Regional summaries

This section provides more detail on the waste generation and infrastructure needs of each region in Western Australia. Each summary includes a snapshot of the region's industries, demographics and economy, painting a picture of how the region's activities have influenced waste generation in 2020. The 2020 waste generation and demographic data is then used to estimate 2030 waste generation.

The 2020 resource recovery infrastructure capacity is based on licensed capacity which was obtained through the *State Waste Infrastructure Register*. Gaps in existing infrastructure capacity are identified when comparing 2020 infrastructure capacity and 2030 waste generation data. Projections of needed waste infrastructure are developed using the methodology described in previous sections. Existing and planned infrastructure by region is compared to projected waste volumes to determine need, based on the concept of critical mass presented in this plan and the need for expansion of existing or development of new facilities.

Each regional summary includes waste generation by source, including MSW, C&D and C&I, to provide more insight and guide decision-making at the regional level. Each regional summary includes:

- an assessment of the social, economic and environmental indicators of the region
- a summary of waste generation, treatment and movements in 2020
- a summary of waste generation and treatment in 2030
- infrastructure capacity needs in 2030, including assessment of opportunities to provide or access capacity in neighbouring regions
- breakdown of the waste by facility type and source (MSW, C&I or C&D) in 2030
- breakdown of the material generation and recovery in 2030
- analysis of landfills by type and identified capacity risk
- an assessment of the principles and priorities for the region.

A desktop assessment of facilities' licences has been employed to understand infrastructure capacity and, as such, may not accurately reflect the specific activities conducted on site. This is one of the key limitations of with the *State Waste Infrastructure Needs Analysis* methodology for assessment, particularly in relation to FOGO recovery facility capacity needs and organics recovery facility capacity needs.

The infrastructure plan focuses on identifying infrastructure needs in alignment with meeting the waste strategy targets. Targets specifically relating to FOGO are currently limited to the Perth and Peel regions. In regions outside of Perth and Peel, FOGO waste is collectively categorised as 'organics'. Stakeholder feedback highlighted this gap in the 2030 needs assessment as several major regional centre municipalities, such as the South West and Great Southern, are considering or implementing FOGO recovery as a means to achieve their MSW recovery targets.

While there appears to be sufficient licensed capacity for organics recovery to meet regional demands until 2030, the specific availability of FOGO recovery capacity remains uncertain. In addition, there is potential for barriers to arise in regions outside of Perth and Peel depending on regional approaches on kerbside FOGO recovery. Some facilities, despite being licensed for FOGO waste, either do not accept it or handle quantities below their licensed capacity. This is discussed in more detail in the Considerations and limitations section.

Further, more detailed exploration of FOGO capacity needs outside Perth and Peel is required as an area of future work.

The infrastructure plan includes a summary for each region outlined in Figure 22:

- Perth
- Peel
- Pilbara
- Kimberley
- South West
- Great Southern
- Mid West
- Gascoyne
- Wheatbelt
- Goldfields-Esperance.

Major regional centres as defined by the waste strategy are also included in assessments:

- Albany (Great Southern region)
- Bunbury (South West region)
- Busselton (South West region)
- Greater Geraldton (Mid West region)
- Kalgoorlie-Boulder (Goldfields-Esperance region).

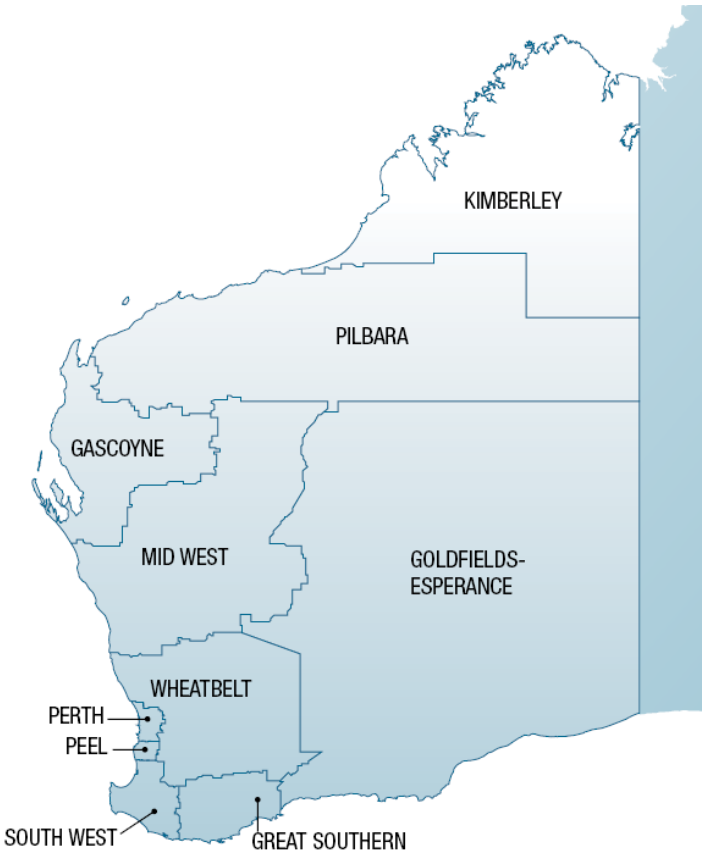


Figure 22 Regions used for the infrastructure plan

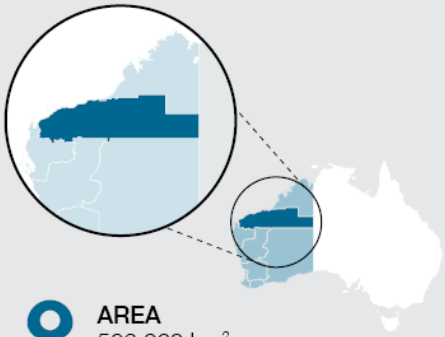
Pilbara region

Waste profile in 2020

The Pilbara is a low-density region of Western Australia that has the highest per capita waste generation rate (4.87 tonnes per capita). The region generated 296,000 tonnes of waste in 2020, consisting of about 46 per cent C&I waste, 37 per cent C&D waste and 17 per cent MSW. The region treated 249,000 tonnes in 2020 with 115,000 tonnes (46 per cent) being recovered and 134,000 (54 per cent) being landfilled. Key waste profile data for Pilbara waste and resource recovery in 2020 is presented below.

