up over 50% of the waste generated in the metropolitan area. It is mainly made up of concrete, brick, sand and rubble, all of which is easily recycled. Therefore, C&D recycling facilities have a great potential to contribute to the meeting the waste strategy targets.
Readiness	Drop-off facilities are a well-proven technology.	Transfer stations are proven technologies.	MRFs are well-established across the world, with the level of automation and degree of separation increasing.	There are various composting technologies available, many of which are well-proven and readily available.	There are a range of technologies employed in modern C&D recycling facilities, many of which are well-proven and readily available. Much of the equipment in C&D recycling facilities are also used in other industries.
Reliability	Drop-off facilities should be available virtually 100% of the time, depending on how they are operated. However, as facilities generally need to be staffed, many operators find extensive opening times cost-prohibitive.	A well-designed, well-constructed, well-maintained transfer station should be very reliable.	A well-run MRF should be reliable, although there will be a need for down-time for maintenance. As with any technology, there will be occasional breakdowns, which would need to be managed.	Depending on the technology, composting facilities can be very reliable. However, as a biological system, they require careful management to operate efficiently and effectively.	The technology tends to be reliable, depending on the level of maintenance. However, the material is erosive, and there is significant wear and tear on the equipment. A well-managed facility should be able to manage the timing of shutdowns and stockpiling of feedstock.
Capacity	Drop-off facilities usually have a limited capacity, as they are only designed to receive small loads. However, it is theoretically possible to design the temporary storage area to any capacity.	The capacity of a transfer station is largely dependent on the size of the parcel of land it is on. With good logistics management and good technology, it should be possible to have considerable throughput on a relatively small parcel of land. In addition, given sufficient space and appropriate on-site management, a network of transfer stations has the potential to act as a capacity buffer within an overall waste infrastructure system.	MRFs can range from roughly 20,000 – 200,000 tpa throughput, depending on the design and equipment incorporated. When a MRF's design capacity is exceeded, the proportion of feedstock recovered is reduced; and the quality of the outcomes can also be reduced.	Composting facilities can be very small or up to 150,000tpa, depending on the size of the site and the technology used.	The capacity of C&D facilities is often limited by the size of the site. There are currently facilities processing up to 700,000 tpa.

	Drop-off facilities	Transfer stations	MRFs	Composting (incl. AD)	C&D Recyclers
Flexibility	Drop-off facilities should be highly flexible in the waste streams they can receive, and this should be able to be changed quickly and easily. This will depend largely on whether the infrastructure is permanent (pits) or temporary (skips).	Generally, transfer stations are only designed to aggregate one waste stream – general waste. However, it should be possible to design a transfer station that can aggregate multiple streams, and be somewhat flexible in how much of each stream can be aggregated. For example, rather than having a single pit, the transfer station could have multiple pits or drop points, which could be used for different materials. In addition, if sufficient storage space is assigned on the site, transfer stations could be used for aggregating processed/baled recyclables on the way to market.	MRFs are generally designed for a certain throughput and material composition. However, equipment can be changed and upgraded. The extent of the alterations required would depend on the degree of change in the feedstock. MRFs would only be able to cope with a certain level of variation of feedstock before the recovery rate was significantly affected.	As a biological system, composting facilities are sensitive to the feedstock characteristics: The amount, the moisture content, the carbon-to-nitrogen ratio of the feedstock are all important and need to be kept within certain limits for the facility to operate properly.	Due to the highly variable nature of the C&D industry, C&D recycling facilities are designed to be flexible with regards to the amount and composition of the material they accept. Where facilities are set up to process specific types of materials, they manage this by only accepting certain types of loads, or loads from certain sources.
Environmental performance	The environmental impact from drop-off facilities should be low, depending on the throughput and amount of material stored on site. A well-managed site should be able to control issues of odour, litter and vermin.	The potential impacts of waste transfer stations are odour, noise and surface water run-off, which can be controlled using good site design and readily-available pollution control technology. The use of transfer stations to aggregate materials and siting facilities close to the source of waste generation when possible can substantially reduce traffic resulting from transport of waste / recyclables. Therefore, they can reduce indirect impacts, such as traffic pollution and carbon emissions.	MRFs are generally enclosed, which limits the impact of odours, litter, dust and water run-off. Noise is a major problem with MRFs. Fire is a significant risk at MRFs.	Composting facilities can have significant odour, dust and water issues. The most difficult issue to manage is odour. These issues can be managed by having good operational procedures and by installing readily-available pollution control equipment.	The main environmental impacts of C&D facilities are dust and noise. Surface water and sediment run-off can also be an issue. These issues can be managed by having good operational procedures and by installing readily-available pollution control equipment. The potential for contamination of feedstock and product with asbestos is primarily a health issue, but needs to be managed through the site management process.

	Drop-off facilities	Transfer stations	MRFs	Composting (incl. AD)	C&D Recyclers
Siting requirements and suitability for Perth/Peel	Existing drop-off facilities in Perth and Peel are found in a range of different region planning scheme zones and are generally co-located with other local government waste facilities. Small-scale, non-putrescible drop-off centres are likely to be easier to site than larger scale putrescible drop-off facilities. The EPA recommended buffer between drop-off facilities and sensitive land uses is 200m. Drop-off facilities are best sited in locations that are convenient for residents and/or small businesses.	The siting requirements are general similar to those for other industrial-type waste facilities. Transfer stations have a recommended buffer of 200m to sensitive land uses. Existing transfer stations in Perth and Peel are generally located in areas zoned industrial under the region planning schemes. To be effective, a transfer station needs to be sited central to its catchment area and close to major transport routes. Such sites would be in high demand.	MRFs have similar siting considerations to other waste facilities. Currently, 'clean' MRFs do not require a DER licence to operate; so, the EPA has not stipulated a recommended minimum buffer distances to sensitive land uses. However, due to noise and traffic issues, a minimum buffer of 200m is advisable. The 'clean' MRFs in Perth and Peel are generally located in industrial zoned areas under the region planning schemes.	EPA buffer recommendations for composting facilities range from 150m to 1000m, depending on the type of technology used and the type of waste processed. Buffer requirements can be reduced by enclosing windrows or using odour control measures or in-vessel composting. Composting facilities in Perth and Peel are generally found in areas zoned *rural* or *industrial*. There is potential for composting facilities to be co-located with organic waste generators (e.g. piggeries, waste water treatment plants).	C&D facilities can operate on relatively small sites, if they are not required to hold large stockpiles on site. The dust and noise issues mean that they can be difficult to site, and may require a substantial buffer to sensitive land uses (up to 1000m in some cases). C&D waste can be expensive to transport, so it is generally advantageous for C&D recyclers to be located close to waste generators. Existing C&D recyclers in Perth and Peel are mainly located in industrial zoned areas.
Cost	Drop-off facilities generally have relatively low capital costs and low financial risk. The cost will depend on the design and the amount of permanent infrastructure at the site. If sited in built-up areas, the costs of the land might be high. Drop-off facilities need to be well-staffed to operate properly, which can result in high ongoing operating costs.	Transfer stations generally have low capital costs and low financial risk. The main cost is likely to be the purchase of the land, with the construction cost depending on the facility design and the type/range of materials accepted.	The capital cost of MRFs depends on the size and the type of equipment. However, they are generally less expensive than AWTs processing mixed waste.	Windrow composting facilities are relatively low cost to establish. The more equipment and technology employed in the operation, the higher the capital and operational costs.	C&D recycling equipment has a relatively low capital cost, compared to AWTs. The simpler the process, that is processing source-separated material, the cheaper the set up costs. Hi-tech equipment for separating mixed C&D waste is obviously more expensive.
Overall comment	Drop-off facilities are run as service to the community. They are unlikely to recover sufficient material to cover the capital and operational costs. Therefore, the owners / operators should expect to operate at a financial loss.	Transfer stations are an essential component for the efficient operation of a waste management system as a whole, as they can substantially reduce transport costs, as well as traffic congestion.	Having adequate MRF capacity will be essential to meeting the waste diversion targets.	Composting of source-separated organics is the best way to extract the maximum value from waste organic material.	To meet the waste diversion targets, a substantial capacity of C&D recycling will be required. To enable facilities to be sited within close proximity to where the waste is generated may require operators to implement pollution control measures that they haven't previously.

Table 47: Summary of assessment of mixed waste processing / disposal technologies

	Landfills	MBT	W2E
Ability to contribute to the waste diversion targets	Landfills make no contribution towards meeting the targets in the waste strategy.	MBT can contribute significantly to the diversion of waste from landfill by treating the organic fraction of the mixed waste stream. A large portion of this organic fraction can either be separated out or converted to gas. MBT plants can also be used to produce different types of refuse-derived fuel (RDF), which can then be disposed in a waste-to-energy plant.	Most of the waste processed in waste-to-energy facilities is diverted from landfill. Waste-to-energy plants can reduce the volume of the mixed waste fraction by up to 90%, and reduce the weight by approximately 75%. The residual material is usually disposed to landfill; although, it is theoretically possible to find alternative uses for it. Therefore, waste-to-energy plants have the potential to make a significant contribution towards the waste diversion targets.
Readiness	Landfill technology is readily available in Australia.	MBTs are used widely across Europe, with many plants in operation for more than 10 years. There are different technologies and designs used. They are increasingly used to produce RDF. Performance of MBT plants has improved substantially over tha past decade.	Waste-to-energy technologies, such as grate and fluidised bed combustion facilities, are widely used across Europe. Waste-to-energy is a proven technology, with a number of reputable suppliers around the world.
Reliability	Landfills are a very reliable technology, with a low risk of not being able to take material.	The reliability depends on the design. MBTs with fewer moving parts and proven designs are more reliable. Being biological systems, MBTs require a high level of management by qualified and experienced staff to operate efficiently.	Waste-to-energy plants are reliable if well-maintained and well-managed. However, they do require regular maintenance down-time.
Capacity	Landfills have an almost unlimited capacity, with most modern landfills receiving between 100,000tpa and 300,000tpa of waste. However, the size and annual capacity is limited by the site dimensions and the operational logistics.	MBTs generally have a capacity between 100,000tpa and 300,000tpa.	The capacity of waste-to-energy facilities can vary from around 100,000tpa to 600,000tpa. Smaller plants can be built, but are not generally financially viable. Larger plants are also possible.
Flexibility	Landfills can receive all types of wastes, depending on the pollution control measures built into the design/construction and the siting conditions.	MBTs are usually designed for a specific feedstock. Being biological systems, they do not respond well to great variations in feedstock volume or characteristics. In the USA, many MBTs have been converted to processing only source-separated organics (food and green waste). So, MBT plants do have the potential to be converted in the future.	Waste-to-energy plants are generally designed to receive feedstocks of a certain size, moisture content and calorific value. They are quite sensitive to significant variations in any of the design characteristics of the feedstock.
Environmental performance	The environmental performance of landfills has improved substantially in recent decades. However, the environmental performance of landfills, particularly in Western Australia, is generally low.	MBTs are generally enclosed, so issues of dust, noise and water run-off should be straightforward to manage. The main environmental impact of MBTs is odour. European plants tend to have expensive odour management technology to ensure they do not have odour problems. Fire is also a significant risk.	Waste-to-energy plants in Europe and Japan operate to strict environmental standards. However, a significant investment in pollution control equipment and ongoing operation of that equipment is required to achieve those standards.

	Landfills	MBT	W2E
Siting requirements and suitability for Perth/Peel	Although landfills have many general siting characteristics in common with other types of waste facilities they are, generally, extremely difficult to site, More than any other type of waste facility, there is a high risk of ground water pollution, odour, dust and litter – even with good pollution control measures. In addition, there are methane emissions and surface water issues. The state government's position on restricting new putrescible landfills on the Swan Coastal Plain means that development of new putrescible landfills is likely to occur outside the Perth metropolitan and Peel regions. EPA recommended buffer distances to sensitive land uses are up to 500m for putrescible landfills and 150m for inert landfills.	MBT plants can range in size; different technologies require different footprints. Buffers between MBT plants and sensitive land uses must be considered on case-by-case basis and the potential for odour, noise, gaseous emissions and risk must be considered. Existing MBT facilities in Perth and Peel are located in a range of different region planning scheme zones; although, they are generally industrial in nature. Given the history of odour complaints about MBT plants in WA, siting a new MBT plant is likely to be problematic due to community concerns.	Waste-to-energy facilities have similar siting considerations to other waste facilities. The (potential) low emissions, small buffer distances and relatively small footprint means that waste-to-energy plants should theoretically be comparatively easy to site. However, low social acceptance may make siting difficult. To be financially viable, waste-to-energy plants generally need to be sited next to (or within) a site that can utilise the steam produced. Alternatively, the site needs access to a sub-station and transmission lines, which would allow any electricity to be fed into the power grid.
Cost	Landfills are generally lower cost to build and run than mixed-waste processing facilities, such as MBT or waste-to-energy. However, they do require many years of post-closure aftercare, which is sometimes not fully costed during the operational life of the landfill.	MBT plants are expensive, with capital costs generally over $100million.	Waste-to-energy plants are expensive to build and operate, with capital cost in excess of $100million. In Europe and Japan, the sale of the energy offsets the cost (capital and operational).
Overall comment	Some landfill capacity will be required for the foreseeable future as the ultimate depository for residual waste. How much capacity will depend on what preprocessing is put in place. Landfills have a particularly useful role in contingency planning; for example, landfills are able to accept sudden large volumes of waste following a storm or other natural disaster.	MBT plants can play an important and cost-effective role within an integrated waste system, provided the appropriate technology is selected for the objective of the plant. MBT plants were primarily developed to reduce the volume and stabilise the biodegradable component of mixed putrescible waste prior to its disposal to landfill. Such plants, located close to the source of waste, could reduce the cost of transporting waste to remote landfills. Anaerobic digestion plants are able extract energy, in the form of gas, from the waste, prior to the residual being disposed. A MBT plant producing RDF reduces the waste volume (and hence transport costs) and is producing a feedstock that facilitates the more efficient operation of the receiving waste-to-energy plant, but it adds to the capital costs. Whether a MBT plant is cost-effective will depend on whether the party bearing the capital and operational costs of the plant also benefits from the subsequent cost savings.	Waste-to-energy could make a significant contribution towards meeting the waste diversion targets. However, this will depend on whether it can meet the environmental standards that the community expects while being financially viable. Due the high capital costs of waste-to-energy plants, they are most appropriate to use as an "end-of-pipe" solution, and only process waste that has not, or can not, be separated for recycling.

