6.0 Sustainability

6.1 Realising the Key Sustainability Principles and Targets

The Cockburn Coast project is intended to establish a new benchmark for sustainable urban (re)development.

For community planners and urban designers, understanding how well the Cockburn Coast becomes a sustainable community will be important to assess. But assessing this is a complex undertaking. Designing and building a Cockburn Coast that meets the aspirational goals that have been set is a multi-faceted endeavour involving many stakeholders and delivery agents, crosses jurisdictions and requires the coordination of multiple efforts.

Similarly, developing a framework from which to assess these multiple facets has been a complex undertaking that has required input from many disciplines, each with the same strong commitment to sustainability and sustainable practice.

The Western Australian State Sustainability Strategy defines sustainability as "meeting the needs of current and future generations through an integration of environmental protection, social advancement and economic prosperity".

Sustainability has been a guiding concept in the planning for the Cockburn Coast Project. Establishing a sustainable community on the Cockburn Coast means creating places where people want to live and work, not only today but into the future. Sustainable communities cater to the different needs of all its residents; they are safe and inclusive and offer equality of opportunity, they are sensitive to their environment; and contribute to a high quality of life.

The following key principles and targets were put in place by the 2009 DSP, and have informed the development of this District Structure Plan (Part 2).

6.1.1 Principles

The DSP listed the following key design principles as being integral to the successful translation of the Vision through to development into a structure plan that can be effectively implemented:

- Creating strong leadership, vision and a plan
- Building community and stakeholder support
- Focusing on public realm and built form outcomes - not strict land use regulations
- Providing housing density and diversity
- Embracing an integrated mix of uses
- Providing places of employment
- Integrating and optimising civic land uses
- Ensuring good connectivity for pedestrians, cyclists and vehicles
- Creating people-friendly spaces
- Providing a network of open spaces
- Being transit oriented

6.1.2 Targets

The DSP set the following performance targets:

- 20% affordable housing
- 15% of homes to be 'family homes'
- Employment self-sufficiency
- Minimum 40 percent (approximately 2700 jobs)
- Preferred 60 percent (approximately 3600 jobs)

In addition to the above targets, the DSP sets a 'preferred' housing mix for the project area, as follows:

Housing type	Housing mix range
Separate House	3% - 6%
Semi-detached / row or terrace and town house	22% - 33%
Flat/unit/apartment: low rise	33% - 35%
Flat/unit/apartment: high rise	31% - 37%
Total	**100%**

Table 6_District Structure Plan Preferred Housing Mix

6.2 A Workable Framework

Developing a Sustainability Framework for the Cockburn Coast District Structure Plan commenced early in the process. The intent was to adopt a highly iterative process of community and other stakeholder engagement that set best practice environmental, social and economic benchmarks. Work on the sustainability framework has proceeded throughout the planning and design stages of the project resulting in the Assessment Framework presented in this document.

The District Structure Plan described the process for developing the Cockburn Coast sustainability framework as shown below.

The sustainability principles contained within the District Structure Plan include:

- Telling the story of the Cockburn coast through the identification, management and promotion of significant sites that contribute to the area's cultural heritage and to build on these unique features to provide a sense of place
- Demonstrating innovation in the development of Cockburn coast through the application of best practice technologies and design
- Demonstrating a range of affordable housing strategies
- Promoting efficient use of resources, land and infrastructure
- Encouraging development that is commercially feasible, attractive to the market and to the wider community
- Ensuring diversity of land uses to facilitate locally-based employment, providing services that are appropriate to the needs of the local and wider community
- Demonstrating best practice, responsible environmental management, facilitating remediation and rehabilitation
- Providing opportunities for the use of alternative transport modes, through the provision of quality transport, cycling and pedestrian infrastructure combined with an interconnected urban design
- Capitalising on the exceptional natural assets of the Cockburn coast through improvement, enhancement and provision of greater access to the local environment
- Demonstrating efficient land use and transport in the structure plan through the application of transit oriented design principles
- Engaging the community in the planning, design and development of the Cockburn coast, instilling a sense of ownership and ensuring equitable outcomes