Residents in the Pilbara	2 per cent of Western Australia's population resides in the Pilbara region.
	Population density of 0.1 people per km^2.
	Low-density region with one quater (25 per cent) of population in Karratha.
Local governments in the region	Shire of Ashburton, Shire of East Pilbara, City of Karratha, and Town of Port Hedland.
Generating waste	The Pilbara generates 5 per cent of the waste generated in Western Australia.
Transporting waste	Extensive road networks connect the Pilbara with Perth, neighboring regions and two large commercial ports.
Treating waste	The Pilbara treats 4 per cent of the waste treated in Western Australia.
	The Pilbara recovers 3 per cent of the waste recovered in Western Australia.
	The Pilbara landfills 5 per cent of the waste landfilled in Western Australia.

PILBARA
REGIONAL SUMMARY



AREA
506,260 km²

GROSS REGIONAL PRODUCT (2019–20)
$62.22B/CAP

NUMBER OF BUSINESSES (2019–20)
1,096

TOP 5 EMPLOYMENT BY INDUSTRY

16.87%	Construction
13.57%	Rental, hiring and real estate services
10.54%	Transport, postal and warehousing
10.27%	Other services
8.07%	Professional, scientific and tech services

The mining industry sector makes the greatest contribution to economic output in the region, which at $78.6B accounts for 86.33% of total output. This industry sector is also the largest employer with 31,414 jobs which represents 52.55% of total employment within the region.

2020
- POPULATION 60,674
- WASTE GENERATED 296,000 TONNES
- WASTE GENERATION PER CAPITA 4.87 TONNES

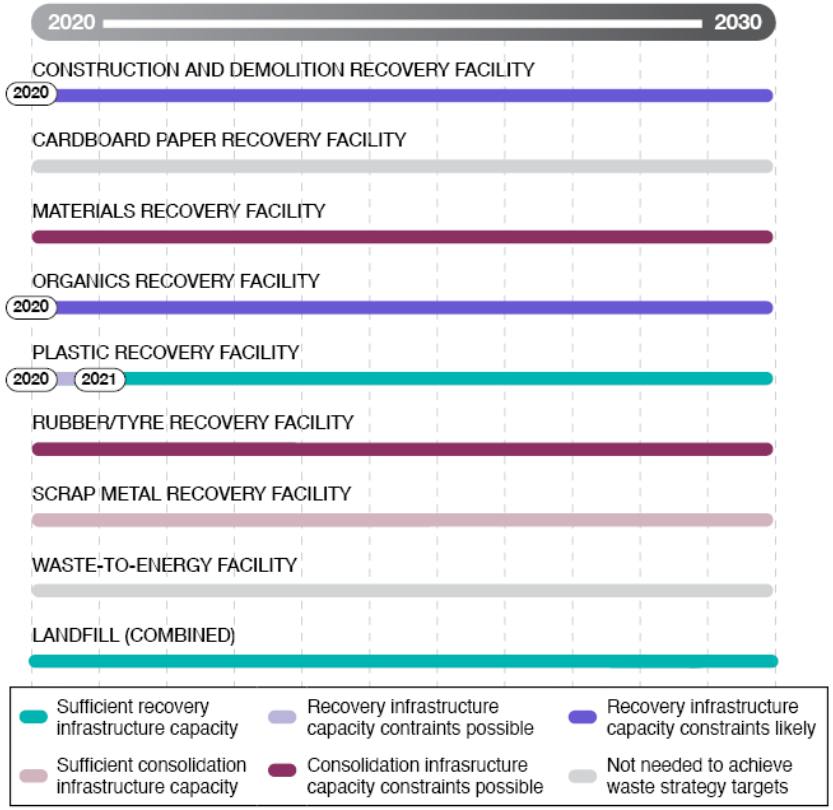
2030
PROJECTIONS TO 2030 BASED ON ACHIEVING WASTE STRATEGY TARGETS

- POPULATION 63,595 (▲5%)
- WASTE GENERATED 271,000 TONNES
- WASTE GENERATION PER CAPITA 4.26 TONNES

2030 INFRASTRUCTURE CAPACITY NEED
1. Construction and demolition | 38,000 tonnes
2. Organics | 26,000 tonnes
3. Material recovery facility | 7,000 tonnes

TOP PRIORITIES
1. Review options to facilitate lifetime and capacity expansion of existing construction and demolition facilities in the Pilbara.
2. Assess waste generation and infrastructure needs in remote Aboriginal communities to ensure adequate access to services.
3. Investigate a rural landfill risk assessment of unlicensed landfill and REMS landfills.
4. Investigate alternative landfill facility contingency arrangements with the Kimberley to alleviate short term capacity constraints in neighbouring regions.
5. Assess whether existing 67A licensed facilities in neighbouring regions can be increasingly utilised to alleviate food organics and garden organics recovery capacity need.

INFRASTRUCTURE NEED BETWEEN 2020 AND 2030
Projections for capacity constraints compare current, approved and planned capacity against the infrastructure needs by 2030 to meet the waste strategy targets.



WASTE IN PILBARA 2020 AND 2030
Waste projections to 2030 based on meeting the waste strategy targets

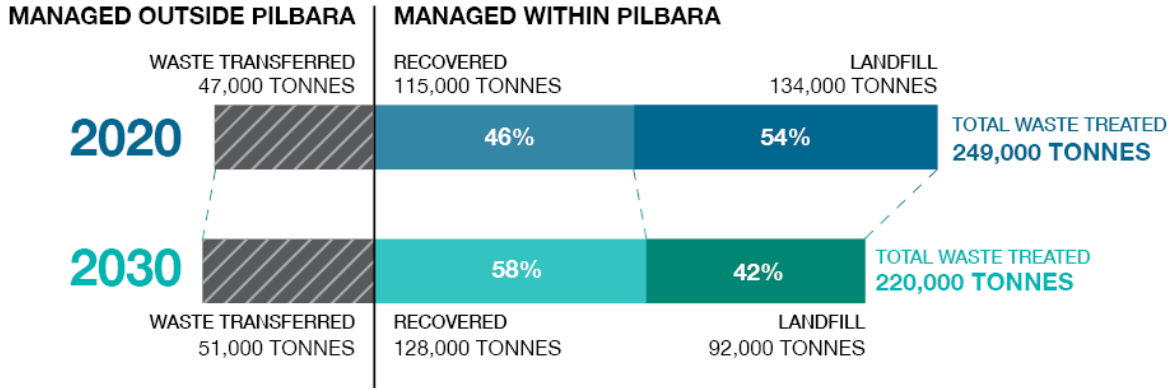


Figure 39 Waste in the Pilbara: statistics and projections

Waste and resource recovery in 2020

Much of the Pilbara population is on the coast, although commercial operations that generate a complex waste mixture extend across the region. Mixed C&D material was the largest single waste material generated and processed in the region, with some volumes being transferred out of the region because of constrained processing capacity. The top five materials processed in the region in 2020 include:

1. mixed C&D waste
2. mixed putrescible waste – domestic (household)
3. metals – ferrous steel – non-packaging
4. mixed inert waste
5. contaminated soil.

Half of the material treated in the Pilbara is through two C&D recovery facilities. There is also one plastics recovery facility (that received support through the Recycling Modernisation Fund). There is additional capacity for rubber/tyre and C&D recovery already planned for the region. Landfill disposal is supported by nine putrescible landfills and 12 REMS-managed landfills. Additional landfill planning is already underway for an inert landfill and a Class IV landfill.

The remote geography of the region creates a barrier to accessing material, although there are opportunities to consolidate material from neighbouring regions such as the Kimberley and Gascoyne. Several key highways and ports in the Pilbara facilitate inter-regional and international material movement. Currently the Pilbara transfers ferrous steel (31,000 tonnes) primarily to Perth.

Key aspects of waste and resource recovery system in the Pilbara in 2020, considered by the infrastructure plan, include:

- C&I formed the largest material generation source in the Pilbara region, consisting of about 140,000 tonnes, of which 47 per cent was recovered
- The majority (92 per cent) of waste transferred out of the Pilbara is transported to Perth for further treatment.
- Mixed ferrous steel was the third-largest material type generated in the Pilbara and was the largest category of material transferred out of the region.
- Recent investment will create additional capacity to treat plastics and rubber/ tyres in the region.

The locations of current and planned recovery infrastructure in 2030 are shown in Figure 42 (see Facility lists in the Appendix for a full list of facilities). Facilities granted work approvals since 2020 by the department in the Pilbara region are listed below in Table 27. These facilities have not been included in the modelling for the infrastructure plan and may alleviate some of the region's capacity needs.

Table 27 Facilities granted licences or works approvals since 2020 in the Pilbara

Facility type	Facility name	Location
Consolidation centre	Veolia Port Hedland Waste Transfer Station	Pilbara

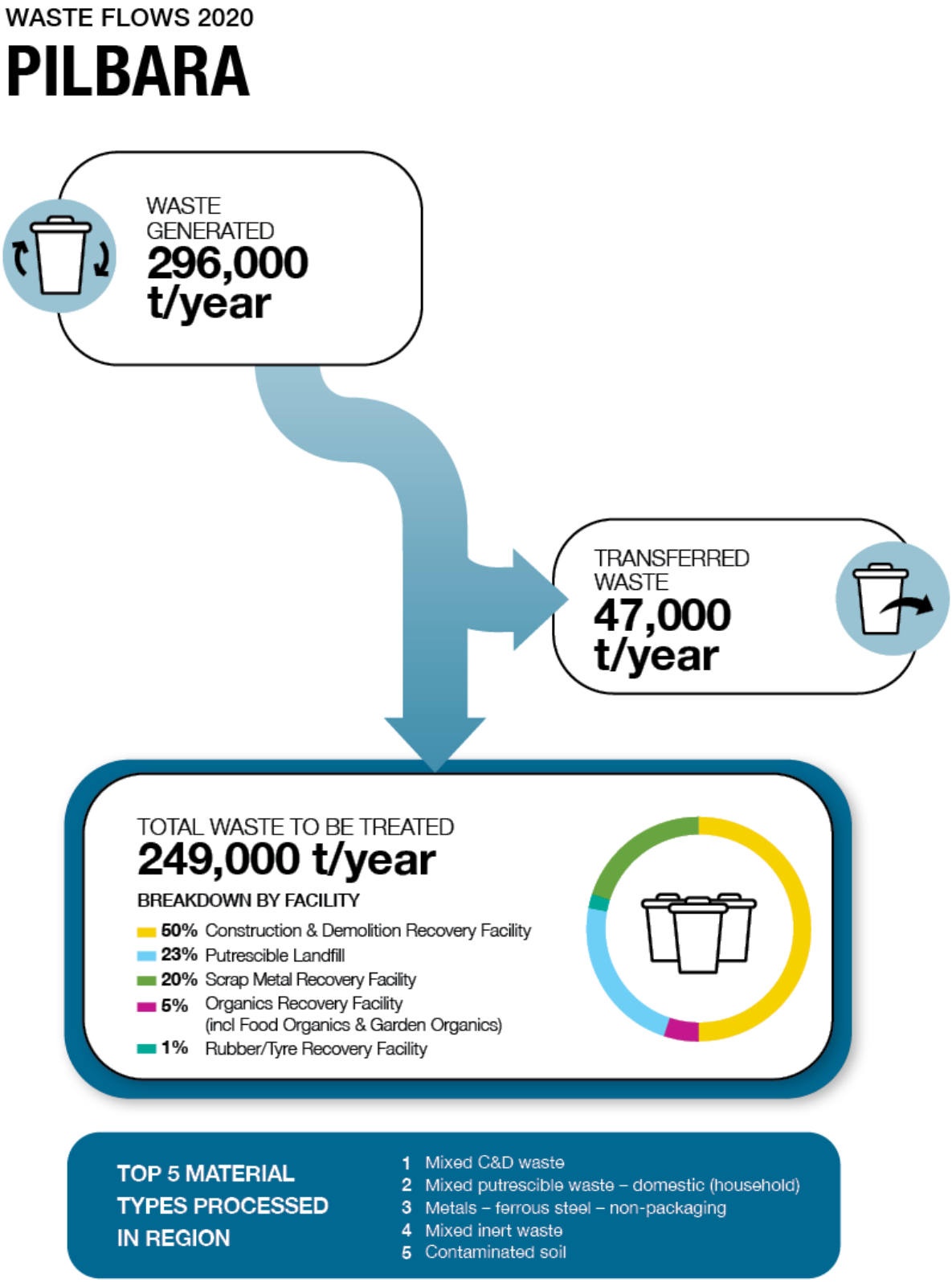


Figure 40 Waste generated, received, transferred and treated in the Pilbara in 2020