Appendix 5A - Infrastructure Options modelling flow charts

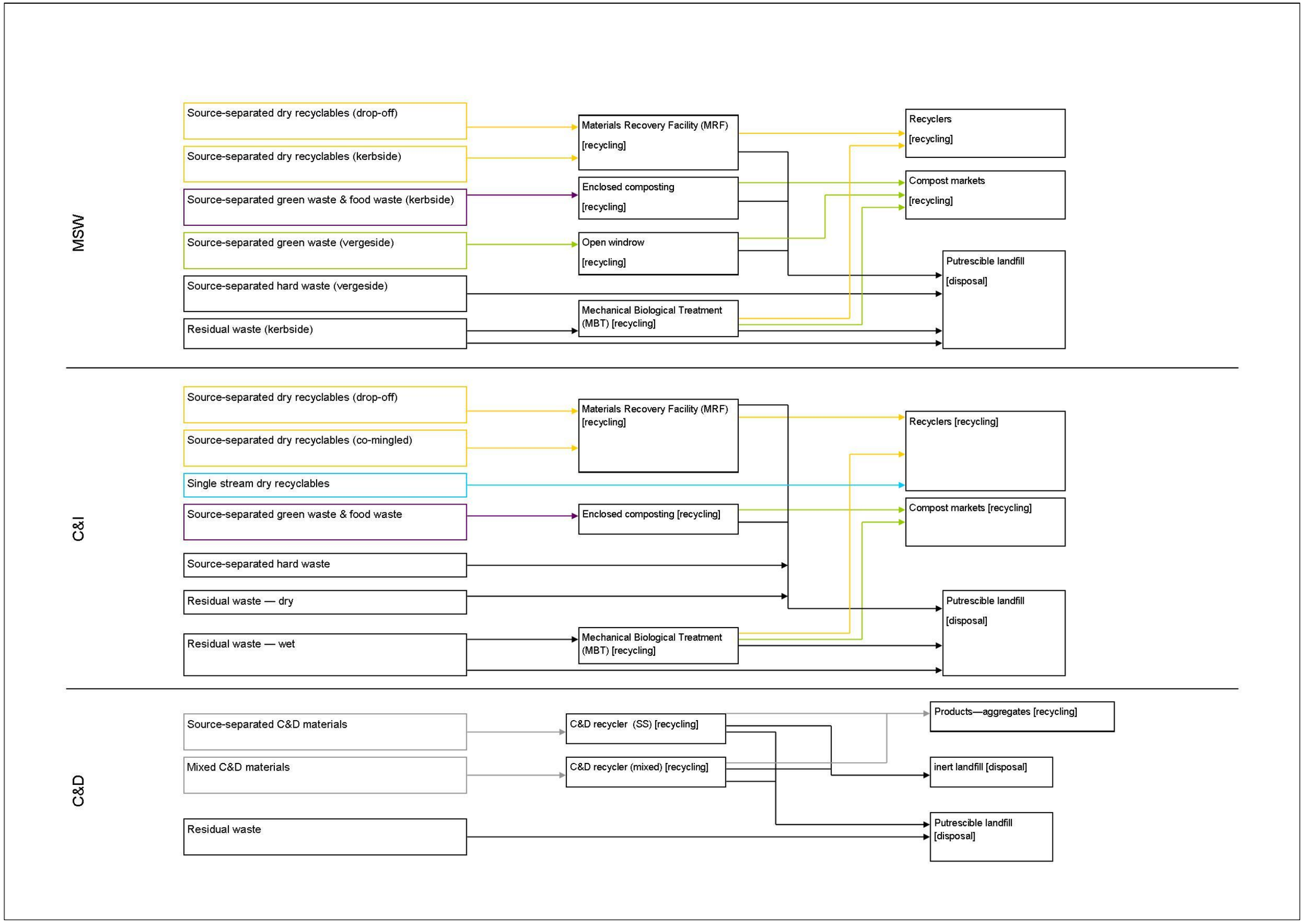

Figure 34: Option 1 (MBT to CLO) waste flow chart

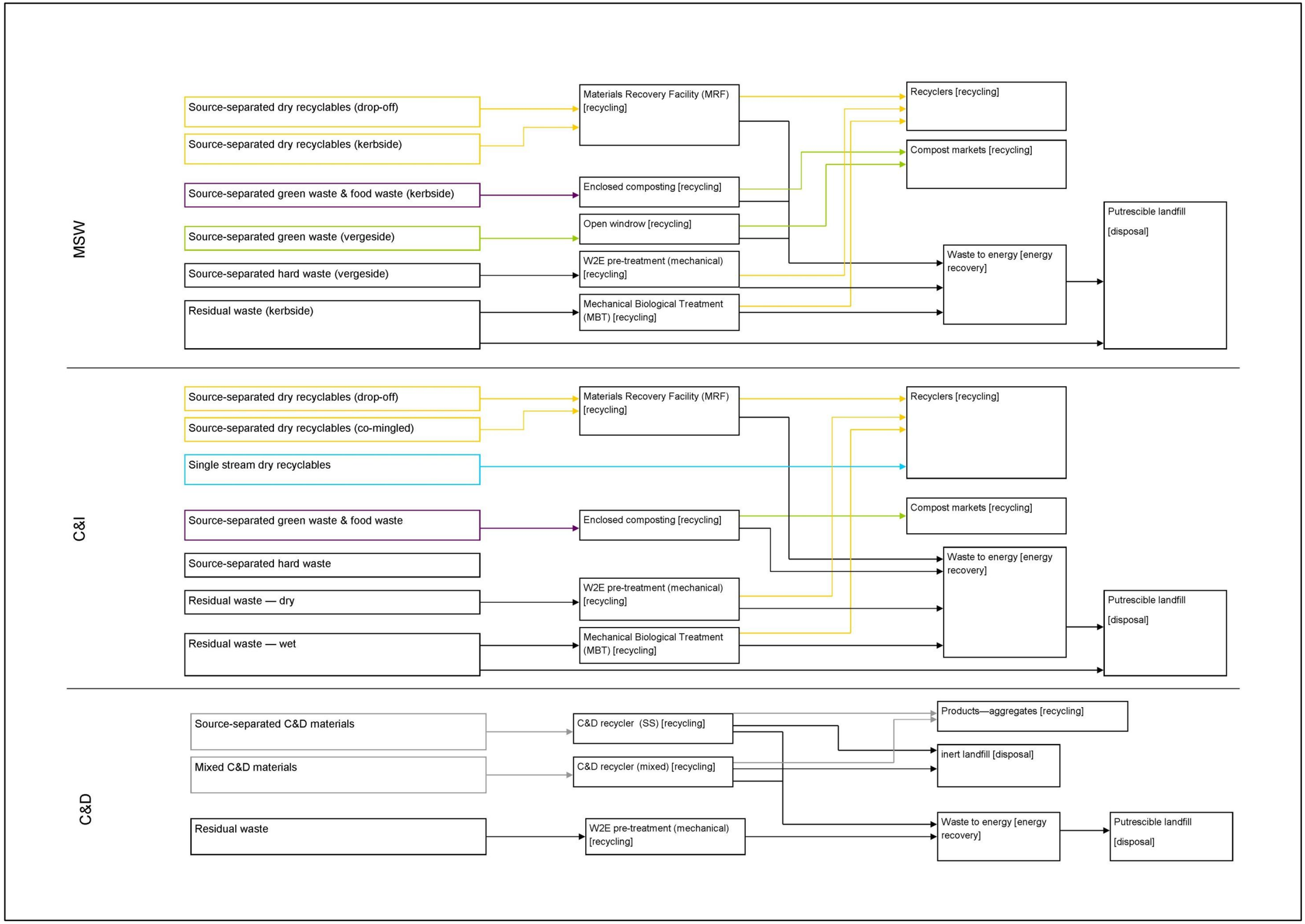

Figure 35: Option 2 (MBT to RDF) waste flow chart

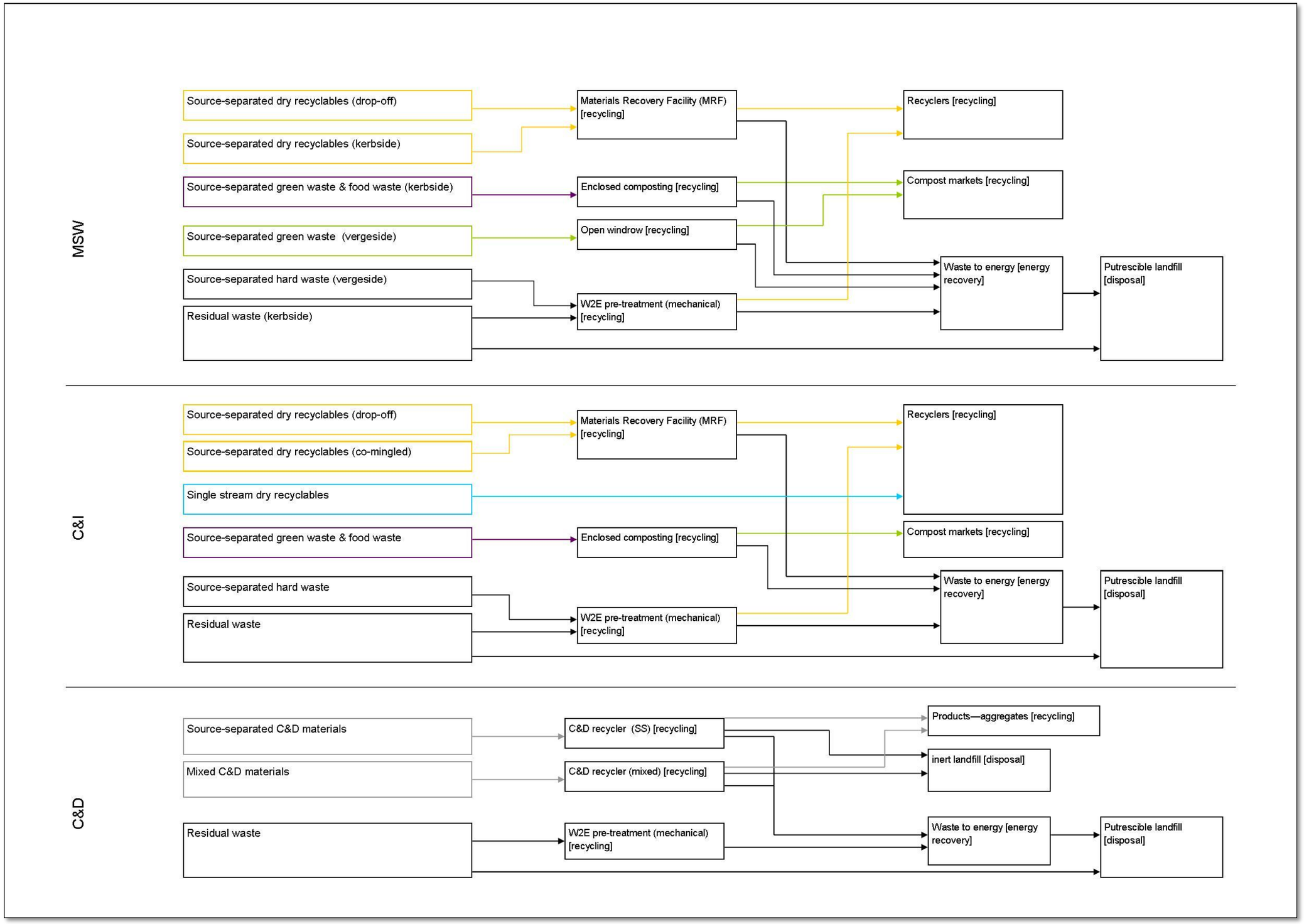

Figure 36: Option 3 (direct to W2E) waste flow chart

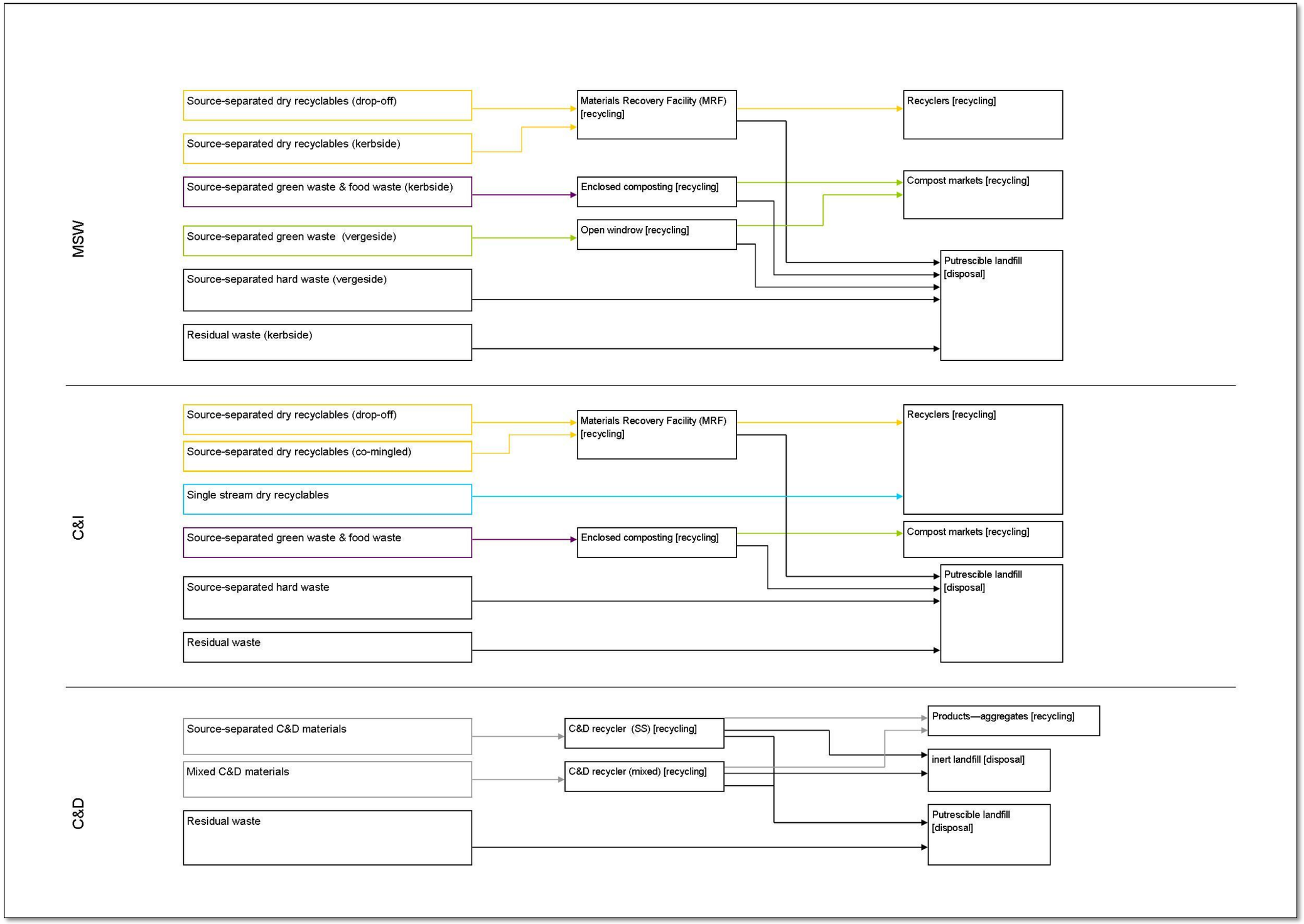

Figure 37: Option 4 (no mixed waste processing) waste flow chart

Appendix 5B – Infrastructure options modelling sensitivity analysis

Assumptions common to all options modelled

Within the model, certain performance characteristics need to be set by the user. This section lists the key assumptions used in model for each of the options described below.

System and service assumptions

The following assumptions are common to all systems modelled:

- Source-separated collection from both households and businesses of co-mingled recyclables and organic waste (green waste and food waste). The collected food and garden waste from these (containerised) collections are processed in enclosed composting facilities, which can be either aerobic or anaerobic.

- Source-separated green waste collected through domestic vergeside collections are processed in open windrow composting facilities.

- Both the MSW waste stream and C&I waste streams have access to drop-off and kerbside co-mingled recycling collection services for collecting dry recyclables, such as bottles, cans, cardboard and plastic.

- The model has the function to estimate the impact of access to a separate 'hard waste' collection for both the MSW and C&I waste streams, which is reflected in the flowcharts presented in Appendix 5. However, this has only been used for the MSW waste stream. It is assumed that hard waste from the MSW sector is sent directly to waste-to-energy (if available) or to landfill.

- The C&I sector also has access to 'single-stream' kerbside recycling collections. These are where the recyclables are collected as a single material type, for example cardboard collections, plastic film or timber. These can occur where businesses produce large amounts of a single type of recyclable waste material.

- The model also allows for 'wet' and 'dry' collection runs for servicing the C&I sector. These can occur where different collection runs is designed to service businesses with a high putrescible waste content, such as restaurants, supermarkets, providores, etc.

- The construction and demolition sector has access to recycling facilities that process only source-separated material and to recycling facilities that process mixed C&D waste.

- The residual waste from C&D recycling facilities is disposed to inert landfill (Category 63) or putrescible landfill (Category 64), or to waste-to-energy (if available).

For the purposes of the sensitivity modelling, it is assumed that all waste is treated through the 'system'. For options that include an AWT (options 1-3), no mixed putrescible waste is sent directly to landfill.

For the modelling conducted for section 7 to present different examples, it is assumed a certain percentage is sent directly to landfill. The Examples assume that only enough processing capacity is built to meet the waste diversion targets, with the rest disposed directly to landfill. This is explained more fully in the relevant sections under section 7.

Waste generation and composition assumptions

Table 48: Assumed rates of waste generation by sector

MSW Generation (tonnes per capita)	C&I Generation (tonnes per capita)	C&D Generation (tonnes per capita)
0.65	0.72	1.35

Table 49: Assumed waste composition by waste stream

Component	% in MSW stream (total)	% in C&I stream (total)	% in C&D stream (total)
Metals	2.00%	27.31%	4.60%
Plastic	4.67%	6.91%	0.06%
Paper & cardboard	17.67%	17.16%	0.19%
Glass	4.53%	1.29%	0.02%
Food waste	17.89%	8.08%	0.00%
Green waste	47.28%	2.48%	0.53%
Wood/timber	0.00%	15.53%	1.35%
C&D materials	0.00%	3.85%	77.47%
Hazardous	2.07%	6.94%	0.00%
Other	3.90%	10.45%	15.79%
TOTAL	100%	100%	100%

Facility performance assumptions

Table 50: Assumptions about facility performance used in modelling

Parameter	Assumed value	
Proportion of material received at MRFs that is recovered and sent to recycling	Metals	90%
	Plastic	85%
	Paper & cardboard	85%
	Glass	50%
	Food waste	-
	Green waste	-
	Wood/timber	-
	C&D materials	-
	Hazardous	-
	Other	-
Contamination removed from source-separated green waste and food waste sent to enclosed composting	5%	
Contamination removed from source-separated green waste sent to open windrow composting	5%	
Proportion of material received at MBTs that is recovered and sent to recycling from the pre-treatment part of the facility	Metals	60%
	Plastic	-
	Paper & cardboard	-
	Glass	-
	Food waste	-
	Green waste	-
	Wood/timber	-
	C&D materials	-
	Hazardous	-
	Other	-
CLO produced (% of total input to MBT after pre-treatment to remove metals)	30%	
RDF produced (% of total input to MBT after pre-treatment to remove metals)	50%	
Mass loss at MBT (% of total input to MBT)	25%	
Proportion of material received at W2E pre-treatment	Metals	60%

Parameter	Assumed value	
facilities that is recovered and sent to recycling	Plastic	-
	Paper & cardboard	-
	Glass	-
	Food waste	-
	Green waste	-
	Wood/timber	-
	C&D materials	-
	Hazardous	-
	Other	-
Air pollution control (APC) residue (% of input)	4%	
Incinerator bottom ash (IBA) produced (% of total treated)	20%	
Proportion of metals extracted from IBA	60%	
Proportion of material received at source-separated C&D recycling facilities that is recovered and sent to recycling	Metals	95%
	Plastic	-
	Paper & cardboard	-
	Glass	75%
	Food waste	-
	Green waste	-
	Wood/timber	80%
	C&D materials	95%
	Hazardous	-
	Other	-
Proportion of material received at source-separated C&D recycling facilities that is sent to inert landfill for disposal (with the remainder of the residual disposed to putrescible landfill)	Metals	2%
	Plastic	2%
	Paper & cardboard	2%
	Glass	2%
	Food waste	2%
	Green waste	2%
	Wood/timber	2%
	C&D materials	2%
	Hazardous	2%
	Other	2%
Proportion of material received at mixed C&D recycling	Metals	95%

Parameter	Assumed value	
facilities that is recovered and sent to recycling	Plastic	-
	Paper & cardboard	-
	Glass	-
	Food waste	-
	Green waste	-
	Wood/timber	20%
	C&D materials	80%
	Hazardous	-
	Other	-
Proportion of material received at mixed C&D recycling facilities that is sent to inert landfill for disposal (with the remainder of the residual disposed to putrescible landfill)	Metals	2%
	Plastic	2%
	Paper & cardboard	2%
	Glass	2%
	Food waste	2%
	Green waste	2%
	Wood/timber	2%
	C&D materials	10%
	Hazardous	2%
	Other	2%

Financial assumptions

The capital cost per tonne is based on similar facilities that have been constructed in Australia or Europe. The actual capital cost varies considerably. As such, these capital cost estimates are used for comparative purposes only.

Table 51: Capital costs assumed in modelling

Facility category	Assumed capital cost ($/t)
Materials Recovery Facility (MRF)	100
Enclosed composting	320
Open windrow	15
Mechanical Biological Treatment (MBT)	650
W2E pre-treatment (mechanical)	80
Waste-to-energy	1000
Recyclers	250
C&D recycler (source-segregated)	25

Facility category	Assumed capital cost ($/t)
C&D recycler (mixed)	50

Option 1 (MBT to CLO) sensitivity analysis

A summary of the results of the waste flow modelling for each of the three scenarios for Option 1 for the year 2020/21 are as per the tables and charts below.