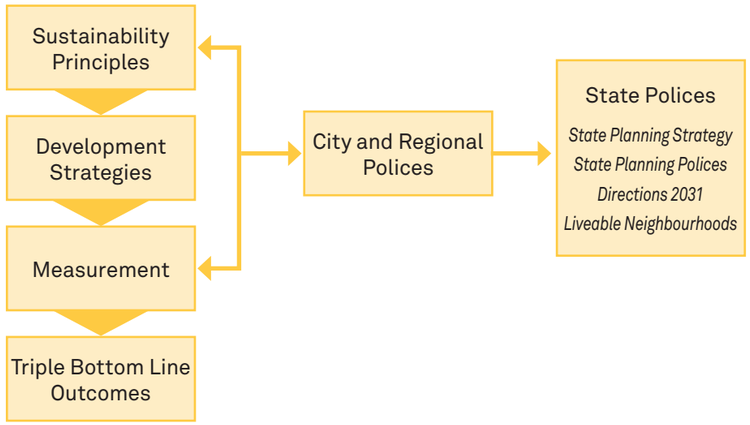

Figure 61_Sustainability Framework

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6.2.1 Measuring the Performance of the Plan

As the project has commenced the guiding principles for the Cockburn Coast development have been aligned with the National Principles for Sustainable Communities documented in the Green Star Communities Draft National Framework . These five headline principles aim for communities that deliver: liveability, place making, environmental quality, economic prosperity, and urban governance.

A prime consideration in framing the Cockburn Coast DSP Part 2 has been the enhancement of sustainability through attention to building and place design, construction practices, water management, increased biodiversity, energy management, and across the community through improved engagement and education opportunities.

The process of measuring sustainability performance in the Cockburn Coast project began with an investigation of the main drivers influencing decision-making in the area. Like other population centres in the Perth metropolitan region, planning in the Cockburn Coast region must take account of increasing population numbers and the ramifications of that increase (e.g. traffic congestion, water demand, employment needs, etc), the potential effects of climate change including water scarcity, conservation of dwindling resources as well as environmental concerns with conserving biodiversity and supporting community health and well-being. Each of these value drivers were assigned a rating consistent with the perceived level of impact each had on planning for the region.

While the National Principles for Sustainable Developments provide the over-arching principles, DSP Part 2 has set a range of more specific objectives which, if met, will see the Cockburn Coast develop as a vibrant, landmark destination that is connected, integrated, diverse and accessible.

Sixteen objectives have been developed to guide the design and revitalisation of the former industrial coastal strip so that its full potential as a hub for creativity, recreation, cultural and artistic activity and exciting events can be achieved. The objectives - the “success factors” - were considered in terms of their ability to respond to the value drivers and correlated to the importance of the driver and are listed in Table 7.

Green Star Principles for Sustainable Communities	Objectives / Success Factors
Liveability Sustainable communities are liveable, they are diverse, affordable, connected and healthy; they enhance social interaction and ownership, are safe and caring and improve people’s well-being	Affordable living
	Development provides opportunities for socially disadvantaged people to live in the area
	Accessible services
	Safe and healthy neighbourhoods
	Achieve a high population density
Place Making Sustainable communities are great places, they are attractive, accessible and adaptable, have their own distinct character and identity and evolve over time	Desirable place to live
	A hub for creativity, recreation, cultural and artistic activity and exciting events
Environmental Quality Sustainable communities respect the environmental systems that support them, they protect and restore the natural environmental values and promote infrastructure, transport and buildings that reduce overall environmental footprint	Efficient use of water in construction and occupation
	Reduction in GHG emissions associated with construction and occupation
	Efficient use of materials
	Air quality is maintained
	Quality of natural water resources is maintained or enhanced
	Biodiversity is protected
	Change in travel behaviour to reduce reliance on the car
Economic Prosperity Sustainable communities prosper. They encourage opportunities for business diversity, innovation and economic prosperity that support local jobs for people in the region	Develop a sub-regional economy
Urban Governance Sustainable communities are characterised by good governance. They promote strong partnerships to achieve a shared vision and deliver community benefit	Place-specific, well resourced and empowered governance structures are created to deliver outcomes

Table 7_ Sustainability objectives for Cockburn Coast

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The next step in the process of developing the Sustainability Framework was to assign meaningful measures to each of the objectives. The measures were chosen to answer the question "how will we know if we have achieved x?"

Many of the objectives are not able to be determined as a success or not, by asking a single question. Rather a series of measures are posed that, when brought together, give an indication of attainment of the objective.

Next in the process came the allocation of specific targets for each of the measures. Local, national and international standards have been reviewed and where possible 'stretched' to encourage innovation, best practice and continual improvement. Devising the targets has taken account of community sentiments, government directions, regulatory frameworks, has recognised 'best practice' and considered potential impacts.

The sustainability objectives, measures and targets for Cockburn Coast are set out in the Appendix of this report.