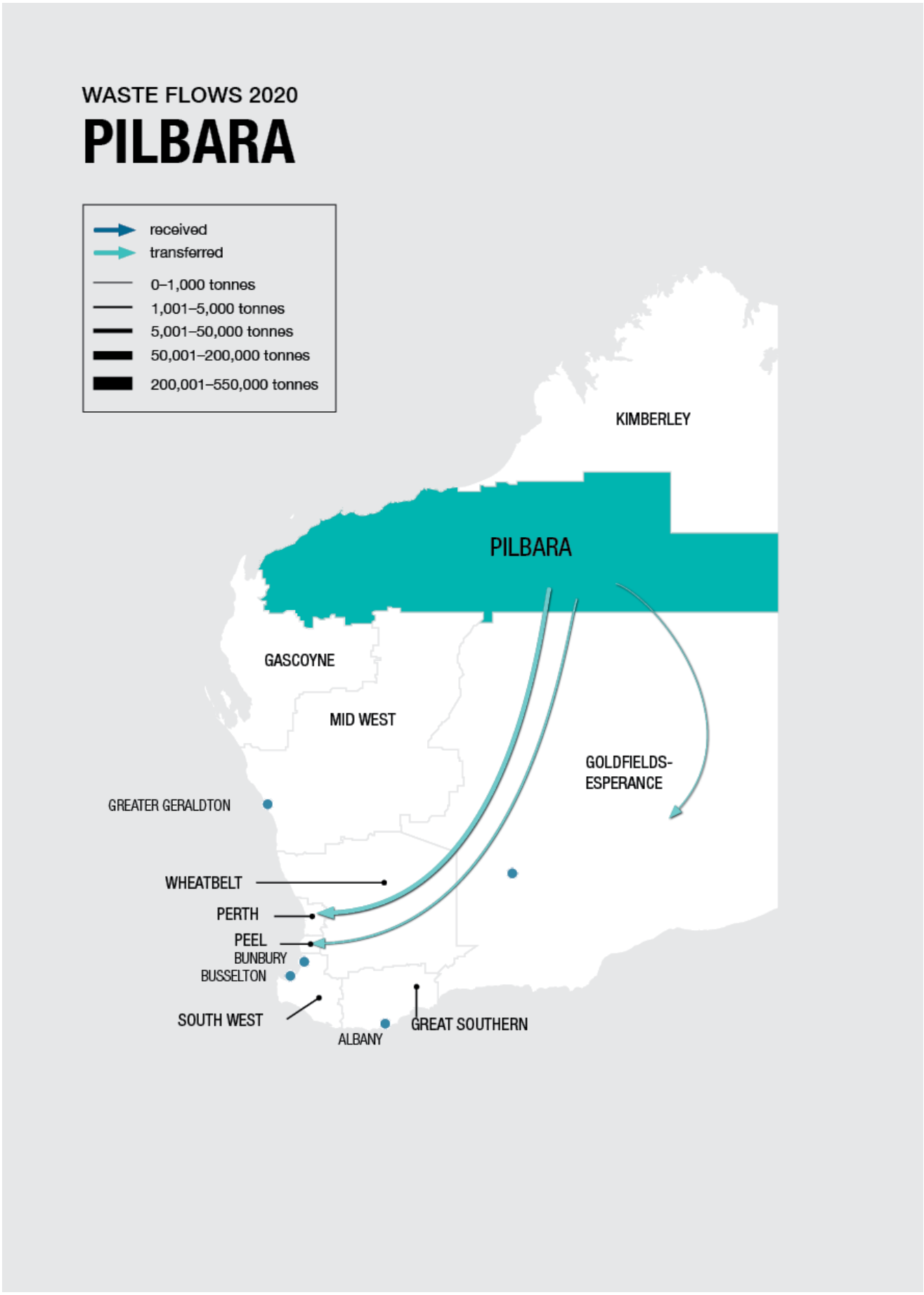


Figure 41 Waste flows in the Pilbara in 2020

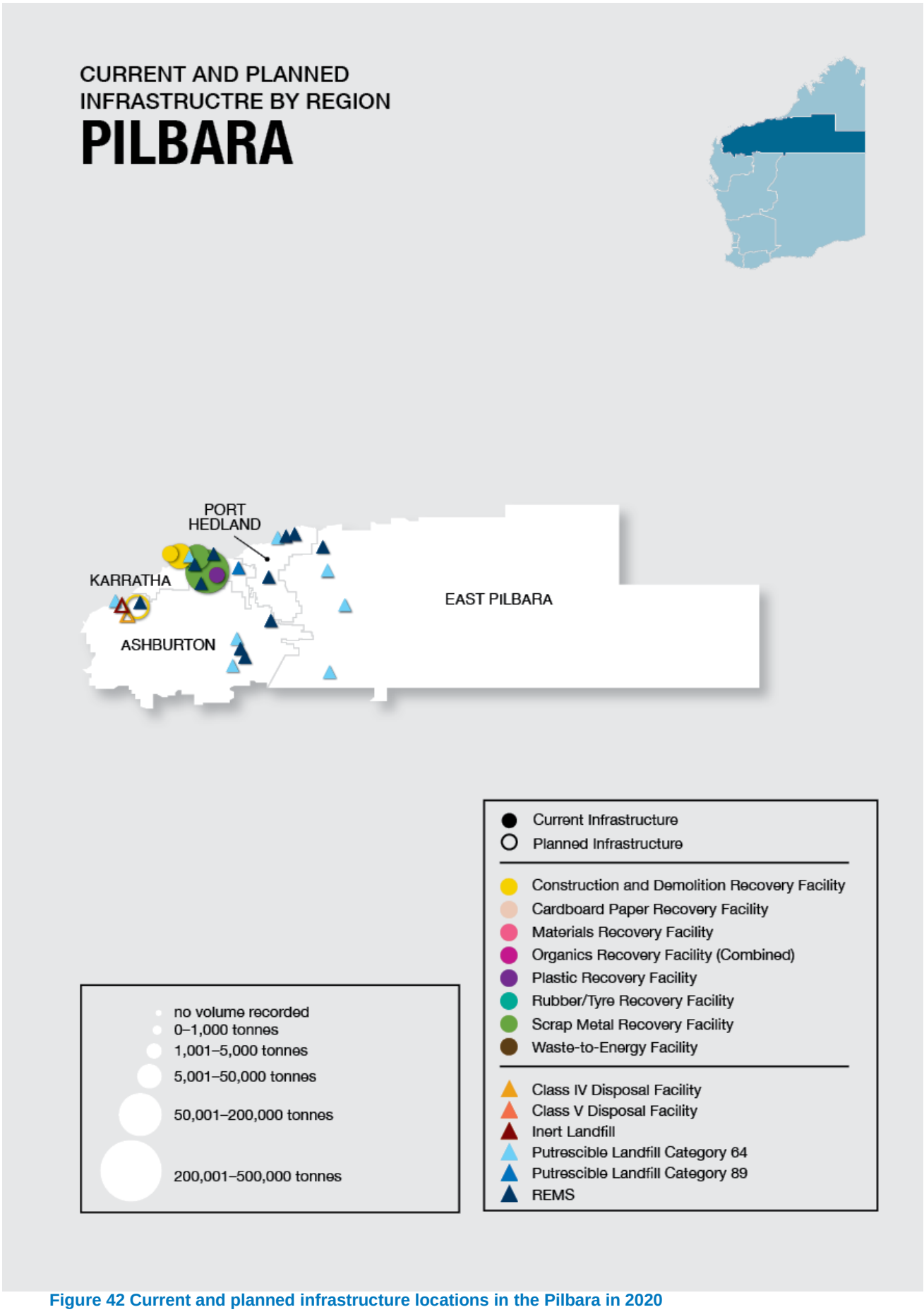


Figure 42 Current and planned infrastructure locations in the Pilbara in 2020

Waste and resource recovery in 2030

Modelling achievement of all waste strategy targets in 2030 found the Pilbara region would generate 271,000 tonnes and transfer 51,000 tonnes out of region, both similar to 2020 quantities.

Increases in local infrastructure capacity will increase the Pilbara material recovery rate from 46 per cent to 58 per cent. Figure 43 shows the distribution of feedstock materials used by each facility type, indicating which waste streams are most significant and where the resource recovery efforts should be concentrated. This is also reflected in the Pilbara region Principles and priorities section.

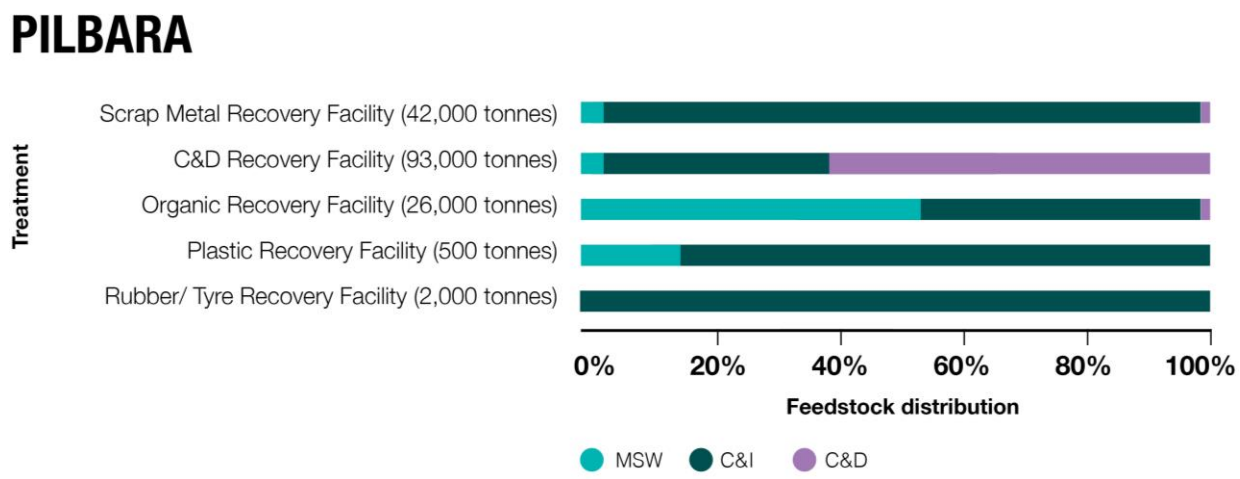


Figure 43 Feedstock distribution of treatments in the Pilbara in 2030

Infrastructure capacity needs in 2030

Based on current, planned and approved infrastructure in 2020, the Pilbara requires the following additional capacities to meet the waste strategy targets in 2030:

- 38,000 tonnes of additional recovery capacity is needed for C&D, which is sufficient to allow for an additional facility.
- 26,000 tonnes of additional recovery capacity is needed for organics, which is sufficient volume to allow for development of a new organics recovery facility and a FOGO recovery facility. As demonstrated in Figure 43, more than half of the organics feedstock (52 per cent) is estimated to consist of MSW, indicating that there may also be a need for a FOGO recovery in the region.
- 7,000 tonnes of additional consolidation capacity is needed for material recovery.