Table 52: Option 1 Scenario 1 [High waste generation rate (band E population growth) and low source separation (30%)] estimated processing capacity required

Overall diversion rate	MSW	C&I	C&D	Overall
Total generated (Mt)	1,420,262	1,803,176	2,877,034	6,100,471
Tonnage to: Putrescible landfill	493,569	1,012,926	1,454,694	2,961,189
Tonnage to: Inert landfill	-	-	78,370	78,370
Therefore total diverted (tonnes)	926,693	790,250	1,343,970	3,060,912
Rate of diversion from landfill (%)	65%	44%	47%	50%
Waste strategy target	65%	70%	75%	

Infrastructure requirements (inputs to facilities) (tonnes / year)	MSW	C&I	C&D	Overall
Materials Recovery Facility (MRF)	111,002	327,798	-	438,800
Enclosed composting	214,137	18,450	-	232,586
Open windrow	100,716	-	-	100,716
Mechanical Biological Treatment (MBT)	975,871	584,427	-	1,560,298
W2E pre-treatment (mechanical)	-	-	-	-
Waste-to-energy	-	-	-	-
Recyclers	95,247	451,288	-	546,535
Compost markets	587,478	192,855	-	780,333
Putrescible landfill	493,569	1,012,926	1,454,694	2,961,189
Inert landfill	-	-	78,370	78,370
C&D recycler (source-segregated)	-	-	864,111	864,111
C&D recycler (mixed)	-	-	647,343	647,343
Products – C&D recycled materials	-	-	1,343,970	1,343,970

Table 53: Option 1 Scenario 2 [Medium waste generation rate (band C population growth) and low source separation (50%)] estimated processing capacity required

Overall diversion rate	MSW	C&I	C&D	Overall
Total generated (Mt)	1,395,373	1,771,577	2,826,617	5,993,567
Tonnage to: Putrescible landfill	384,809	773,138	885,372	2,043,318

Tonnage to: Inert landfill	-	-	88,298	88,298
Therefore total diverted (tonnes)	1,010,564	998,439	1,852,947	3,861,951
Rate of diversion from landfill (%)	72%	56%	66%	64%
Waste strategy target	65%	70%	75%	

Infrastructure requirements (inputs to facilities) (tonnes / year)	**MSW**	**C&I**	**C&D**	**Overall**
Materials Recovery Facility (MRF)	185,196	471,600	-	656,796
Enclosed composting	379,764	77,852	-	457,616
Open windrow	131,935	-	-	131,935
Mechanical Biological Treatment (MBT)	680,267	452,853	-	1,133,121
W2E pre-treatment (mechanical)	-	-	-	-
Waste-to-energy	-	-	-	-
Recyclers	153,968	675,410	-	829,378
Compost markets	686,530	209,816	-	896,345
Putrescible landfill	384,809	773,138	885,372	2,043,318
Inert landfill	-	-	88,298	88,298
C&D recycler (source-segregated)	-	-	1,414,038	1,414,038
C&D recycler (mixed)	-	-	635,999	635,999
Products – C&D recycled materials	-	-	1,852,947	1,852,947

Table 54: Option 1 Scenario 3 [Low waste generation rate (band A population growth) and low source separation (70%)] estimated processing capacity required

Overall diversion rate	**MSW**	**C&I**	**C&D**	**Overall**
Total generated (Mt)	1,369,324	1,738,505	2,773,850	5,881,680
Tonnage to: Putrescible landfill	294,967	591,596	670,181	1,556,744
Tonnage to: Inert landfill	-	-	61,219	61,219
Therefore total diverted (tonnes)	1,074,357	1,146,909	2,042,450	4,263,717
Rate of diversion from landfill (%)	78%	66%	74%	72%
Waste strategy target	65%	70%	75%	

Infrastructure requirements (inputs to facilities) (tonnes / year)	**MSW**	**C&I**	**C&D**	**Overall**
Materials Recovery Facility (MRF)	302,659	707,718	-	1,010,378
Enclosed composting	493,931	123,291	-	617,221
Open windrow	161,840	-	-	161,840
Mechanical Biological Treatment (MBT)	393,024	287,362	-	680,386
W2E pre-treatment (mechanical)	-	-	-	-
Waste-to-energy	-	-	-	-
Recyclers	236,345	871,734	-	1,108,079
Compost markets	739,756	203,335	-	943,091
Putrescible landfill	294,967	591,596	670,181	1,556,744

Infrastructure requirements (inputs to facilities) (tonnes / year)	MSW	C&I	C&D	Overall
Inert landfill	-	-	61,219	61,219
C&D recycler (source-segregated)	-	-	1,942,580	1,942,580
C&D recycler (mixed)	-	-	258,830	258,830
Products – C&D recycled materials	-	-	2,042,450	2,042,450

Option 2 MBT to RDF) sensitivity analysis

Table 55: Option 2 Scenario 1 [High waste generation rate (band E population growth) and low source separation (30%)] estimated processing capacity required

Overall diversion rate	MSW	C&I	C&D	Overall
Total generated (Mt)	1,420,262	1,803,176	2,877,034	6,100,471
Tonnage to: Putrescible landfill	402,366	356,189	389,399	1,147,954
Tonnage to: Inert landfill	-	-	78,370	78,370
Therefore total diverted (tonnes)	1,017,895	1,446,987	2,409,266	4,874,147
Rate of diversion from landfill (%)	72%	80%	84%	80%
Waste strategy target	65%	70%	75%	

Infrastructure requirements (inputs to facilities) (tonnes / year)	MSW	C&I	C&D	Overall
Materials Recovery Facility (MRF)	111,002	327,798	-	438,800
Enclosed composting	214,137	18,450	-	232,586
Open windrow	100,716	-	-	100,716
Mechanical Biological Treatment (MBT)	975,871	584,427	-	1,560,298
W2E pre-treatment (mechanical)	18,535	678,203	1,365,580	2,062,318
Waste-to-energy	498,807	822,684	1,322,682	2,644,173
Recyclers	95,724	658,113	42,898	796,735
Compost markets	299,110	17,527	-	316,637
Putrescible landfill	402,366	356,189	389,399	1,147,954
Inert landfill	-	-	78,370	78,370
C&D recycler (source-segregated)	-	-	864,111	864,111
C&D recycler (mixed)	-	-	647,343	647,343
Products – C&D recycled materials	-	-	1,343,970	1,343,970

Table 56: Option 2 Scenario 2 [Medium waste generation rate (band C population growth) and low source separation (50%)] estimated processing capacity required

Overall diversion rate	MSW	C&I	C&D	Overall
Total generated (Mt)	1,395,373	1,771,577	2,826,617	5,993,567
Tonnage to: Putrescible landfill	317,310	342,734	279,174	939,219
Tonnage to: Inert landfill	-	-	88,298	88,298
Therefore total diverted (tonnes)	1,078,062	1,428,842	2,459,145	4,966,050

Overall diversion rate	MSW	C&I	C&D	Overall
Rate of diversion from landfill (%)	77%	81%	87%	83%
Waste strategy target	65%	70%	75%	

Infrastructure requirements (inputs to facilities) (tonnes / year)	MSW	C&I	C&D	Overall
Materials Recovery Facility (MRF)	185,196	471,600	-	656,796
Enclosed composting	379,764	77,852	-	457,616
Open windrow	131,935	-	-	131,935
Mechanical Biological Treatment (MBT)	680,267	452,853	-	1,133,121
W2E pre-treatment (mechanical)	18,210	445,316	776,581	1,240,106
Waste-to-energy	351,902	584,656	751,586	1,688,144
Recyclers	154,436	797,330	24,995	976,761
Compost markets	486,114	73,960	-	560,074
Putrescible landfill	317,310	342,734	279,174	939,219
Inert landfill	-	-	88,298	88,298
C&D recycler (source-segregated)	-	-	1,414,038	1,414,038
C&D recycler (mixed)	-	-	635,999	635,999
Products – C&D recycled materials	-	-	1,852,947	1,852,947

Table 57: Option 2 Scenario 3 [Low waste generation rate (band A population growth) and low source separation (70%)] estimated processing capacity required

Overall diversion rate	MSW	C&I	C&D	Overall
Total generated (Mt)	1,369,324	1,738,505	2,773,850	5,881,680
Tonnage to: Putrescible landfill	250,036	372,829	231,670	854,535
Tonnage to: Inert landfill	-	-	61,219	61,219
Therefore total diverted (tonnes)	1,119,289	1,365,676	2,480,962	4,965,927
Rate of diversion from landfill (%)	82%	79%	89%	84%
Waste strategy target	65%	70%	75%	

Infrastructure requirements (inputs to facilities) (tonnes / year)	MSW	C&I	C&D	Overall
Materials Recovery Facility (MRF)	302,659	707,718	-	1,010,378
Enclosed composting	493,931	123,291	-	617,221
Open windrow	161,840	-	-	161,840
Mechanical Biological Treatment (MBT)	393,024	287,362	-	680,386
W2E pre-treatment (mechanical)	17,870	233,613	572,440	823,924
Waste-to-energy	212,165	348,808	567,038	1,128,011
Recyclers	236,805	911,616	5,402	1,153,822
Compost markets	622,982	117,126	-	740,108
Putrescible landfill	250,036	372,829	231,670	854,535
Inert landfill	-	-	61,219	61,219

Infrastructure requirements (inputs to facilities) (tonnes / year)	MSW	C&I	C&D	Overall
C&D recycler (source-segregated)	-	-	1,942,580	1,942,580
C&D recycler (mixed)	-	-	258,830	258,830
Products – C&D recycled materials	-	-	2,042,450	2,042,450

Option 3 (Waste-to-energy) sensitivity analysis

Table 58: Option 3 Scenario 1 [High waste generation rate (band E population growth) and low source separation (30%)] estimated processing capacity required

Overall diversion rate	MSW	C&I	C&D	Overall
Total generated (Mt)	1,420,262	1,803,176	2,877,034	6,100,471
Tonnage to: Putrescible landfill	275,210	280,214	389,399	944,822
Tonnage to: Inert landfill	-	-	78,370	78,370
Therefore total diverted (tonnes)	1,145,051	1,522,962	2,409,266	5,077,279
Rate of diversion from landfill (%)	81%	84%	84%	83%
Waste strategy target	65%	70%	75%	

Infrastructure requirements (inputs to facilities) (tonnes / year)	MSW	C&I	C&D	Overall
Materials Recovery Facility (MRF)	111,002	327,798	-	438,800
Enclosed composting	214,137	18,450	-	232,586
Open windrow	100,716	-	-	100,716
Mechanical Biological Treatment (MBT)	-	-	-	-
W2E pre-treatment (mechanical)	994,406	1,262,629	1,365,580	3,622,616
Waste-to-energy	979,419	1,114,898	1,322,682	3,416,999
Recyclers	101,583	658,113	42,898	802,594
Compost markets	299,110	17,527	-	316,637
Putrescible landfill	275,210	280,214	389,399	944,822
Inert landfill	-	-	78,370	78,370
C&D recycler (source-segregated)	-	-	864,111	864,111
C&D recycler (mixed)	-	-	647,343	647,343
Products – C&D recycled materials	-	-	1,343,970	1,343,970

Table 59: Option 3 Scenario 2 [Medium waste generation rate (band C population growth) and low source separation (50%)] estimated processing capacity required

Overall diversion rate	MSW	C&I	C&D	Overall
Total generated (Mt)	1,395,373	1,771,577	2,826,617	5,993,567
Tonnage to: Putrescible landfill	228,631	283,864	279,174	791,669
Tonnage to: Inert landfill	-	-	88,298	88,298
Therefore total diverted (tonnes)	1,166,742	1,487,713	2,459,145	5,113,600
Rate of diversion from landfill (%)	84%	84%	87%	85%

Overall diversion rate	MSW	C&I	C&D	Overall
Waste strategy target	65%	70%	75%	

Infrastructure requirements (inputs to facilities) (tonnes / year)	MSW	C&I	C&D	Overall
Materials Recovery Facility (MRF)	185,196	471,600	-	656,796
Enclosed composting	379,764	77,852	-	457,616
Open windrow	131,935	-	-	131,935
Mechanical Biological Treatment (MBT)	-	-	-	-
W2E pre-treatment (mechanical)	698,478	898,169	776,581	2,373,227
Waste-to-energy	685,928	811,083	751,586	2,248,597
Recyclers	159,322	797,330	24,995	981,647
Compost markets	486,114	73,960	-	560,074
Putrescible landfill	228,631	283,864	279,174	791,669
Inert landfill	-	-	88,298	88,298
C&D recycler (source-segregated)	-	-	1,414,038	1,414,038
C&D recycler (mixed)	-	-	635,999	635,999
Products – C&D recycled materials	-	-	1,852,947	1,852,947

Table 60: Option 3 Scenario 3 [Low waste generation rate (band A population growth) and low source separation (70%)] estimated processing capacity required

Overall diversion rate	MSW	C&I	C&D	Overall
Total generated (Mt)	1,369,324	1,738,505	2,773,850	5,881,680
Tonnage to: Putrescible landfill	198,867	335,472	231,670	766,009
Tonnage to: Inert landfill	-	-	61,219	61,219
Therefore total diverted (tonnes)	1,170,457	1,403,033	2,480,962	5,054,452
Rate of diversion from landfill (%)	85%	81%	89%	86%
Waste strategy target	65%	70%	75%	

Infrastructure requirements (inputs to facilities) (tonnes / year)	MSW	C&I	C&D	Overall
Materials Recovery Facility (MRF)	302,659	707,718	-	1,010,378
Enclosed composting	493,931	123,291	-	617,221
Open windrow	161,840	-	-	161,840
Mechanical Biological Treatment (MBT)	-	-	-	-
W2E pre-treatment (mechanical)	410,894	520,975	572,440	1,504,309
Waste-to-energy	406,789	492,489	567,038	1,466,316
Recyclers	238,316	911,616	5,402	1,155,333
Compost markets	622,982	117,126	-	740,108
Putrescible landfill	198,867	335,472	231,670	766,009
Inert landfill	-	-	61,219	61,219
C&D recycler (source-segregated)	-	-	1,942,580	1,942,580

Infrastructure requirements (inputs to facilities) (tonnes / year)	MSW	C&I	C&D	Overall
C&D recycler (mixed)	-	-	258,830	258,830
Products – C&D recycled materials	-	-	2,042,450	2,042,450

Option 4 (no AWT) sensitivity analysis

Table 61: Option 4 Scenario 1 [High waste generation rate (band E population growth) and low source separation (30%)] estimated processing capacity required

Overall diversion rate	MSW	C&I	C&D	Overall
Total generated (Mt)	1,420,262	1,803,176	2,877,034	6,100,471
Tonnage to: Putrescible landfill	1,040,551	1,334,360	1,454,694	3,829,606
Tonnage to: Inert landfill	-	-	78,370	78,370
Therefore total diverted (tonnes)	379,711	468,815	1,343,970	2,192,496
Rate of diversion from landfill (%)	27%	26%	47%	36%
Waste strategy target	65%	70%	75%	

Infrastructure requirements (inputs to facilities) (tonnes / year)	MSW	C&I	C&D	Overall
Materials Recovery Facility (MRF)	111,002	327,798	-	438,800
Enclosed composting	214,137	18,450	-	232,586
Open windrow	100,716	-	-	100,716
Mechanical Biological Treatment (MBT)	-	-	-	-
W2E pre-treatment (mechanical)	-	-	-	-
Waste-to-energy	-	-	-	-
Recyclers	80,600	451,288	-	531,888
Compost markets	299,110	17,527	-	316,637
Putrescible landfill	1,040,551	1,334,360	1,454,694	3,829,606
Inert landfill	-	-	78,370	78,370
C&D recycler (source-segregated)	-	-	864,111	864,111
C&D recycler (mixed)	-	-	647,343	647,343
Products – C&D recycled materials	-	-	1,343,970	1,343,970

Table 62: Option 4 Scenario 2 [Medium waste generation rate (band C population growth) and low source separation (50%)] estimated processing capacity required

Overall diversion rate	MSW	C&I	C&D	Overall
Total generated (Mt)	1,395,373	1,771,577	2,826,617	5,993,567
Tonnage to: Putrescible landfill	767,506	1,022,207	885,372	2,675,085
Tonnage to: Inert landfill	-	-	88,298	88,298
Therefore total diverted (tonnes)	627,867	749,370	1,852,947	3,230,184
Rate of diversion from landfill (%)	45%	42%	66%	54%
Waste strategy target	65%	70%	75%	

Infrastructure requirements (inputs to facilities) (tonnes / year)	MSW	C&I	C&D	Overall
Materials Recovery Facility (MRF)	185,196	471,600	-	656,796
Enclosed composting	379,764	77,852	-	457,616
Open windrow	131,935	-	-	131,935
Mechanical Biological Treatment (MBT)	-	-	-	-
W2E pre-treatment (mechanical)	-	-	-	-
Waste-to-energy	-	-	-	-
Recyclers	141,753	675,410	-	817,163
Compost markets	486,114	73,960	-	560,074
Putrescible landfill	767,506	1,022,207	885,372	2,675,085
Inert landfill	-	-	88,298	88,298
C&D recycler (source-segregated)	-	-	1,414,038	1,414,038
C&D recycler (mixed)	-	-	635,999	635,999
Products – C&D recycled materials	-	-	1,852,947	1,852,947

Table 63: Option 4 Scenario 3 [Low waste generation rate (band A population growth) and low source separation (70%)] estimated processing capacity required

Overall diversion rate	MSW	C&I	C&D	Overall
Total generated (Mt)	1,369,324	1,738,505	2,773,850	5,881,680
Tonnage to: Putrescible landfill	513,774	749,645	670,181	1,933,600
Tonnage to: Inert landfill	-	-	61,219	61,219
Therefore total diverted (tonnes)	855,551	988,860	2,042,450	3,886,861
Rate of diversion from landfill (%)	62%	57%	74%	66%
Waste strategy target	65%	70%	75%	