	Develop a sub-regional economy	Efficient use of water in construction and occupation	Change in travel behaviour to reduce reliance on the car	Reduction in GHG emissions associated with construction and occupation	Affordable living	Accessible services	Development provides opportunities for socially disadvantaged people to live in the area	Desirable place to live	Achieve a high population density	A hub for creativity, recreation, cultural and artistic activity and exciting events	Safe & healthy neighbourhoods	Efficient use of materials	Quality of natural water resources is maintained or enhanced	Biodiversity is protected
Highest Possible Score Master Plan	5.0	5.0	5.0	3.8	5.0	5.0	2.5	2.5	5.0	4.3	1.0	0.0	0.0	3.3
Master Plan Jan 2011	3.8	3.3	4.8	1.0	2.0	5.0	1.0	2.0	4.7	2.9	0.4	0.0	0.0	3.3

Table 8_Rating the Master Plan Against Targets

6.3 Rating the Plan

Table 8 shows the maximum scores for each success factor that were allocated to the assessment phase and the scores achieved by the Cockburn Coast DSP (Part 2). They following success factors are below:

- Develop a sub-regional economy
- Efficient use of water in construction and occupation
- Change in travel behaviour to reduce reliance on the car
- Affordable living
- Accessible services
- High population density.

Some or all of the targets for the other success factors can only be assessed at more detailed stages of planning, or post-occupancy.

The success factors in Table 7 are presented in the order of importance derived during the development of the sustainability framework, with the success factor of highest importance being shown to the left of the table.

6.3.1 Performance Against Top 5 Success Factors

DSP Part 2 contributes strongly towards three of the most important five success factors, namely:

- Sub-regional economy (score of 3.8 out of 5)
- Efficient use of water in construction and occupation (score of 3.3 out of 5)
- Change in travel behaviour to reduce reliance on the car (score of 4.8 out of 5)

The Plan provides a lesser contribution to the other two of the most important five success factors (reduce GHG emissions associated with construction and occupation (score of 1 out of 3.8), and affordable living (score of 2 out of 5)). This is because achievement of these targets is largely dependent on:

- A number of factors being addressed at the detailed planning and implementation stages of the project
- Establishing appropriate governance arrangements and partnerships with appropriate organisations to deliver desired outcomes

6.3.2 Performance Against Other Success Factors

DSP Part 2 contributes significantly to achieving the success factors of:
- Accessible services
- High population density

It has a moderate contribution to:
- Desirable place to live
- A hub for creativity
- Protection of biodiversity

DSP Part 2, as a standalone document does not contribute strongly to: efficient use of materials;
- Quality of natural water resources
- Safe and healthy neighbourhoods
- Opportunities for socially disadvantaged people

The achievement of the success factors to which this document makes a moderate or low contribution is dependent on more detailed stages of planning, partnerships with appropriate organisations, establishment of appropriate governance arrangements and social marketing to encourage behaviour change.

6.3.3 Supporting Strategies For Success

The following key strategies and plans were identified as important to achieving success factors required to support the realisation of the Plan in the next stages of planning:
- Cost Contribution Plan to assist with understanding the timing of various activities and costs associated with each project component
- Integrated Community and Economic Development Strategy so that community, public art, heritage and economic development issues are not looked at in isolation
- Land Use Strategy to help deliver good outcomes for the hub for creativity success factor
- Public Realm Delivery Strategy to outline how and when the first stages of the development will be implemented
- Integrated Transport Plan
- Local Water Management Strategy
- Integrated Energy Management Plan
- Integrated Green Infrastructure Plan and dedicated steering group to look at the alignment of water management, energy efficiency, waste management and transport plans

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6.4 Green Infrastructure

The purpose of the Cockburn Coast Green Infrastructure Study is to explore, test and refine the possible solutions and to deliver a green infrastructure plan that achieves the DSP sustainability targets with maximum benefit to the project.

Water	• 30% reduction in scheme water (against per capita average) • 60% wastewater re-use
GHG emissions	• 40% reduction in stationary GHG emissions (against per capita average)
Transport	• 60% dwellings to be within 800 m of public transit
Waste	• 20% waste reduction (against per capita average)

Table 9_District Structure Plan targets relating to Green Infrastructure

Green infrastructure is a term used to describe technologies and strategies that ensure more sustainable outcomes in greenhouse gas emissions, water use and materials recovery. Green infrastructure could be:

- Efficient, low carbon public transport, such as Light Rail Transit
- Distributed systems, such as local third-pipe recycled non potable and local renewable energy generation
- High standards of building energy and water efficiency

Approach

The approach adopted was to explore the potential green infrastructure options and refine them to suit the Cockburn Coast context and to conducted detailed sustainability performance modelling, using Kinesis' CCAP Precinct tool. The end result is a short-list of green infrastructure technologies and strategies that offer high performance in terms of greenhouse gas emission reduction, reduced scheme water use and high levels of materials recovery for least cost.