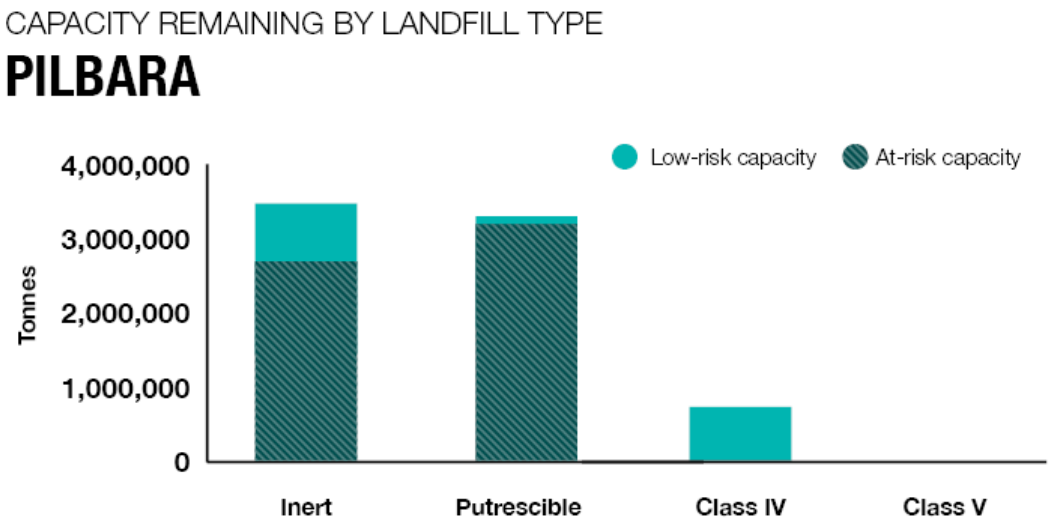


Figure 44 Capacity remaining by landfill type in the Pilbara, including an assessment of low-risk and at-risk capacity

Total remaining capacity by landfill types is presented in . This figure also indicates the proportion of that capacity that is at risk (see section on Landfill capacity lifetime assessment to 2030 and 2050).

Under the low-risk scenario, most of the total landfill capacity of 6 million tonnes was identified as potentially at risk, of which inert landfills make up 47 per cent and putrescible landfills 53 per cent. *State Waste Infrastructure Needs Analysis* modelling predicts 36,000 tonnes of residual waste will be disposed of in landfill each year. Feedstock lifetime remaining for landfills is shown in Figure 19 .

Details of the infrastructure needed to achieve waste strategy targets are outlined in Figure 45, including the expected facilities, capacities, and capacity needs in 2030.

CURRENT RECOVERY INFRASTRUCTURE PIPELINE

PILBARA

This overview includes a comparison of projected generation and capacities to determine the infrastructure need in 2030.
It includes planned and approved facilities, as well as closures between 2020 and 2030.

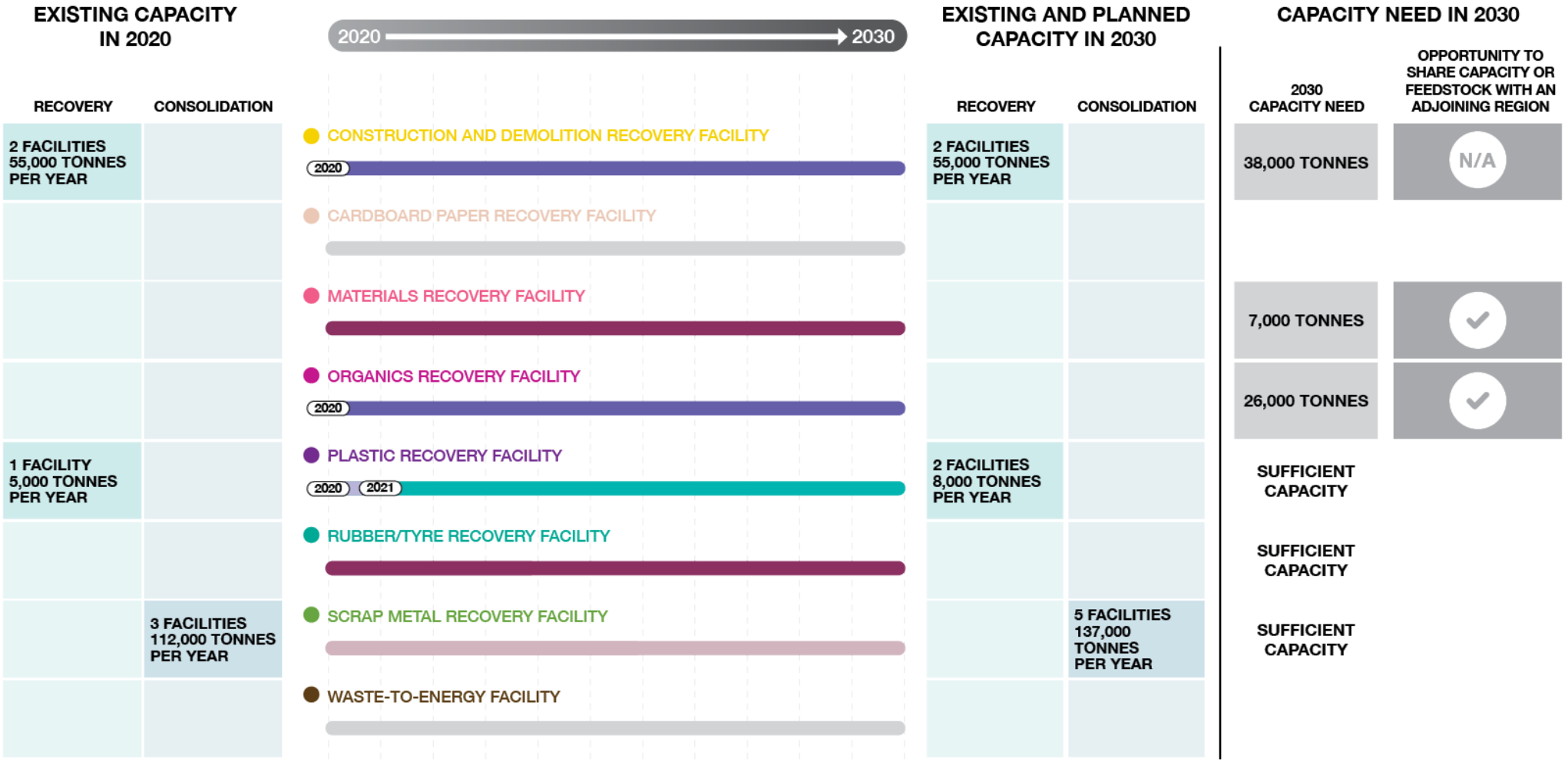


Figure 45 Pilbara infrastructure pipeline and capacity need in 2030

Principles and priorities

The principles outlined in this plan have been used to identify priorities.

Priority areas that are projected to go beyond capacity need, based on the completed modelling for the region, arise when applying the principles.