Infrastructure requirements (inputs to facilities) (tonnes / year)	MSW	C&I	C&D	Overall
Materials Recovery Facility (MRF)	302,659	707,718	-	1,010,378
Enclosed composting	493,931	123,291	-	617,221
Open windrow	161,840	-	-	161,840
Mechanical Biological Treatment (MBT)	-	-	-	-
W2E pre-treatment (mechanical)	-	-	-	-
Waste-to-energy	-	-	-	-
Recyclers	232,568	871,734	-	1,104,303
Compost markets	622,982	117,126	-	740,108
Putrescible landfill	513,774	749,645	670,181	1,933,600
Inert landfill	-	-	61,219	61,219
C&D recycler (source-segregated)	-	-	1,942,580	1,942,580
C&D recycler (mixed)	-	-	258,830	258,830
Products – C&D recycled materials	-	-	2,042,450	2,042,450

Appendix 6 – Summary comparison of governance models

Key

Colour	Code	Performance against criteria
	H	Performs extremely well against criteria
	M/H	Performs very well against criteria
	M	Performs well against criteria
	M/L	Performs fairly again criteria
	L	Performs poorly against criteria

		GOVERNANCE MODELS									
KEY CRITERIA		Existing arrangements remain	WALGA vision	Waste Corporation ownership model	Waste Corporation operation model	Waste Planning Authority model	Waste Planning and Policy Authority model	Waste Planning, Policy and Procurement Authority model	Voluntary Metropolitan Waste Management Group model	Statutory Metropolitan Waste Group model (Phase 2)	Full Commercial Access model
Coverage	Waste streams catered for	MSW, C&I and C&D	Primarily MSW. Complementary measures will be required to cater for C&I and C&D waste streams	MSW, C&I and C&D	MSW, C&I and C&D	MSW, C&I and C&D	MSW, C&I and C&D	MSW, C&I and C&D	Primarily MSW but can cater for C&I and C&D waste streams	Primarily MSW but can cater for C&I and C&D waste streams	MSW, C&I and C&D
Alignment with State government policy priorities	Ability to facilitate delivery of Waste Strategy targets	Unlikely to achieve targets under current arrangements L	Potential to improve the ability to meet MSW target if local governments are required to develop complimentary policy to deliver state set outcomes. Economic drivers are required to enable this and unclear as to whether the model will provide these. C&I and C&D targets will not be met unless complementary measures are introduced. M/L	Waste Corporation has the ability under this model to set and enforce policy that will facilitate the achievement of the Strategy targets. H	Waste Corporation has the ability under this model to set and enforce policy that will facilitate the achievement of the Strategy targets. H	Model would deliver infrastructure that will assist the region to achieve its targets but no guarantee that it will deliver waste diversion targets. L	Model provides the government with the ability to implements its strategic infrastructure plan for the region (with regional local governments) and set policies and measures to facilitate the delivery of the waste diversion targets. H	Model provides the government with the ability to implements its strategic infrastructure plan for the region (with regional local governments) and set policies and measures to facilitate the delivery of the waste diversion targets. H	Model provides the government with the ability to implements its strategic infrastructure plan for the region (with regional local governments) and set policies and measures to facilitate the delivery of the waste diversion targets. However voluntary nature of model means that some regional local governments could choose not to participate. M	Model provides the government with the ability to implements its strategic infrastructure plan for the region and set policies and measures to facilitate the delivery of the waste diversion targets. Mandatory nature of model resolves participation issues. H	Unlikely to achieve targets as there is no compulsion/incentives for waste collectors or processors to improve waste management outcomes. Commercial imperatives may well drive cheapest collection and disposal option under this model. L
Financial impact on government	Funding implementation of governance change	No additional cost. H	Additional costs associated with establishing strengthened Waste Authority and rationalising number of regional local governments. Also potential costs associated with transitioning regional local governments to regional subsidiaries model if this is to occur. M/L	Potential significant costs associated with establishing Waste Corporation, transferring ownership of facilities and establishing new facilities as required. L	Potential significant costs associated with establishing Waste Corporation, transferring ownership collection contracts although under this model the Waste Corporation will not be required to own any processing facilities. M/L	Costs associated with setting up Waste Planning Agency and new approvals regime. M	Costs associated with setting up Waste Planning Agency, new approvals regime and developing waste policy and measures. M	Costs associated with setting up Waste Planning Agency, new approvals regime and developing waste policy and measures and securing sites for future infrastructure purposes. M/L	Costs associated with establishing and running VMWMGs and costs associate with providing incentives for participation (managed supply grants). M/H	Costs associated with establishing and running mandatory SMWMG though efficiencies will be gained from treating the region as a whole and reducing duplicated resources that exist within the current regional local government model. M/H	Minimal costs associated with transitioning to this model. Some savings may be possible from rationalising the roles of existing governance agencies. H

		GOVERNANCE MODELS									
KEY CRITERIA		Existing arrangements remain	WALGA vision	Waste Corporation ownership model	Waste Corporation operation model	Waste Planning Authority model	Waste Planning and Policy Authority model	Waste Planning, Policy and Procurement Authority model	Voluntary Metropolitan Waste Management Group model	Statutory Metropolitan Waste Group model (Phase 2)	Full Commercial Access model
	Cost of providing new infrastructure, sites or services	None. H	Proposes that 100% of the levy be hypothecated to provide funding for infrastructure and waste management initiatives. L	All costs borne by State Government as owner and operator of facilities. L	Costs associated with transferring ownership of collection contracts and establishing coordinated collection systems. L	Set up and administrative costs associated with Waste Planning Authority. M	Set up and administrative costs associated with Waste Planning and Policy Authority. M	Increase in costs from Waste Planning and Policy Authority model as State will purchase sites for siting waste management infrastructure. However, the costs associated with this could be recouped by charging commercial leases to the private sector and local governments to operate facilities on the sites. M/L	Some funding required to provide incentives for participation (managed supply grants for funding infrastructure). M/L	Some funding required to members to facilitate infrastructure development. . M/L	Funding will be required for increased compliance and enforcement activities, but the increase in cost above current levels would be relatively minimal. H
Other financial impacts	**Financial impacts on participants in the waste sector**	Private sector and local governments (via debt financing) incur costs of providing infrastructure and services. M	Private sector and local governments (via debt financing) incur costs of providing infrastructure and services. M	Rates for local government and private sector will be determined in part by waste disposal charges set by Waste Corporation. Model is unlikely to minimise the cost impost through optimising role for markets/involvement of private sector. M/L	Rates for local government and private sector will be determined in part by waste disposal charges set by Waste Corporation. Model is unlikely to minimise the cost impost through optimising role for markets/involvement of private sector. M/L	Potential costs associated with meeting additional approval requirements although benefits associated with certainty provided by strategic infrastructure plan. M/H	Potential costs associated with meeting additional approval requirements although benefits associated with certainty provided by strategic infrastructure plan. M/H	Potential costs associated with meeting additional approval requirements although benefits associated with certainty provided by implementation of WRIP and from state government zoning and making available suitable sites for waste management infrastructure. H	Potential costs associated with meeting additional requirements although benefits associated with certainty provided by strategic infrastructure plan and from state government reserving suitable sites for installing waste management infrastructure. M/H	Potential costs associated with meeting additional requirements although benefits associated with certainty provided by strategic infrastructure plan and from state government reserving suitable sites for installing waste management infrastructure. M/H	Potential reduced costs as a result of having to comply with only minimum environmental and public health standards. H
Ability to improve efficiency of waste management	**Economies of scale**	Not efficient. Facility scale is determined by regional local governments and the private sector and unlikely to be optimal. Ability of local governments to opt out of regional local government arrangements compounds inefficiency. L	Some efficiency could be gained through rationalised regional local government arrangements and strengthened policy direction. M	Model has the potential to optimise economies of scale by controlling all waste streams and planning for the region as a whole. H	Model has the potential to optimise economies of scale by controlling all waste streams and planning for the region as a whole. H	Limited ability to improve economies of scale. L	Policy drivers can be put into place to improve economies of scale. H	Policy drivers can be put into place to improve economies of scale. H	Policy drivers can be put into place to improve economies of scale although voluntary nature of VMWMG poses threats. M	Policy drivers can be put into place to improve economies of scale. Mandatory nature of SMWMG should ensure that economies of scale are maintained. H	Reduced coordination of waste streams would result in further reduced economies of scale. L
	Economies of scope	Model has delivered multiple waste processing options however it is not clear if these are operating in a coordinated manner. M	Focused on improving options for MSW. Complementary measures will be required to increase economies from the C&I and C&D waste streams. M	Model has the potential to optimise economies of scope by controlling all waste streams and planning for the region as a whole. H	Model has the potential to optimise economies of scope by controlling all waste streams however due to private sector involvement; this model is likely to deliver fewer waste precincts than model 3A or 4C. M/H	Some opportunities available to set up waste precincts that improve economies of scope. M	Policy drivers can be put into place to improve economies of scope. H	Policy drivers can be put into place to improve economies of scope. State will have the ability to develop waste precincts that improve economy of scope. H	Policy drivers can be put into place to improve economies of scope although voluntary nature of VMWMG poses threats. M	Policy drivers to be put into place to improve economies of scope. H	Model could deliver multiple waste processing options however does not ensure coordination between these. M/L

		GOVERNANCE MODELS									
KEY CRITERIA		Existing arrangements remain	WALGA vision	Waste Corporation ownership model	Waste Corporation operation model	Waste Planning Authority model	Waste Planning and Policy Authority model	Waste Planning, Policy and Procurement Authority model	Voluntary Metropolitan Waste Management Group model	Statutory Metropolitan Waste Group model (Phase 2)	Full Commercial Access model
	Coordination of waste streams	Determined by individual councils with considerable variation in collection types and hence waste stream characteristics vary. L	Potential for coordinated and consistent Improved waste collection due to ability for State Government to set policy position and requirement for local governments to be consistent with this. Complimentary measures will be required to coordinate C&I and C&D waste streams. M	Provides opportunity for Waste Corporation to control and standardise waste streams and optimise processing outcomes. H	Under this model, Waste Corporation is responsible for controlling and standardising waste streams and therefore facilitating the improvement of processing outcomes. H	No mechanisms available under this model to allow the state to coordinate waste stream. L	Waste Planning and Policy Authority is responsible for setting standards which should facilitate coordination of waste streams. M	Waste Planning, Policy and Procurement Authority is responsible for setting standards which should facilitate coordination of waste streams. M	The Waste Authority is responsible for setting standards which should facilitate coordination of waste streams although voluntary nature of VMWMG poses threats. M	The Waste Authority is responsible for setting standards which should facilitate coordination of waste streams. Mandatory nature of SMWMG and requirement to implement consistent state and regional approaches should assist in achieving outcomes. H	Potential for reduced coordination of MSW due to limited role for regional local governments. No guarantee that C&I and C&D waste streams will be coordinated. L
	Incentives for efficiency	Incentives are not strong as waste supply is secured by contracts that are unlikely to shift due to changing price. Landfilling is also a cheap option. L	Consistent policy between state and local governments could provide incentives for improving efficiency. Complimentary measures will be required to improve efficiencies associated with C&I and C&D waste streams. M	Model should deliver improved efficiencies in collection and processing though non-competitive nature might provide a disincentive to implementing ongoing efficiency improvements as technologies improve/change. M/H	Tendering of waste services and aggregating supply has the potential to deliver efficiency improvements. Will depend on Waste Corporations' ability to influence technology choices made by private sector. M/H	Ability for State to preference technologies that provide more efficient outcomes. M	Standardisation and aggregation of supply has the potential to deliver efficiency improvements. Through the WRIP, the state government also has the ability to preference technologies that provide more efficient outcomes. H	Standardisation and aggregation of supply has the potential to deliver efficiency improvements. Through the WRIP, the state government also has the ability to preference technologies that provide more efficient outcomes. H	Standardisation and aggregation of supply has the potential to deliver efficiency improvements. Through the WRIP, the state government also has the ability to preference technologies that provide more efficient outcomes. Voluntary nature of VMWMG poses threats. M	Standardisation and aggregation of supply has the potential to deliver efficiency improvements. Through the WRIP, the state government also has the ability to preference technologies that provide more efficient outcomes. H	Market based approaches could theoretically drive improved efficiency but this is not guaranteed. M/L
Improved planning	**Ability to facilitate better planning for waste infrastructure**	Some options are available through cooperative arrangements with WAPC and DoP however a coordinated and consistent approach across the region is lacking. L/M	Under this model, the Waste Authority could be empowered to undertake strategic infrastructure planning for the region. M	Model gives the State Government ability to plan for future infrastructure needs and through the control it exerts over the waste stream and its ownership of facilities, it can translate planning into the appropriate on-ground measures. H	Model gives the State Government ability to plan for future infrastructure needs. On ground outcome will depend on Waste Corporation's ability to influence technology and siting choices made by private sector. M	The implementation of the WRIP will enables enhanced State coordination of waste facility planning and ensures strategic siting of waste infrastructure in the region. H	The implementation of the WRIP will enables enhanced State coordination of waste facility planning and ensures strategic siting of waste infrastructure in the region. H	The implementation of the WRIP will enables enhanced State coordination of waste facility planning and ensures strategic siting of waste infrastructure in the region. H	The implementation of the WRIP will enables enhanced State coordination of waste facility planning and ensures strategic siting of waste infrastructure in the region. Voluntary nature of VMWMG poses threats. M	The implementation of the WRIP and requirement for consistency with regional infrastructure planning will enables enhanced State coordination of waste facility planning and ensures strategic siting of waste infrastructure in the region. H	The state government would provide information to support better planning for waste infrastructure. However, decisions would continue to be made by multiple organisations with disparate objectives. L
Ease of implementation	**ACCC issues**	None. H	Potential ACCC issues if regional subsidiary model was adopted. M	Creation of a monopolistic entity such as Waste Corporation will likely attract ACCC oversight. L	Likely to attract ACCC oversight as model requires Waste Corporation to take control of waste streams. L	None likely. H	None likely. H	None likely. H	None likely. H	None likely. H	None likely. H

KEY CRITERIA		GOVERNANCE MODELS									
		Existing arrangements remain	**WALGA vision**	**Waste Corporation ownership model**	**Waste Corporation operation model**	**Waste Planning Authority model**	**Waste Planning and Policy Authority model**	**Waste Planning, Policy and Procurement Authority model**	**Voluntary Metropolitan Waste Management Group model**	**Statutory Metropolitan Waste Group model (Phase 2)**	**Full Commercial Access model**
	Other implementation issues	No change required so no additional implementation issues. H	Balancing competing needs of individual councils could be challenging. Potential resistance to regional subsidiary model from some stakeholders. Legislative change potentially required to mandate regional local government membership. M	Significant implementation issues associated with transitioning to this model including ACCC issues, time and cost required to establish Waste Corporation, negotiations required to secure existing sites and contracts. Significant investment required from Government. Model is likely to be resisted strongly by stakeholders particularly those with an interest or financial stake in the market. Capability and expertise required to establish and run Waste Corporation is also a significant issue. L	Number of potential implementation issues including time and costs associated with negotiating existing waste collection contracts, costs associated with implement improved collection systems, potential ACCC issues. Significant investment required by Government and likely to attract some resistance from stakeholders. M/L	Resources required to establish Waste Planning Agency and determine approval process for new facilities. Some stakeholder resistance is expected around new approval process particularly from stakeholders who are likely to be disadvantaged by approval process. Does not resolve issues around voluntary membership of regional local governments. M	Resources required to establish Waste Planning and Policy Agency and to determine approval process for new facilities and develop related policy and measures. Some stakeholder resistance is expected around new approval process particularly from stakeholders who are likely to be disadvantaged by approval process. Does not resolve issues around voluntary membership of regional local governments. M	Resources required to establish Waste Planning, Policy and Procurement Agency, determine and implement mechanisms for securing sites for waste infrastructure, approval process for new facilities and develop related policy and measures. Some stakeholder resistance is expected around new approval process particularly from stakeholders who are likely to be disadvantaged by approval process. Does not resolve issues around voluntary membership of regional local governments. M	Resources and time required to establish VMWMG. Balancing competing needs of individual councils could be challenging and cooperative procurement processes could be lengthy. M	Resources and time required to establish statutory body. Likely resistance from regional local governments who will cease to exist under this model. Balancing competing needs of individual councils could be challenging and cooperative procurement processes could be lengthy. M/L	Model is likely to be resisted by local government sector. It poses significant risks to the state government as it does not ensure good waste management outcomes and will require the state government to develop and implement contingencies in the event that the private sector is not able to provide waste collection and processing services at any given time. L

Key

Colour	Code	Performance against criteria
	H	Performs extremely well against criteria
	M/H	Performs very well against criteria
	M	Performs well against criteria
	M/L	Performs fairly again criteria
	L	Performs poorly against criteria

Appendix 7A - Assessment criteria for industrial locations for suitability for hosting waste facilities

Table 64: Stage 1 assessment criteria for potential waste facility locations

Stage 1 Assessment Criteria		
Planning Criteria	1	**Zoning and land use (current and future):** • What is the area zoned under the Metropolitan Region Scheme or Peel Region Scheme? • Is the area identified as a potential industrial area by the WAPC in the *Economic and Employment Lands Strategy*? • How is the area zoned under the relevant Local Planning Scheme and are waste facilities a permitted land use? • What is the current (and expected future) use of the area, and surrounding areas? Is this likely to adversely affect the approvals processes, construction and/or operation of waste facilities in the area? • Are there any waste facilities currently operating in the area?
	2	**Land ownership:** • What is the current (and expected future) ownership of the site, and surrounding areas? Is this likely to adversely affect the approvals processes, construction and/or operation of waste facilities in the area?
	3	**Buffers and proximity to sensitive land uses:** • How far is the area from sensitive land uses? • Does the area have the potential for on-site buffers (200m and 500m to sensitive land uses)? • Are off-site buffers available?
Technical Criteria	4	**Land availability:** • How much vacant development-ready land is available in the area? • How much/what type of other land is available? (e.g. serviced, developed land currently occupied by other land uses; vacant land not currently development-ready)
	5	**Access to transport routes:** • Does the area have appropriate access to transport routes? (especially roads, but also including rail and ports)
	6	**Access to services and utilities:** • Does the area have appropriate access to services and utilities? (e.g. waste, electricity, gas and sewage services) • If these services/utilities are not currently available does the area have the potential for them to be made available?
	7	**Access to electricity generation connection points:** • Does the area enable waste-to-energy facilities to access to a generation connection point of the South West Interconnected System?
		Advantages to the use of this area for waste facilities
		Disadvantages to the use of this area for waste facilities

Appendix 7B - Assessment of industrial locations for suitability for hosting waste facilities outcomes map

Map 1 – areas assessed

Map 2 – outcomes of assessment

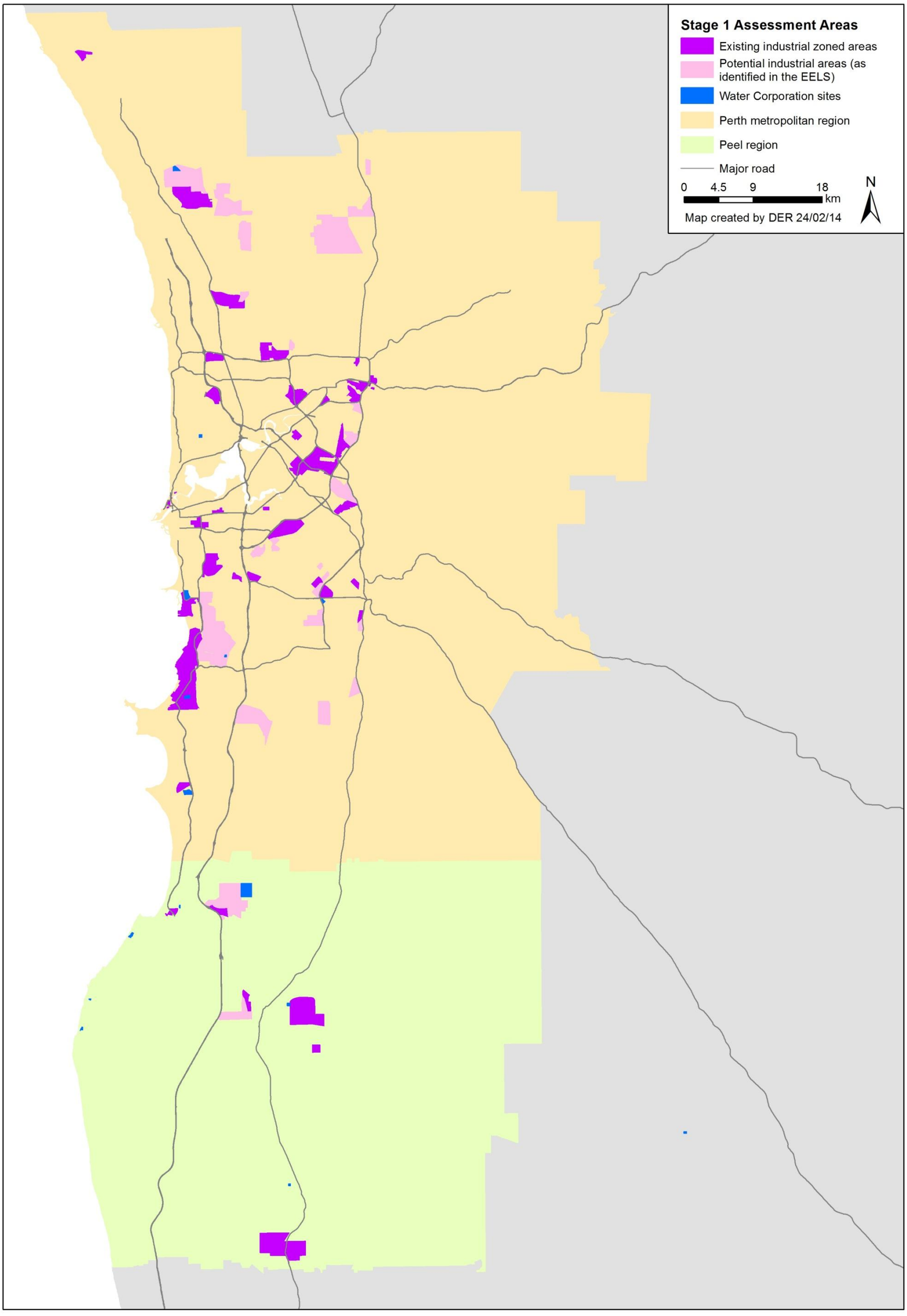

Figure 38: Areas assessed as part of the Stage One preliminary assessment

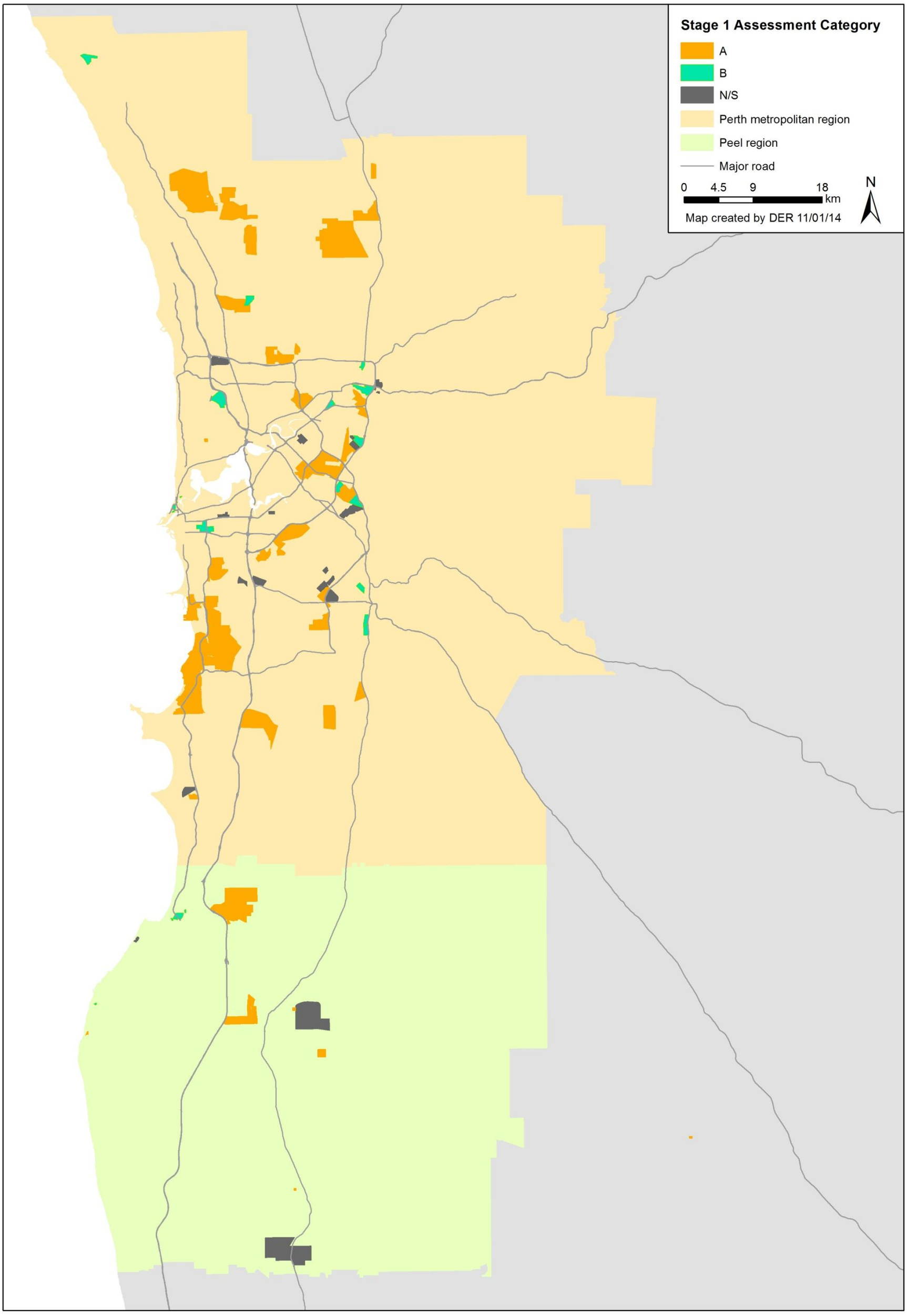

Figure 39: Results of Stage One assessment

Appendix 8A – Modelling results for examples of integrated waste management systems

Example 1 – MSW only, 60% mixed MSW MBT to CLO

Table 65: Example 1 modelling outputs

	2020	2050
Overall diversion rate	**MSW**	**MSW**
Total generated (tonnes)	1,439,345	2,315,605
Tonnage to: Putrescible landfill	5 23,260	841,816
Tonnage to: Inert landfill	-	-
Therefore total diverted (tonnes)	916,085	1,473,789
Rate of diversion from landfil (%)	64%	64%
		tonnes MSW
Infrastructure requirements (inputs to facilities)	**2020**	**2050**
Materials Recovery Facility (MRF)	318,136	511,814
Enclosed composting	323,685	520,741
Open windrow	170,116	273,681
Mechanical Biological Treatment (MBT)	365,174	587,489
W2E pre-treatment (mechanical)	-	-
Waste to energy	-	-
Recyclers	246,843	397,118
Compost markets	577,948	929,798
Putrescible landfill	523,260	841,816
Inert landfill	-	-
C&D recycler (source-segregated)	-	-
C&D recycler (mixed)	-	-
Products - aggregates	-	-

Example 2 – MSW only

Table 66: Example 2 modelling outputs

	2020	2050
Overall diversion rate	**MSW**	**MSW**
Total generated (tonnes)	1,439,345	2,315,605
Tonnage to: Putrescible landfill	520,158	836,825
Tonnage to: Inert landfill	-	-
Therefore total diverted (tonnes)	919,187	1,478,780
Rate of diversion from landfil (%)	64%	64%
Infrastructure requirements (inputs to facilities)	**2020**	**2050**
Materials Recovery Facility (MRF)	222,695	358,270

Enclosed composting	226,579	364,519
Open windrow	119,081	191,577
Mechanical Biological Treatment (MBT)	426,037	685,404
W2E pre-treatment (mechanical)	-	-
Waste to energy	241,344	388,272
Recyclers	173,901	279,771
Compost markets	455,355	732,571
Putrescible landfill	520,158	836,825
Inert landfill	-	-
C&D recycler (source-segregated)	-	-
C&D recycler (mixed)	-	-
Products - C&D recycling	-	-

Example 3 – MSW only

Table 67: Example 3 modelling outputs

MSW generation - 2020	**Region A**	**Region B**	**Region C**	**total**
Total generated (tonnes)	529469	384200	525676	1439345
Tonnage to: Putrescible landfill	142820	93180	89910	325910
Tonnage to: Inert landfill	0	0	0	0
Therefore total diverted (tonnes)	386649	291020	435765	1113435
Rate of diversion from landfill (%)	73%	76%	83%	77%
recycling rate	73%	76%	83%	
Capacity Required - MSW 2020 (tpa)	**Region A**	**Region B**	**Region C**	
Materials Recovery Facility (MRF)	117,028	50,992	116,189	
Enclosed composting	119,069	86,400	118,216	
Open windrow	62,578	36,327	62,129	
Mechanical Biological Treatment (MBT)	223,885	205,467	-	
W2E pre-treatment (mechanical)	-	5,014	229,141	
Waste to energy	-	105,974	227,565	
Recyclers	91,386	42,522	91,488	
Compost markets	239,292	116,591	171,328	
Putrescible landfill	142,820	93,180	89,910	325,910
Inert landfill	-	-	-	
C&D recycler (source-segregated)	-	-	-	
C&D recycler (mixed)	-	-	-	
Products - aggregates	-	-	-	

MSW generation - 2050	**Region A**	**Region B**	**Region C**	**total**
Total generated (tonnes)	829524	597496	888585	2315605
Tonnage to: Putrescible landfill	223757	144911	151981	520649
Tonnage to: Inert landfill	0	0	0	0
Therefore total diverted (tonnes)	605767	452585	736604	1794956
Rate of diversion from landfill (%)	73%	76%	83%	78%
recycling rate	73%	76%	83%	
Capacity Required - MSW 2050 (tpa)	**Region A**	**Region B**	**Region C**	
Materials Recovery Facility (MRF)	183,348	79,301	196,403	
Enclosed composting	186,546	134,367	199,828	
Open windrow	98,041	56,494	105,022	
Mechanical Biological Treatment (MBT)	350,762	319,536	-	
W2E pre-treatment (mechanical)	-	7,798	387,333	
Waste to energy	-	164,807	384,669	
Recyclers	143,176	66,129	154,648	
Compost markets	374,900	181,318	289,607	
Putrescible landfill	223,757	144,911	151,981	520,649
Inert landfill	-	-	-	
C&D recycler (source-segregated)	-	-	-	
C&D recycler (mixed)	-	-	-	
Products - aggregates	-	-	-	

Example 4 – All waste streams

Table 68: Example 4 modelling outputs

	2020				2050			
Overall diversion rate	**MSW**	**C&I**	**C&D**		**MSW**	**C&I**	**C&D**	
Total generated (tonnes)	1,439,345	1,579,267	2,959,814		2,315,605	2,540,710	4,761,722	
Tonnage to: Putrescible landfill	483,308	494,106	249,435		777,541	794,914	401,289	
Tonnage to: Inert landfill	-	-	522,661		-	-	840,852	
Therefore total diverted (tonnes)	956,037	1,085,161	2,187,718		1,538,064	1,745,796	3,519,581	
Rate of diversion from landfil (%)	66%	69%	74%		66%	69%	74%	
	2020				2050			
Infrastructure requirements (inputs to facilities)	**MSW**	**C&I**	**C&D**	**TOTAL**	**MSW**	**C&I**	**C&D**	**TOTAL**
Materials Recovery Facility (MRF)	162,378	336,325	-	498,702	261,232	541,076	-	802,308
Enclosed composting	275,132	32,931	-	308,063	442,630	52,980	-	495,610
Open windrow	115,679	-	-	115,679	186,103	-	-	186,103
Mechanical Biological Treatment (MBT)	654,288	345,545	-	999,834	1,052,613	555,910	-	1,608,523
W2E pre-treatment (mechanical)	15,966	317,580	686,251	1,019,797	25,687	510,920	1,104,034	1,640,640
Waste to energy	375,553	513,930	666,841	1,556,324	604,186	826,805	1,072,808	2,503,799
Recyclers	135,774	576,903	19,409	732,087	218,433	928,116	31,226	1,177,774
Compost markets	371,270	31,285	-	402,555	597,296	50,331	-	647,627
Putrescible landfill	483,308	494,106	249,435	1,226,850	777,541	794,914	401,289	1,973,744
Inert landfill	-	-	522,661	522,661	-	-	840,852	840,852
C&D recycler (source-segregated)	-	-	1,258,570	1,258,570	-	-	2,024,776	2,024,776
C&D recycler (mixed)	-	-	571,021	571,021	-	-	918,654	918,654
Products - aggregates	-	-	1,653,746	1,653,746	-	-	2,660,531	2,660,531

Example 5 – All waste streams

Table 69: Example 5 modelling outputs

	2020				2050			
Overall diversion rate	**MSW**	**C&I**	**C&D**	**TOTAL**	**MSW**	**C&I**	**C&D**	**TOTAL**
Total generated (tonnes)	1,439,345	1,579,267	2,959,814	5,978,426	2,315,605	2,540,710	4,761,722	9,618,037
Tonnage to: Putrescible landfill	520,543	449,185	249,435	1,219,164	837,445	722,645	401,289	1,961,380
Tonnage to: Inert landfill	-	-	522,661	522,661	-	-	840,852	840,852
Therefore total diverted (tonnes)	918,802	1,130,082	2,187,718	4,236,601	1,478,160	1,818,065	3,519,581	6,815,805
Rate of diversion from landfil (%)	64%	72%	74%		64%	72%	74%	
	2020				2050			
Infrastructure requirements (inputs to facilities)	**MSW**	**C&I**	**C&D**	**TOTAL**	**MSW**	**C&I**	**C&D**	**TOTAL**
Materials Recovery Facility (MRF)	143,274	336,325	-	479,599	230,498	541,076	-	771,575
Enclosed composting	242,764	32,931	-	275,695	390,556	52,980	-	443,535
Open windrow	102,070	-	-	102,070	164,209	-	-	164,209
Mechanical Biological Treatment (MBT)	-	-	-	-	-	-	-	-
W2E pre-treatment (mechanical)	591,401	663,126	686,251	1,940,778	951,441	1,066,830	1,104,034	3,122,305
Waste to energy	615,302	686,702	666,841	1,968,845	989,892	1,104,760	1,072,808	3,167,460
Recyclers	123,581	576,903	19,409	719,893	198,816	928,116	31,226	1,158,158
Compost markets	327,592	31,285	-	358,876	527,026	50,331	-	577,357
Putrescible landfill	520,543	449,185	249,435	1,219,164	837,445	722,645	401,289	1,961,380
Inert landfill	-	-	522,661	522,661	-	-	840,852	840,852
C&D recycler (source-segregated)	-	-	1,258,570	1,258,570	-	-	2,024,776	2,024,776
C&D recycler (mixed)	-	-	571,021	571,021	-	-	918,654	918,654
Products - aggregates	-	-	1,653,746	1,653,746	-	-	2,660,531	2,660,531