Based on the analysis, the top priorities for the Pilbara region are:

- Review options to facilitate lifetime and capacity expansion of existing C&D facilities in the region.
- Assess waste generation and infrastructure needs in remote Aboriginal communities to ensure adequate access to services.
- Investigate a rural landfill risk assessment of unlicensed landfills and REMS landfills.
- Investigate alternative landfill facility contingency arrangements with the Kimberley to alleviate short-term capacity constraints in neighbouring regions.
- Assess whether existing 67A licensed facilities in neighbouring regions can be increasingly utilised to alleviate FOGO capacity need.

These are discussed in detail in Table 28 below. The principles are outlined once more in Figure 2 for reference.

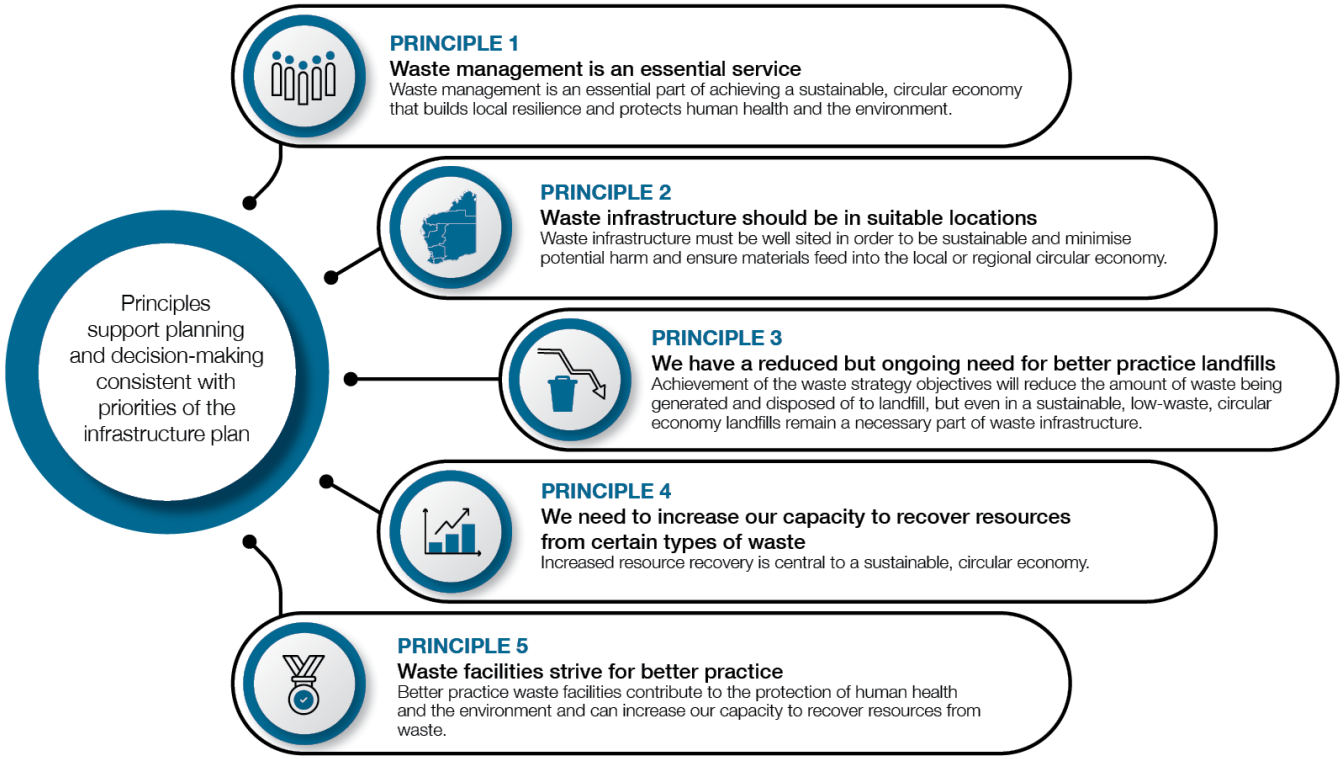


Figure 2 Principles of the *State waste infrastructure plan*

Table 28 Consideration of infrastructure plan principles and priorities in the Pilbara

Capacity needs to achieve waste strategy targets 2030	Consideration of infrastructure plan principles	Findings in response to meeting the waste strategy 2030 target (with assigned priority ranking)
38,000 tonnes of additional capacity for C&D recovery	**Principle 1: Waste management is an essential service** The Pilbara region is currently constrained by high C&D generation rates and limited capacity for treatment. There is a high need to develop additional capacity in the region to minimise the need to transfer C&D out of the region for recovery. Spare contingency is especially important in responding to disaster events which can produce high quantities of mixed demolition waste that requires recovery. **Principle 2: Waste infrastructure should be in suitable locations** Land use constraints (including environmental impact, native titles, Indigenous and cultural heritage areas, and mining tenements) in the Karratha area risk limiting new development options. As the region's existing C&D infrastructure is in Karratha, capacity may be extended across the region by developing capacity in Newman or Port Hedland. These regions have lower constraints compared to Karratha, can support regional development and result in shorter transportation distances for construction outside of Karratha. **Principle 4: We need to increase our capacity to recover resources from certain types of waste** C&D material is the greatest material type generated in the Pilbara region. Investment in new capacity has low risks in accessing necessary feedstocks. Additionally, recovery rates are typically very high and will support waste strategy Recover targets.	**High** Lifetime and capacity expansions of existing C&D facilities in the Pilbara region will decrease the risk, capital costs and timeframes required to meet capacity needs. **High** Better understanding of sub-regional gaps for C&D recovery near major regional generators will improve infrastructure outcomes for Karratha.
26,000 tonnes of additional capacity in organics recovery	**Principle 1: Waste management is an essential service** The lack of existing infrastructure to locally process organic material creates a very high demand to develop new capacity. Significant additional contingency can be developed by undertaking relevant approvals and planning to process organics through existing organics processing. **Principle 2: Waste infrastructure should be in suitable locations** The Pilbara has the highest need for organics processing capacity of the state's northern regions. With capacity constraints in adjoining regions, there is an opportunity to develop organics recovery capacity that can meet the organics capacity needs of the Pilbara while supporting the Kimberley (13,500 tonnes capacity needed) and Gascoyne (6,000 tonnes needed) regions. Location in the Pilbara can also de-risk recovered organic product offtake through access to strong local agricultural markets and mining rehabilitation activities.	**High** New facility development in the Pilbara region can be facilitated through assisted land use planning and approvals frameworks to alleviate local capacity constraints. **High** Better understanding of inter-regional need could support the development of new infrastructure to address capacity need for the Kimberley (13,500 tonnes