Example 6 – All waste streams

Table 70: Example 6 modelling outputs

	2020				2050			
Overall diversion rate	**MSW**	**C&I**	**C&D**	**TOTAL**	**MSW**	**C&I**	**C&D**	**TOTAL**
Total generated (tonnes)	1,439,345	1,579,267	2,959,814	5,978,426	2,315,605	2,540,710	4,761,722	9,618,037
Tonnage to: Putrescible landfill	506,384	657,008	717,060	1,880,452	814,666	1,056,988	1,153,599	3,025,253
Tonnage to: Inert landfill	-	-	65,281	65,281	-	-	105,024	105,024
Therefore total diverted (tonnes)	932,961	922,259	2,177,473	4,032,693	1,500,939	1,483,722	3,503,099	6,487,760
Rate of diversion from landfil (%)	65%	58%	74%		65%	58%	74%	
	2020				2050			
Infrastructure requirements (inputs to facilities)	**MSW**	**C&I**	**C&D**	**TOTAL**	**MSW**	**C&I**	**C&D**	**TOTAL**
Materials Recovery Facility (MRF)	318,136	642,895	-	961,031	511,814	1,034,283	-	1,546,098
Enclosed composting	323,685	41,164	-	364,849	520,741	66,224	-	586,966
Open windrow	170,116	-	-	170,116	273,681	-	-	273,681
Mechanical Biological Treatment (MBT)	395,606	165,937	-	561,543	636,447	266,958	-	903,405
W2E pre-treatment (mechanical)	-	-	-	-	-	-	-	-
Waste to energy	-	-	-	-	-	-	-	-
Recyclers	247,041	791,888	-	1,038,929	397,438	1,273,982	-	1,671,419
Compost markets	587,018	88,887	-	675,905	944,390	143,001	-	1,087,390
Putrescible landfill	506,384	657,008	717,060	1,880,452	814,666	1,056,988	1,153,599	3,025,253
Inert landfill	-	-	65,281	65,281	-	-	105,024	105,024
C&D recycler (source-segregated)	-	-	2,072,815	2,072,815	-	-	3,334,725	3,334,725
C&D recycler (mixed)	-	-	274,096	274,096	-	-	440,963	440,963
Products - aggregates	-	-	2,177,473	2,177,473	-	-	3,503,099	3,503,099

Table 71: Estimated 2020 land requirements

2020					Estimated 2020 Land Requirements**											
Count	Type	Location	Description	Existing Site (ha)	Example 1		Example 2		Example 3		Example 4		Example 5		Example 6	
					Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
1	New waste facilities to be co-located at existing waste facility sites (or waste water treatment plant sites). No additional land required.	Balcatta Recycling Centre	Balcatta Recycling Centre site at 238 Balcatta Road, Balcatta (owned by the City of Stirling).	10.7							1	3	1	3	1	3
2		Bayswater Transfer Station and MRF	Transpacific Transfer Station and MRF site at 271 Collier Road, Bayswater (owned by the City of Bayswater).	1.9	1	3	1	3	1	3	1	3	1	3	1	3
3		Canning (Ranford Rd/SMRC)	SMRC RRRC site at 350 Bannister Road, Canning Vale and Ranford Road Transfer Station site at Lot 500 Ranford Road, Canning Vale (owned by the City of Canning).	97.5	5	23	5	23	3	13	7	35	5	25	7	35
4		EMRC Red Hill	Red Hill Waste Management Centre site at 1094 Toodyay Road, Red Hill (owned by the EMRC).	351.5					3	10	3	10	3	10		
5		JFR (Jim) McGeough RRF	JFR (Jim) McGeough RRF site at corner Brockway Road and Lemnos Street, Shenton Park (owned by the WMRC).	1.5	2	10	2	10	2	10	2	10	2	10	2	10
6		Woodman Point	New waste facility/precinct to be developed at the Woodman Point waste water treatment plant site (owned by the Water Corporation).	78.5					2	10	4	20	2	10	4	20
7	Existing waste facility sites to form the 'hub' of a new waste precincts (additional adjacent land likely to be required).	EMRC Hazelmere	Includes EMRC Recycling Centre site at Lakes Road, Hazelmere (owned by the EMRC) and additional adjacent land if required.	9.5	1	3					3	15	3	15	7	35
8		MRC Neerabup	Includes MRC Neerabup RRF (Biovision 2020) site at Lot 505 Pederick Road, Neerabup (owned by the MRC) and additional adjacent land if required.	10.4	5	23	5	23	5	23	10	45	8	35	7	35
9	New waste precincts to be developed in industrial or potential industrial areas.	Bayswater II	New waste facility/precinct to be developed in the Bayswater/Bassendean industrial area.	0	2	10	2	10	4	20	6	32	5	22	3	15
10		Kwinana/Latitude 32	New waste facility/precinct to be developed in the Kwinana/Latitude 32 industrial/potential industrial area.	0	5	23	6	23	3	10	10	45	8	35	3	15
11		MKSEA	New waste facility/precinct to be developed in the Maddington Kenwick Strategic Employment Area potential industrial area or Maddington industrial area.	0					4	20			2	12	3	15
12		Nambeelup	New waste facility/precinct to be developed in the Nambeelup industrial/potential industrial area.	0							7	32	5	22	2	12
13		Pinjar South	New waste facility/precinct to be developed in the Pinjar South potential industrial area.	0					4	20			2	12	7	35
14		Welshpool/Kewdale	New waste facility/precinct to be developed in the Welshpool/Kewdale industrial area.	0	2	10					3	15	3	15	3	15
			TOTAL (ha)	**561.5**	**23**	**105**	**21**	**92**	**31**	**139**	**57**	**265**	**50**	**229**	**50**	**248**

** estimates based on stand alone facilities using default sizes. Land requirements could be reduced by using efficient co-location/precinct design and by chosing technologies with smaller footprints.

Table 72: Estimated 2050 land requirements

2050					Estimated 2050 Land Requirements**											
Count	Type	Location	Description	Existing Site (ha)	Example 1		Example 2		Example 3		Example 4		Example 5		Example 6	
					Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
1	New waste facilities to be co-located at existing waste facility sites (or waste water treatment plant sites). No additional land required.	Balcatta Recycling Centre	Balcatta Recycling Centre site at 238 Balcatta Road, Balcatta (owned by the City of Stirling).	10.7							1	3	1	6	1	6
2		Bayswater Transfer Station and MRF	Transpacific Transfer Station and MRF site at 271 Collier Road, Bayswater (owned by the City of Bayswater).	1.9	1	6	1	6	1	6	1	6	1	6	1	6
3		Canning (Ranford Rd/SMRC)	SMRC RRRC site at 350 Bannister Road, Canning Vale and Ranford Road Transfer Station site at Lot 500 Ranford Road, Canning Vale (owned by the City of Canning).	97.5	5	36	5	26	3	23	7	70	5	38	7	70
4		EMRC Red Hill	Red Hill Waste Management Centre site at 1094 Toodyay Road, Red Hill (owned by the EMRC).	351.5	2	10			3	20	7	32	5	32	2	12
5		JFR (Jim) McGeough RRF	JFR (Jim) McGeough RRF site at corner Brockway Road and Lemnos Street, Shenton Park (owned by the WMRC).	1.5	2	10	2	10	2	10	2	10	2	10	2	10
6		Woodman Point	New waste facility/precinct to be developed at the Woodman Point waste water treatment plant site (owned by the Water Corporation).	78.5	2	10			2	10	4	40	2	20	6	52
7	Existing waste facility sites to form the 'hub' of a new waste precinct (additional adjacent land likely to be required).	EMRC Hazelmere	Includes EMRC Recycling Centre site at Lakes Road, Hazelmere (owned by the EMRC) and additional adjacent land if required.	9.5	1	6			4	20	3	18	3	30	7	70
8		MRC Neerabup	Includes MRC Neerabup RRF (Biovision 2020) site at Lot 505 Pederick Road, Neerabup (owned by the MRC) and additional adjacent land if required.	10.4	5	46	5	26	5	43	10	80	8	70	7	70
9	New waste precincts to be developed in industrial or potential industrial areas.	Bayswater II	New waste facility/precinct to be developed in the Bayswater/Bassendean industrial area.	0	2	10	2	10	4	20	6	52	5	44	3	30
10		Kwinana/Latitude 32	New waste facility/precinct to be developed in the Kwinana/Latitude 32 industrial/potential industrial area.	0	5	46	6	26	6	40	10	68	8	48	3	30
11		MKSEA	New waste facility/precinct to be developed in the Maddington Kenwick Strategic Employment Area potential industrial area or Maddington industrial area.	0					4	20	2	12	2	24	3	30
12		Nambeelup	New waste facility/precinct to be developed in the Nambeelup industrial/potential industrial area.	0							7	42	5	44	5	37
13		Pinjar South	New waste facility/precinct to be developed in the Pinjar South potential industrial area.	0					5	40	4	22	2	12	7	70
14		Welshpool/Kewdale	New waste facility/precinct to be developed in the Welshpool/Kewdale industrial area.	0	4	20					3	18	5	28	3	30
			TOTAL (ha)	**561.5**	**29**	**200**	**21**	**104**	**39**	**252**	**67**	**473**	**54**	**412**	**57**	**523**

** estimates based on stand alone facilities using default sizes. Land requirements could be reduced by using efficient co-location/precinct design and by chosing technologies with smaller footprints.

Appendix 8B – Maps of potential for locations of waste facilities in each example waste system

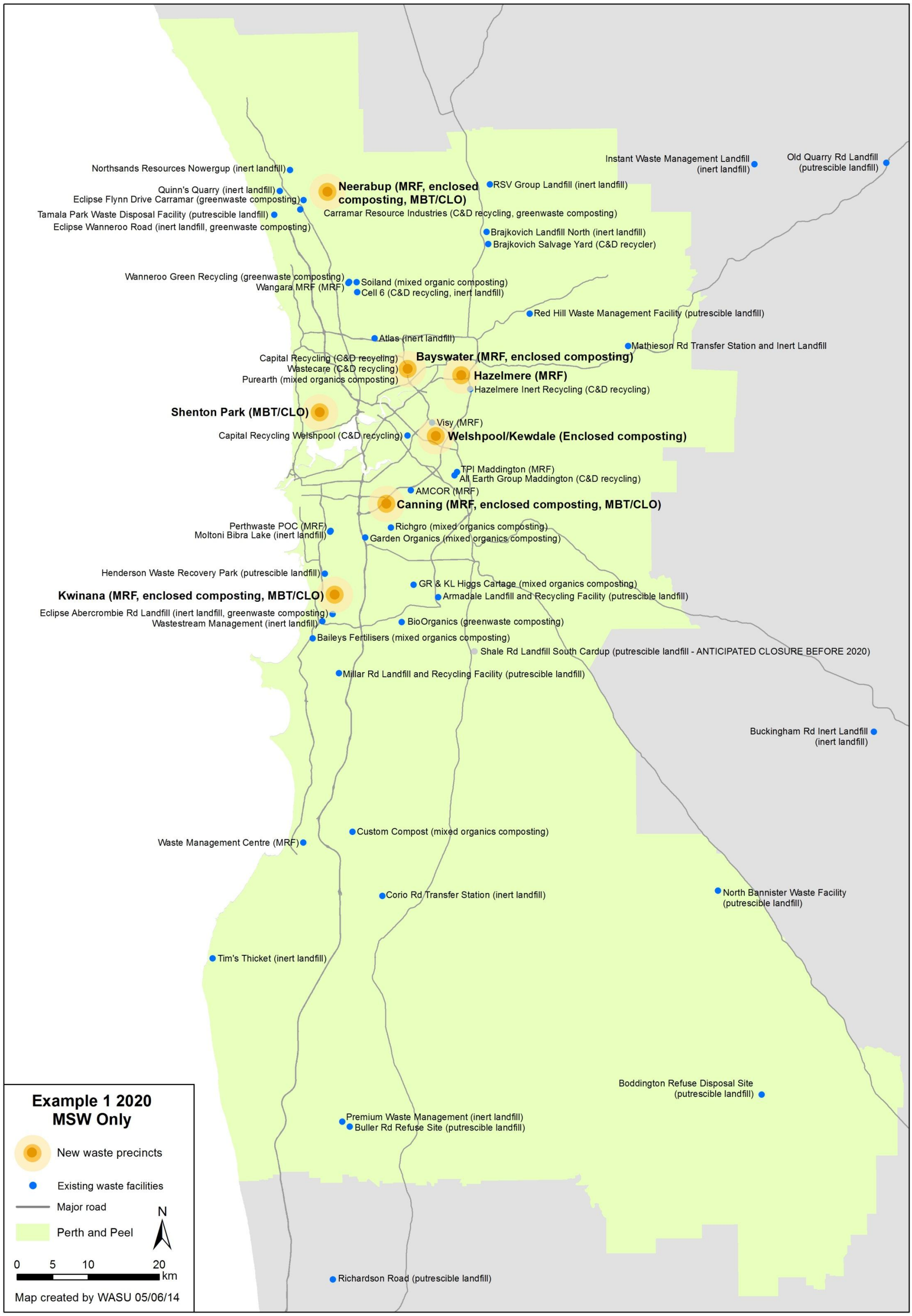

Figure 40: Location of proposed waste processing infrastructure in example 1 - 2020

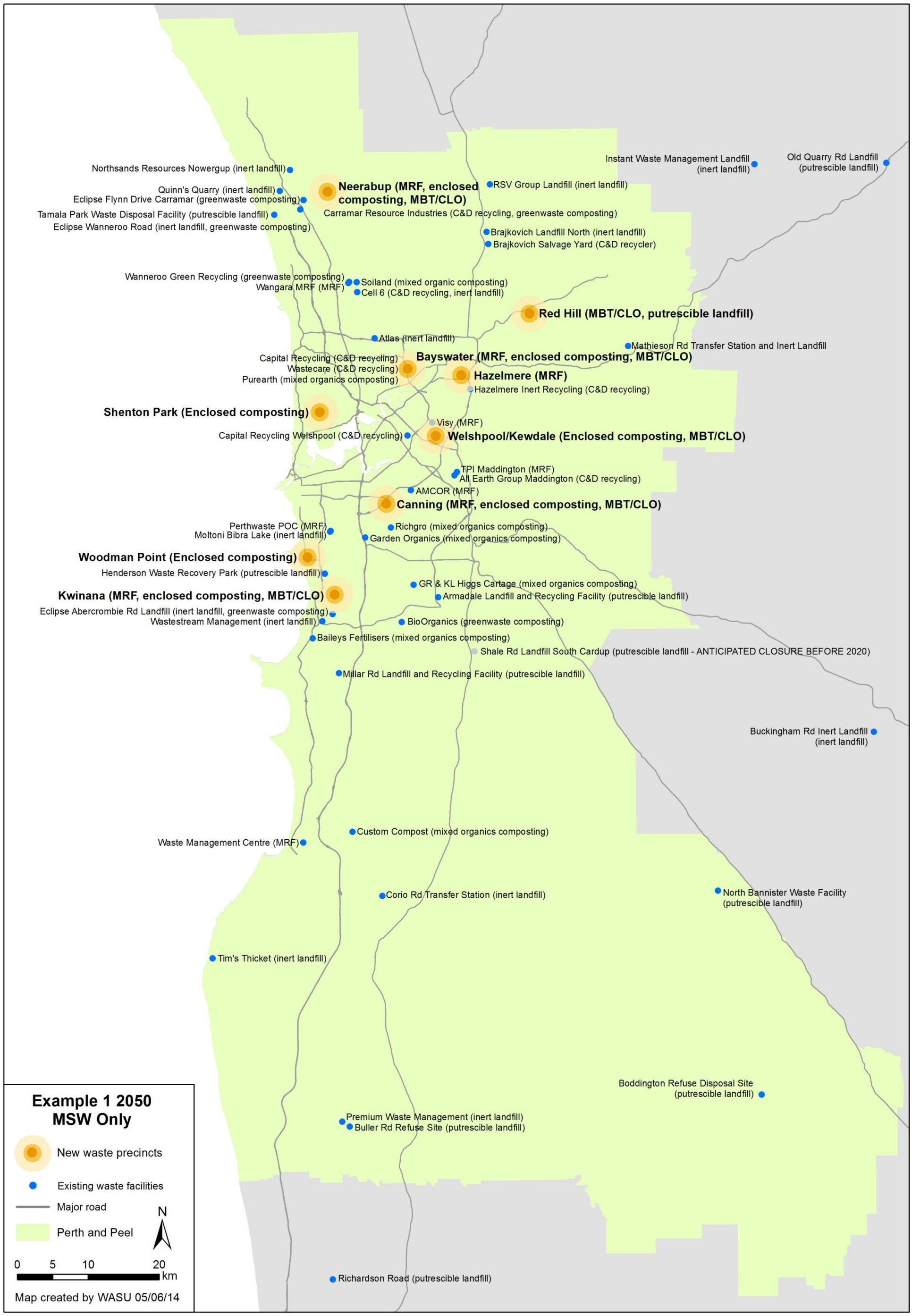

Figure 41: Location of proposed waste processing infrastructure in example 1 - 2050

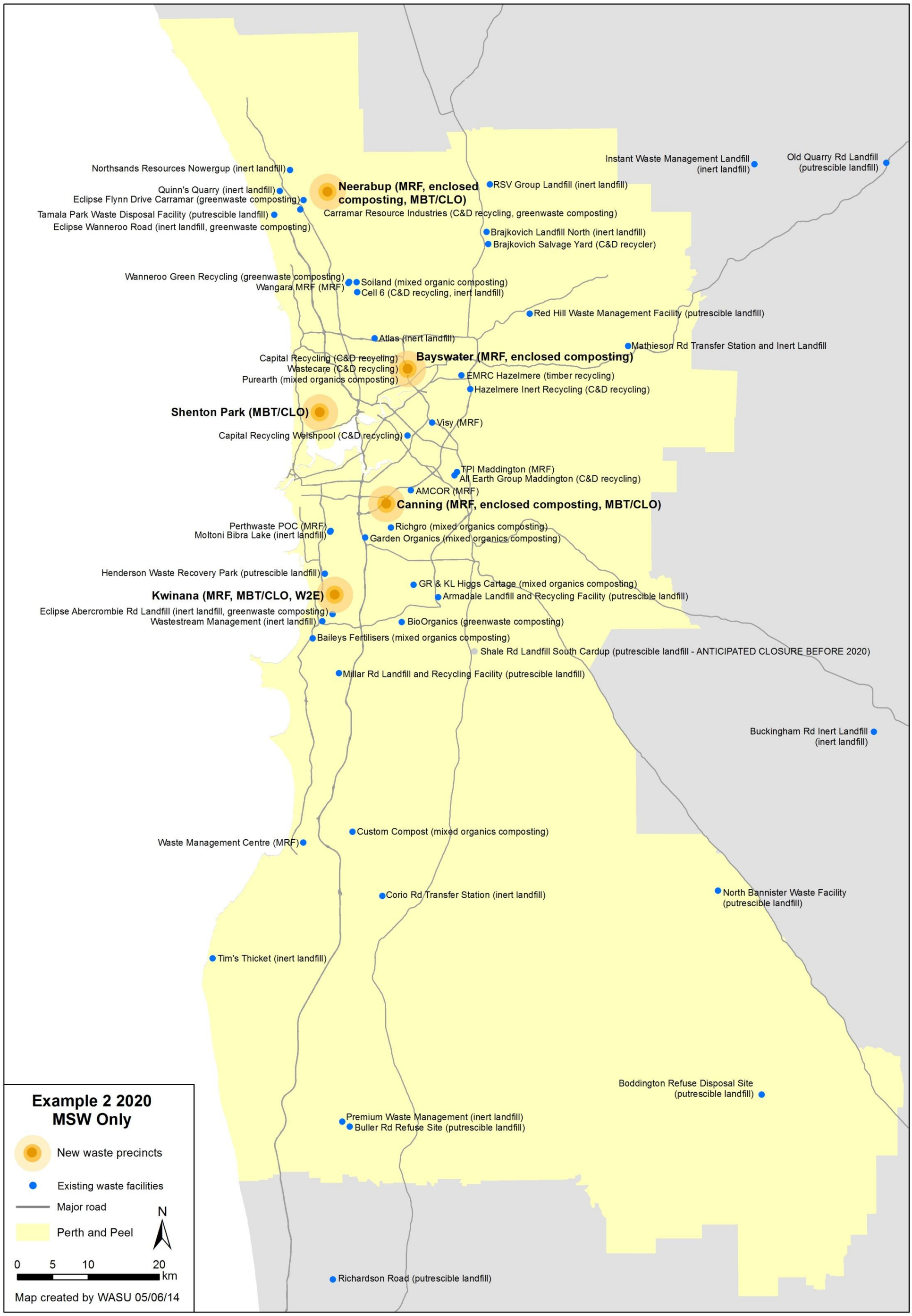

Figure 42: Location of proposed waste processing infrastructure in example 2 – 2020

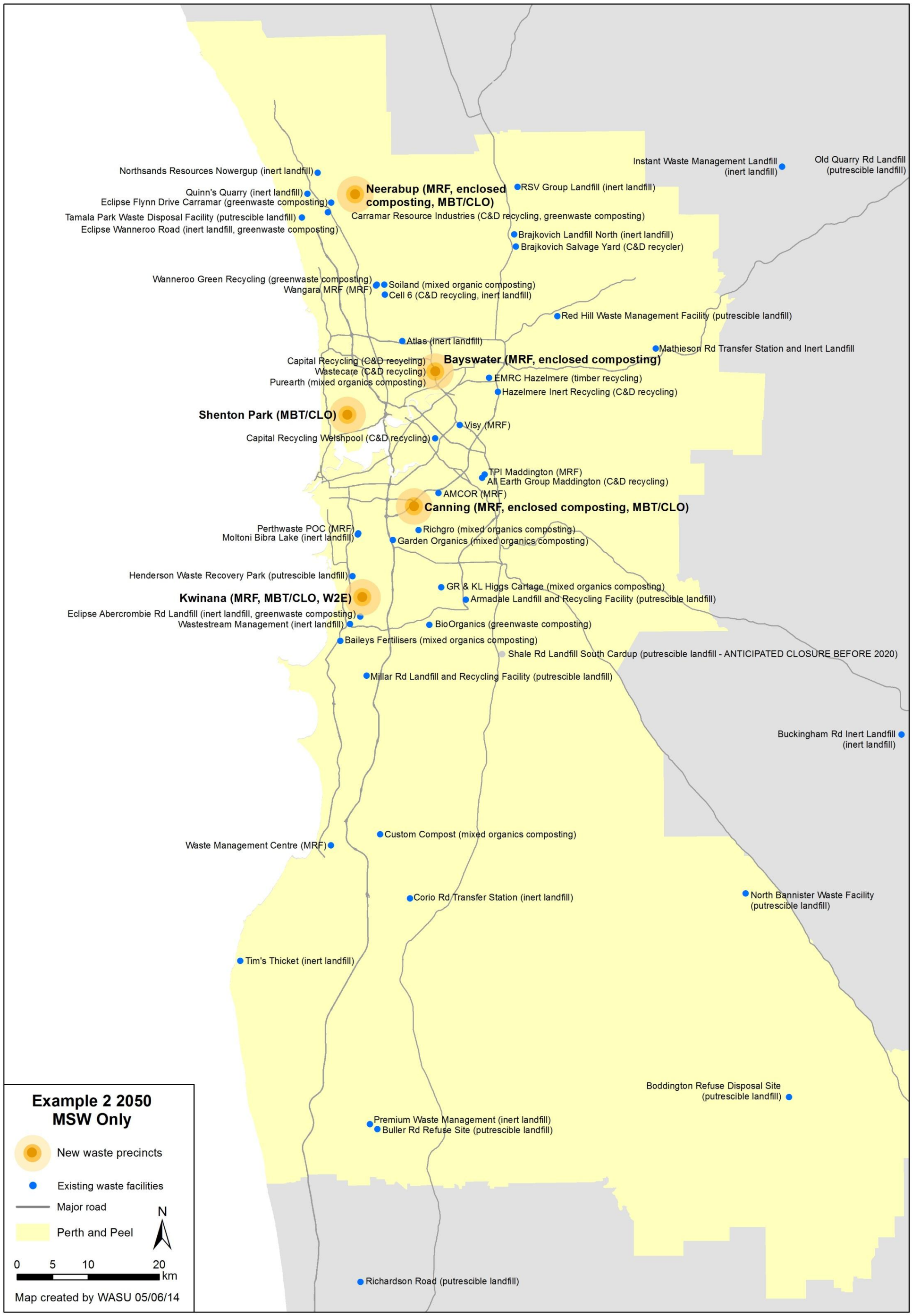

Figure 43: Location of proposed waste processing infrastructure in example 2 - 2050

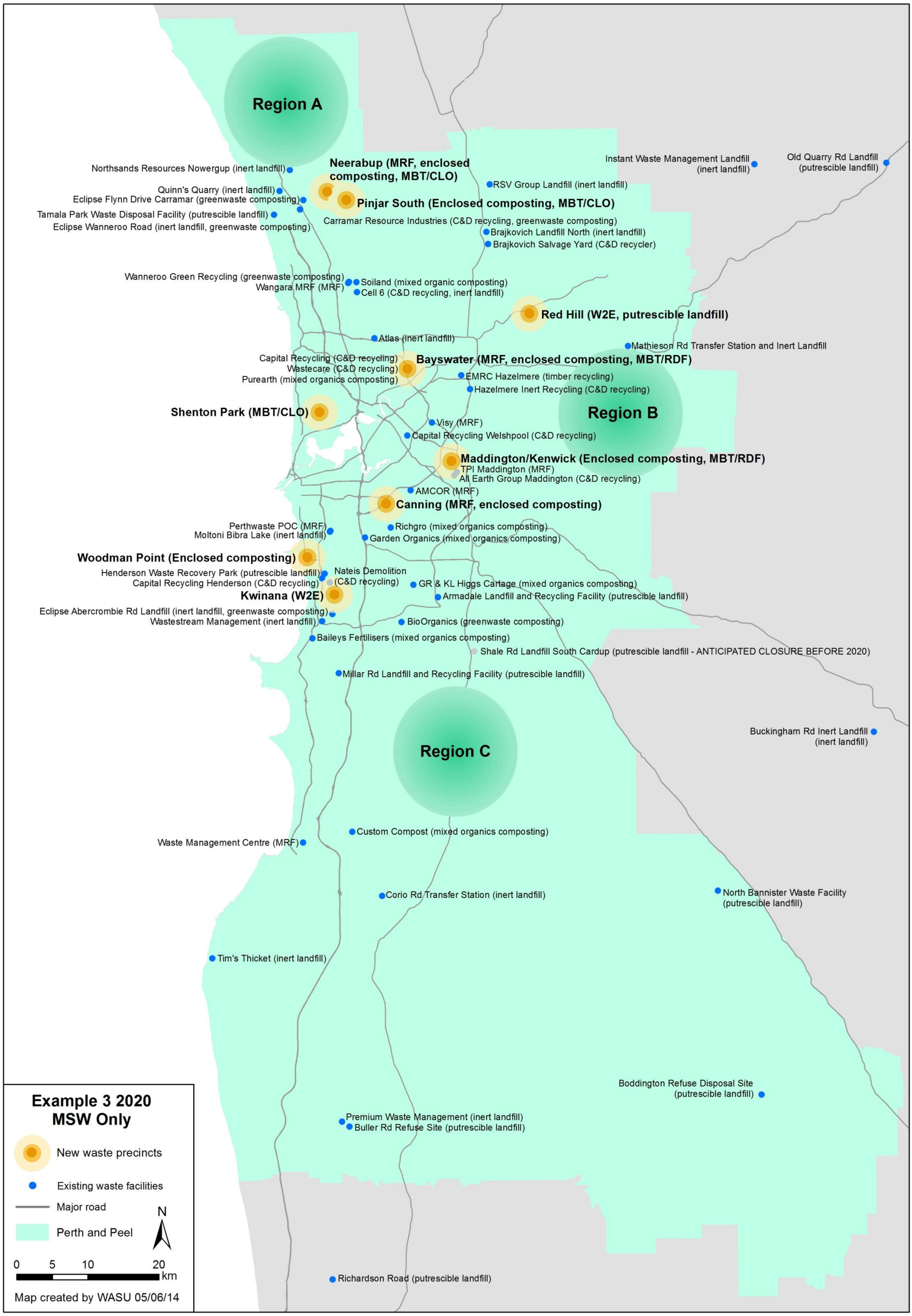

Figure 44: Location of proposed waste processing infrastructure in example 3 - 2020

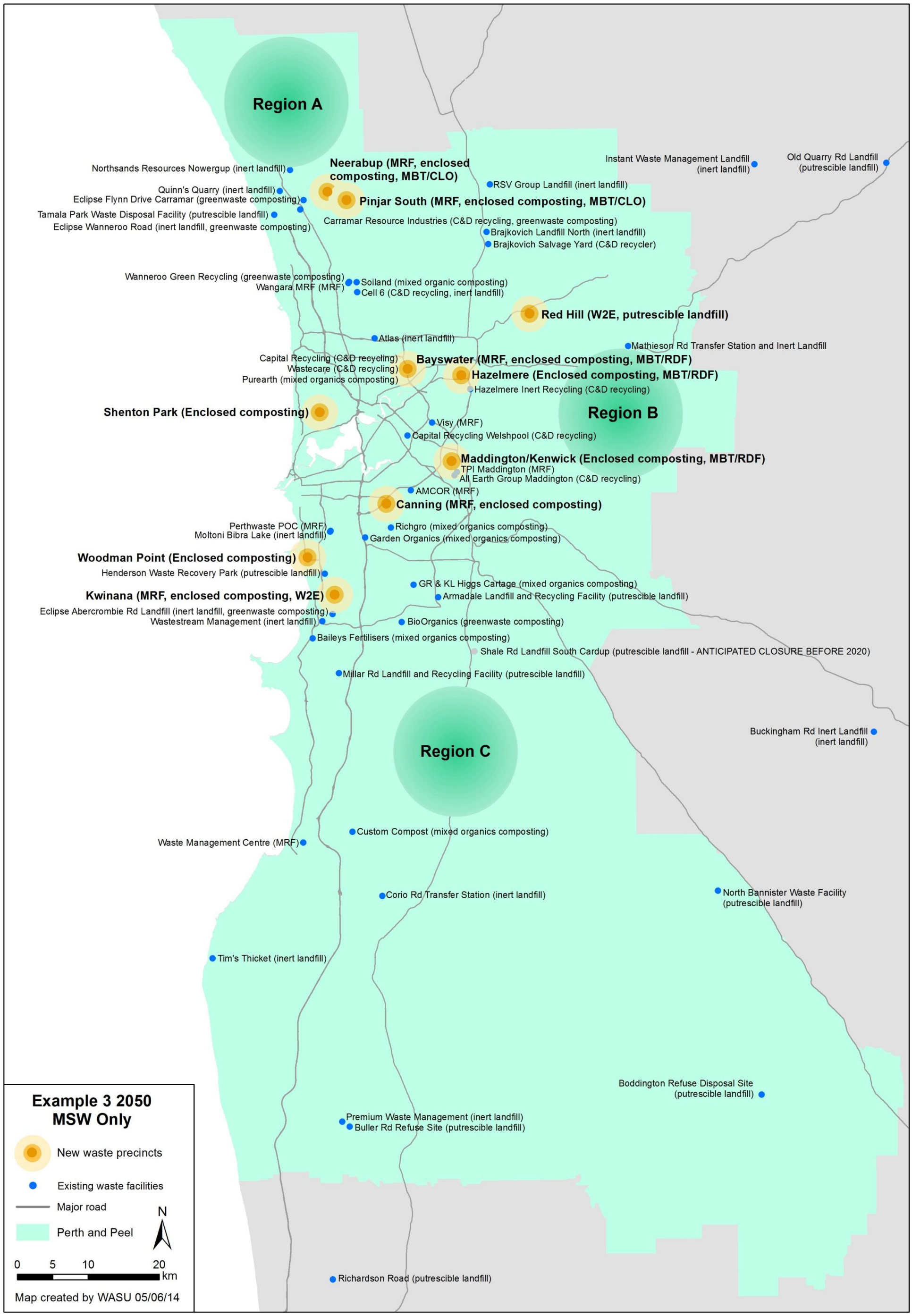

Figure 45: Location of proposed waste processing infrastructure in example 3 - 2050

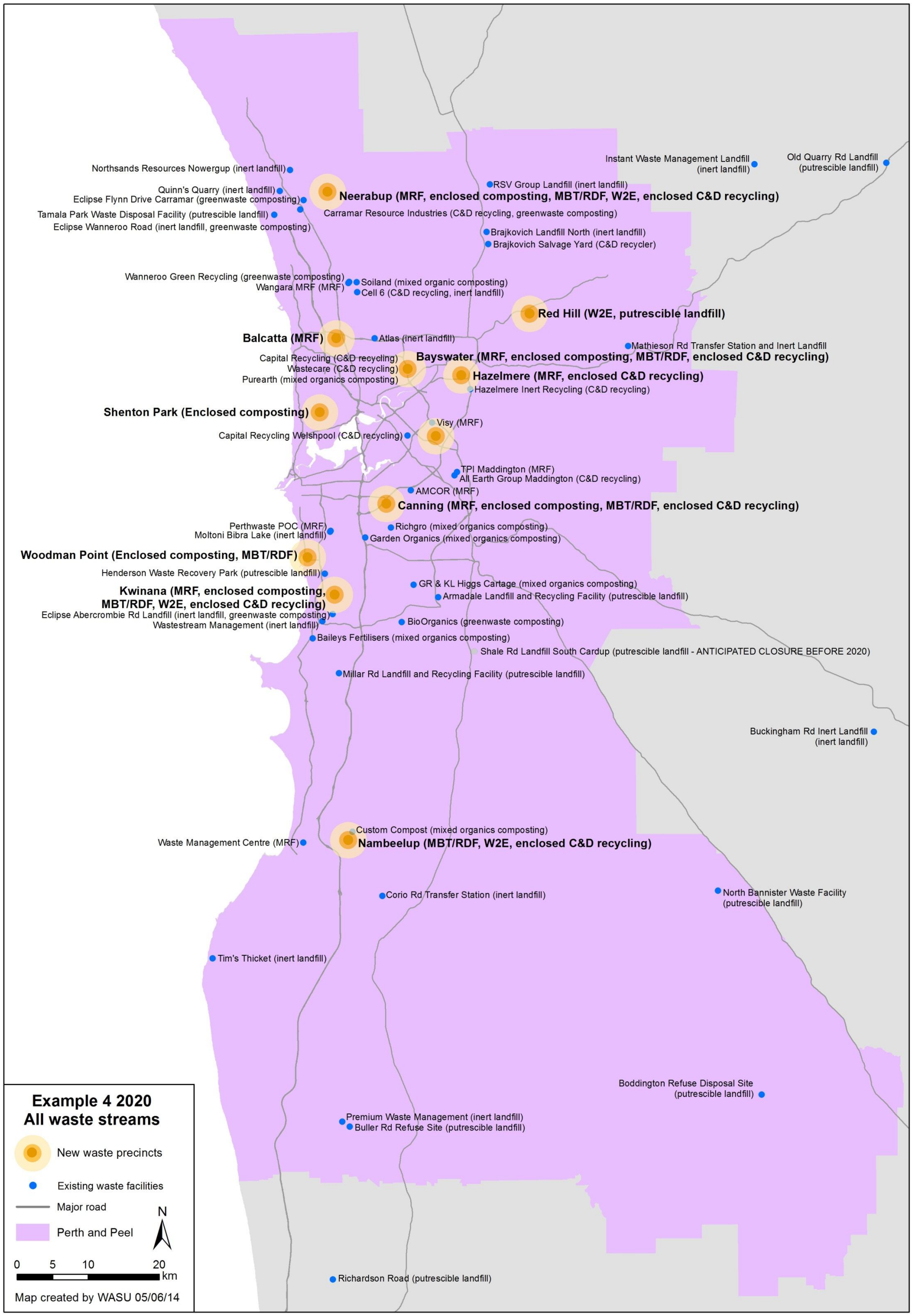

Figure 46: Location of proposed waste processing infrastructure in example 4 - 2020