Capacity needs to achieve waste strategy targets 2030	Consideration of infrastructure plan principles	Findings in response to meeting the waste strategy 2030 target (with assigned priority ranking)
	Principle 4: We need to increase our capacity to recover resources from certain types of waste Application of principle 4 highlights a priority to assess options for recovery of FOGO to improve resource recovery rates in addition to organics capacity alone. New collection services can be offered to regional population centres such as Karratha. **Principle 5: Waste facilities strive for better practice** Application of principle 5 emphasises the importance of better practice organics processing practices because of the risk to surrounding sensitive receivers (in densely populated areas or delicate coastal environments). A review of existing organics recovery facility compliance with the *Guideline: Better practice organics recycling* would facilitate an understanding of the capacity risk for this facility type.	needed) and Gascoyne (6,000 tonnes needed) regions. **Low** Leveraging the mining rehabilitation markets will create opportunities for recovered organic products offtake in the Pilbara region.
7,000 tonnes of additional capacity for material recovery	**Principle 1: Waste management is an essential service** According to modelling, the Pilbara will increase generation of commingled recyclable material, with an additional 7,000 tonnes of local commingled recycling capacity needed achieve the waste strategy Recover targets. This will support population centres implementing new collection services. The lack of contingency in the region (because there are no existing facilities) results in high risks for introducing commingled collection services that may need to transport material long distances to Perth. Excess capacity in the Kimberley could be leveraged to alleviate short term constraints. **Principle 2: Waste infrastructure should be in suitable locations** The need for MRF capacity in the Pilbara (7,000 tonnes) and Gascoyne (1,000 tonnes), compounded by the lack of existing facilities, represents opportunities for a new development that service both regions. A new facility developed east of the region could leverage low constraint zoning around Onslow, located equidistant from regional centres of Karratha and Carnarvon. **Principle 4: We need to increase our capacity to recover resources from certain types of waste** Consideration of principle 4 supports development of facilities in the Pilbara to reduce the negative impacts of transport commingled recycling to the Perth or Kimberley region.	**Medium** Better understanding of inter-regional need could support the development of new infrastructure to address capacity need for the Pilbara (7,000 tonnes) and Gascoyne (1,000 tonnes). **Medium** Lifetime and capacity expansions of existing MRFs in the Kimberley regions can act as shared capacity with the Pilbara and decrease the risk, capital costs and timeframes required to meet capacity needs.
Used tyre storage	**Principle 3: We have a reduced but ongoing need for better practice landfills**	**Medium**

Capacity needs to achieve waste strategy targets 2030	Consideration of infrastructure plan principles	Findings in response to meeting the waste strategy 2030 target (with assigned priority ranking)
	Waste management of tyres in remote locations poses challenges. Existing landfills are being used for collection and consolidation of tyres and present a suitable centralised location for waste management in remote regions. About 2,000 tonnes per annum of rubber/tyre material is projected to be generated in the Pilbara and this will continue to be generated, highlighting better practice landfills as an important part of the Pilbara's waste management. **Principle 4: We need to increase our capacity to recover resources from certain types of waste** Tyres can be processed but infrastructure may only be available in Perth, so the recovery of rubber/tyre materials in the Wheatbelt region is dependent on consolidation and transport to enable recovery. Consolidation and transport will remain the likely fate given the insufficient quantity to support regional processing. **Principle 5: Waste facilities strive for better practice** One class 64 putrescible landfill in the Pilbara is also licensed to store tyres. See the landfill capacity risk assessment below to further understand how the loss of this facilities may occur, noting that this may reduce the ability to consolidate rubber/tyre arising in the Pilbara.	Seven facilities are listed in the region for Category 57, with total capacity exceeding 300,000 tyres. Some of these may be sending tyres to Perth. There is an opportunity to consolidate volumes and transport these tyres for reprocessing outside the region.
Landfill capacity risk assessment	**Principle 1: Waste management is an essential service** Based on current, planned and approved landfill capacity, the Pilbara region has sufficient landfill capacity to 2040. However, under a low-risk approach to landfill, the Pilbara needs additional capacity to provide adequate options for mixed putrescible waste disposal. A large portion of the region's putrescible landfill capacity (13 facilities with a total of 5,810,000 tonnes lifetime capacity) was evaluated to be potentially high risk. **Principle 4: We need to increase our capacity to recover resources from certain types of waste** Planning is currently underway to develop new inert and Class IV landfill infrastructure in the Pilbara, which will facilitate special waste streams and relieve strain on the region's putrescible landfills. There is also a need to better understand the landfill infrastructure required to treat mining waste and waste generated in remote Aboriginal communities. Geographic siting of landfills is concentrated in the western Pilbara, indicating possible need to expand sub-regional capacity.	**High** Quantification of waste generation and infrastructure needs in remote Aboriginal communities can improve access to adequate services in remote areas. **High** Updated rural landfill risk assessment methodology of unlicensed landfill and REMS landfills can be used to effectively assess the potential risk of environmental, human health and amenity impacts.

Capacity needs to achieve waste strategy targets 2030	Consideration of infrastructure plan principles	Findings in response to meeting the waste strategy 2030 target (with assigned priority ranking)
	Principle 4: We need to increase our capacity to recover resources from certain types of waste There is a high need to de-risk existing landfills through better practice management standards. These standards should also be extended to REMS managed landfills in the region. In addition, 62 per cent of landfills also require post-closure planning, having not completed or updated a plan within the past 10 years.[3]	**High** Quantification of waste generation and infrastructure needs for the local mining sector could lead to complementary activities that support local communities. **High** Options for more efficient inter-regional waste transfer infrastructure and contingency arrangement could alleviate short-term capacity constraints between the Kimberley and Pilbara regions

[3] Western Australia Waste Infrastructure Audit, ASK Waste Management Consultancy Services on behalf of the Department of Water and Environmental Regulation, (2021).