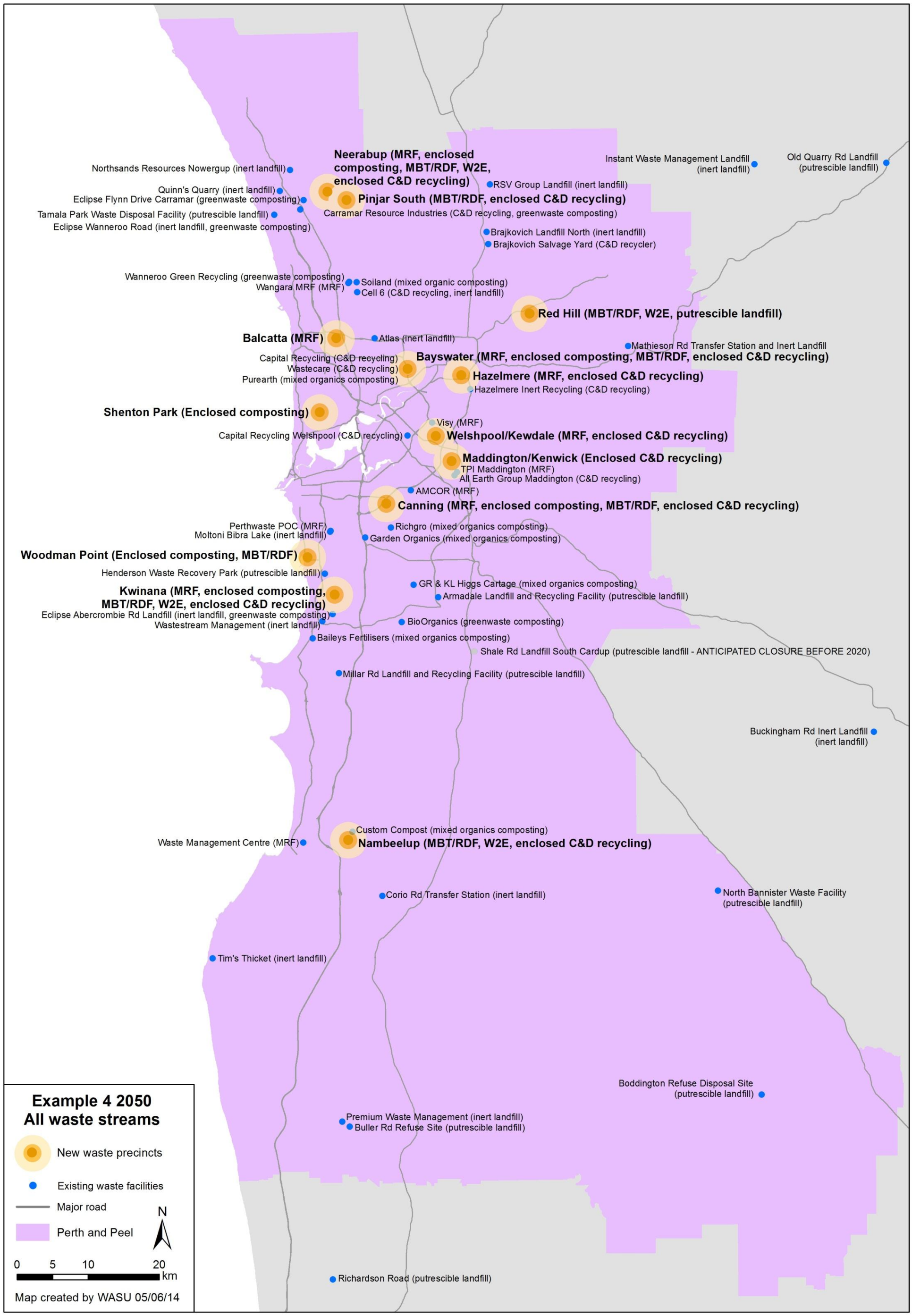

Figure 47: Location of proposed waste processing infrastructure in example 4 - 2050

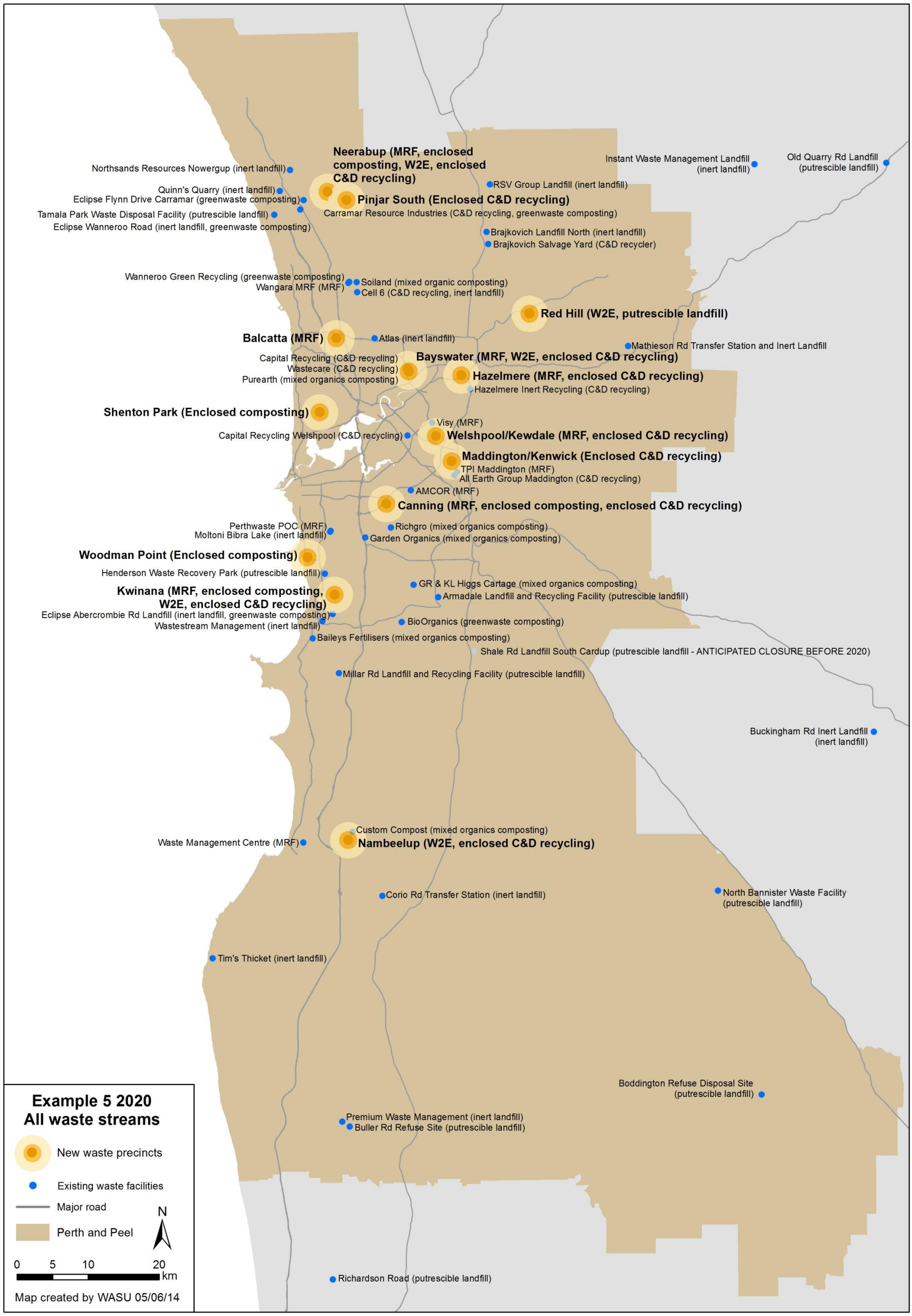

Figure 48: Location of proposed waste processing infrastructure in example 5 - 2020

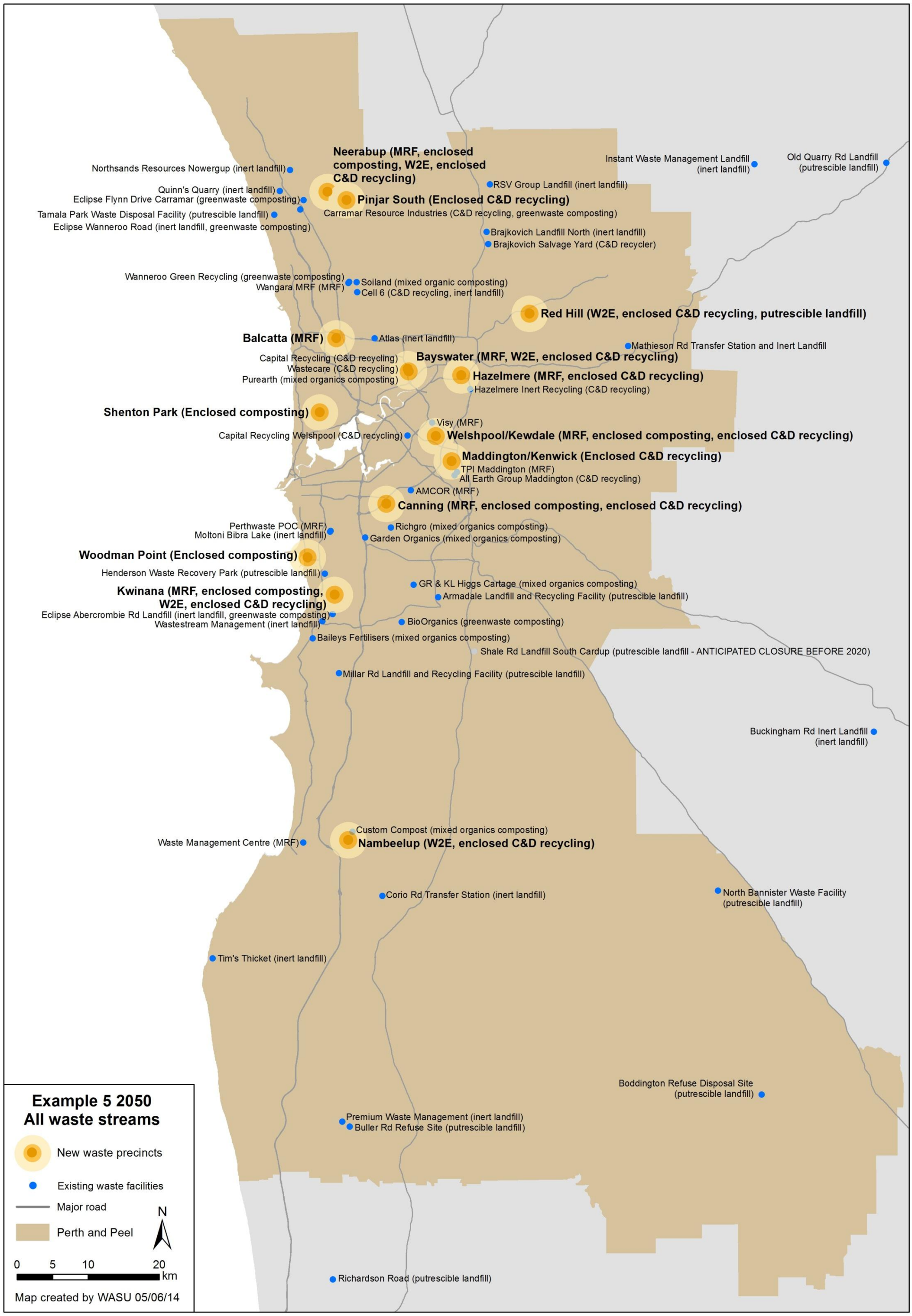

Figure 49: Location of proposed waste processing infrastructure in example 5 – 2050

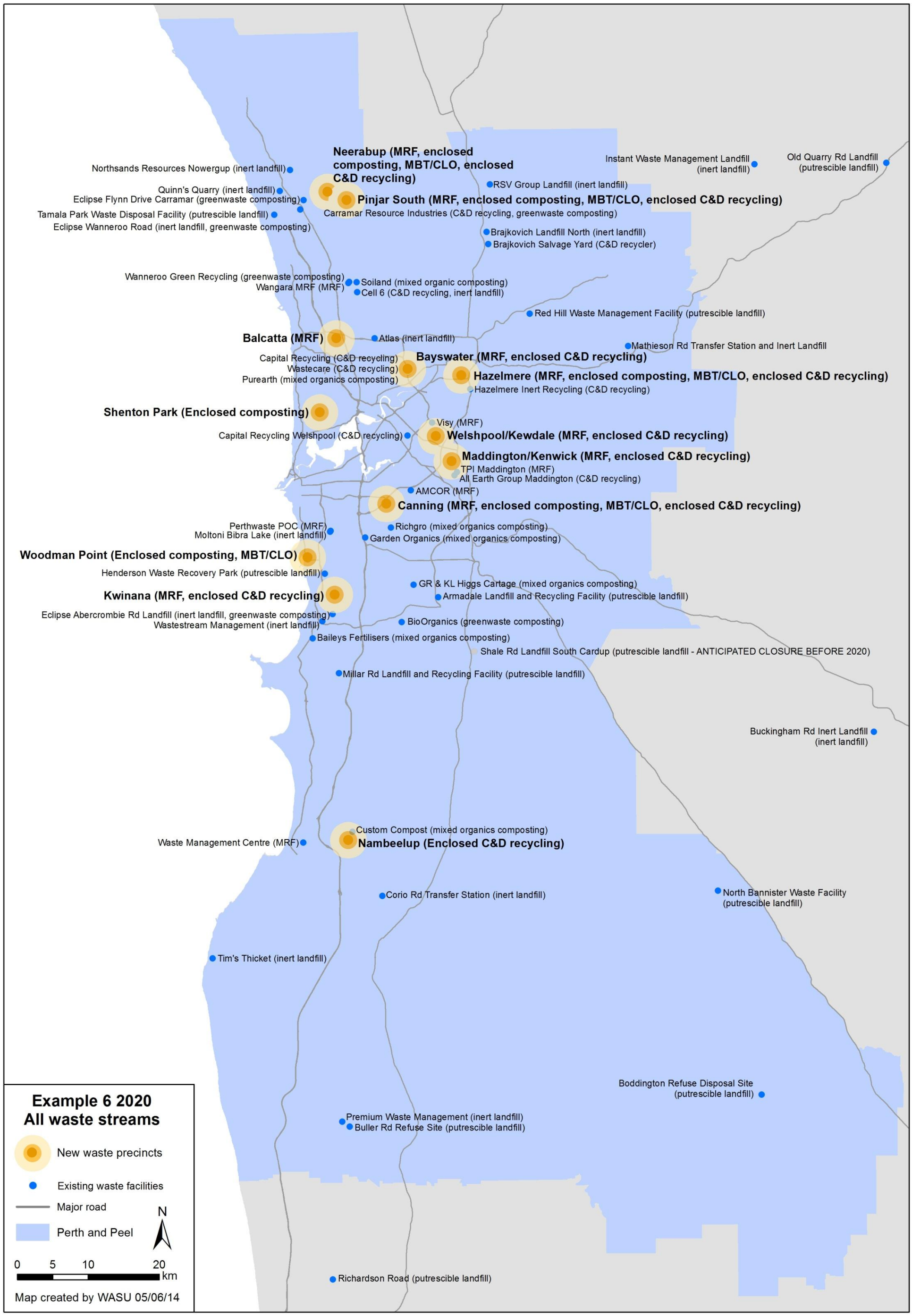

Figure 50: Location of proposed waste processing infrastructure in example 6 - 2020

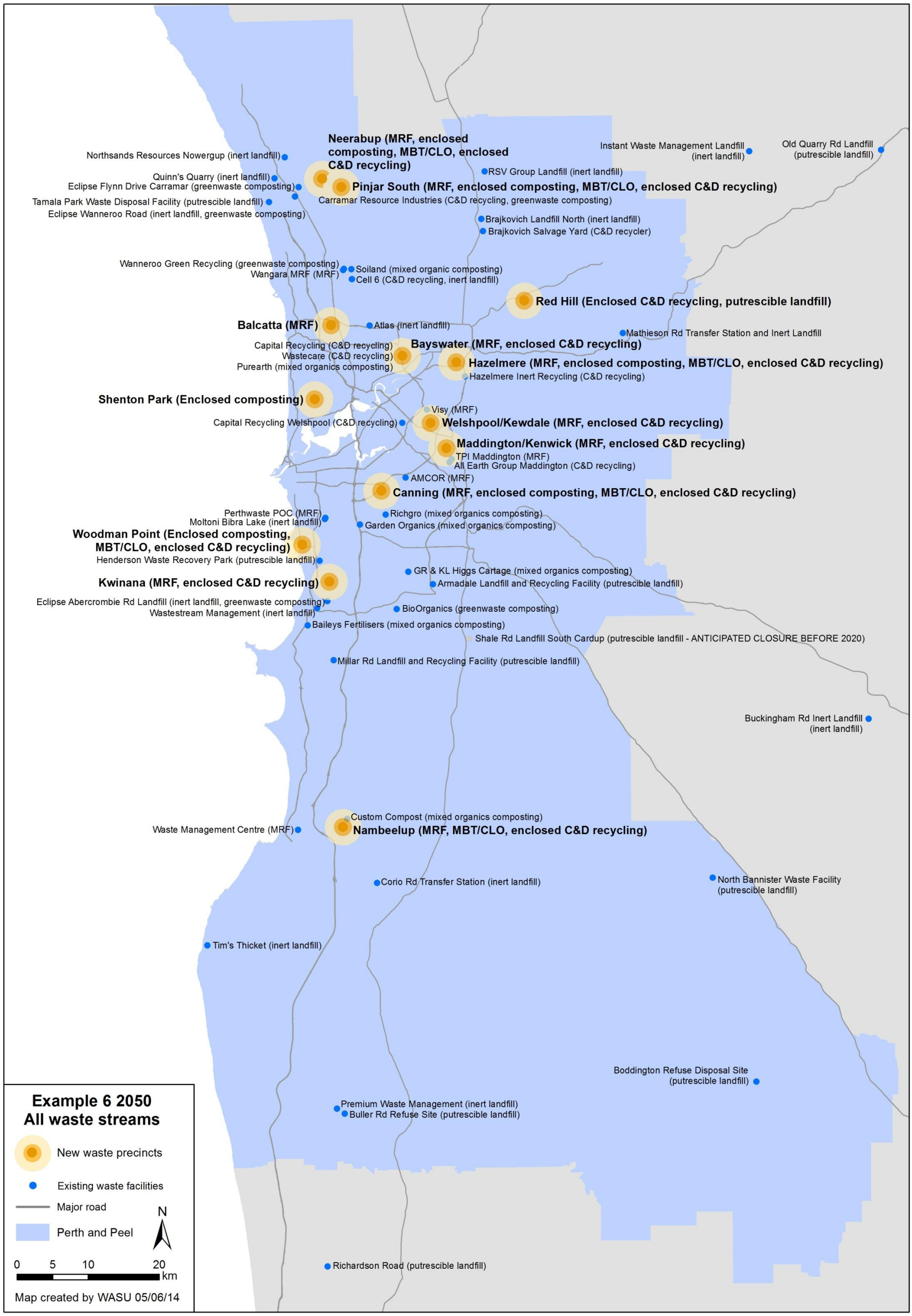

Figure 51: Location of proposed waste processing infrastructure in example 6 - 2050