Key Findings

The DSP sustainability targets are likely to be achieved using relatively easy to implement green infrastructure technologies and strategies, which includes:

- High standards of building performance in thermal efficiency and water efficiency (7 star NatHERS and 3 star WELS respectively)
- Use of groundwater for third pipe non potable water supply for irrigation
- Solar hot water systems
- Best practice appliances (4.5 star energy; 2 star water)
- 5 star space heating and cooling systems
- Bus rapid transit public transport

A second green infrastructure scenario was modelled, which set higher sustainability performance targets than those of the DSP. The analysis found that a step change in performance may be achievable by implementing more innovative options at no significant capital cost increase. Furthermore, in the high performance scenario the household affordability actually improved (see Figure 64 below).

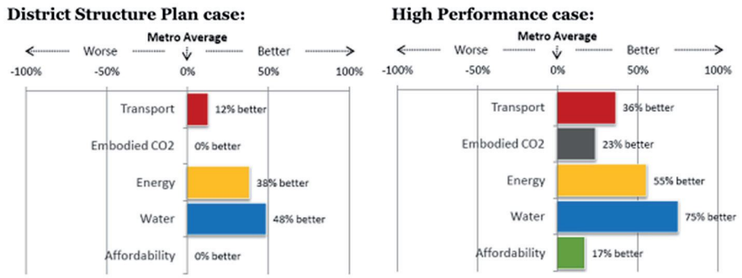

Figure 64

The green infrastructure initiatives in the high performance scenario includes:

- High frequency LRT
- Reduced car parking supply
- High standards of building performance in thermal efficiency and water efficiency (7 star NatHERS and 4.5 star WELS respectively)
- Use of recycled wastewater and groundwater for non potable water supply for irrigation and toilet flushing
- Solar photovoltaics
- Solar hot water systems (for residential detached and semi-detached)
- Best practice appliances (4.5 star energy; 4.5 star water)
- Building and precinct level tri-generation (for multi-story residential and non-residential)
- 22% recycled content in all concrete construction materials.
- In addition, we are recommending enabling infrastructure such as:
- Energy-from-waste capability at Waste Recovery for zero net GHG emission biogas
- Provision for electric vehicles
- Inclusion of 'Smart Grid' technology to manage peak loads
- Vacuum waste collection and separation to improve recovery of organic and recyclable materials

Critical Green Infrastructure and Implementation Risk

The green infrastructure options have been refined to the following list of systems that are considered critical to sustainability performance:

Low implementation risk

- Building performance – thermal, energy and water efficiency and embodied GHG emissions
- Reduced car parking supply
- Solar energy systems
- Enabling infrastructure

High implementation risk

- Light Rail Transit
- Third pipe recycled non potable water supply
- Cogeneration with district heating and cooling (tri-generation)
- Energy-from-waste
- Waste segregation and collection

Low implementation risk options can be implemented relatively easily through local structure plan provisions, design guidelines and/or contract of sale.

High implementation risk options will require more detailed feasibility assessment and cost-benefit analysis and there is greater regulatory, financial and governance barriers to overcome. It is unlikely that these options will be able to be mandated, but would rather be facilitated through a comprehensive strategy.

A Distributed and Integrated Model

A distributed and integrated systems approach has been taken in the development of the scenarios. The impact of the integration between urban form and green infrastructure on sustainability performance is demonstrated in the following examples:

- Reduced parking supply promotes a high-density urban form, a scenario that improves the viability for a light rail option and reduces car ownership, the result of which is less greenhouse gas emissions and improved household affordability
- A high-density urban form uses less water as there is a reduced need for residential irrigation plus improve opportunities for wastewater recycling
- A high-density urban form use energy more efficiently as multi-story buildings have better thermal efficiency and improve viability for tri-generation systems with district heating and cooling.

Figure 65 demonstrates the supply and recovery pathways for energy, water and materials of the proposed high performance scenario. The 'eco-cycle' system has been borrowed from the Hammerby Sjöstad sustainable city in Sweden and modified for the Cockburn Coast context to demonstrate the distributed and integrated approach.

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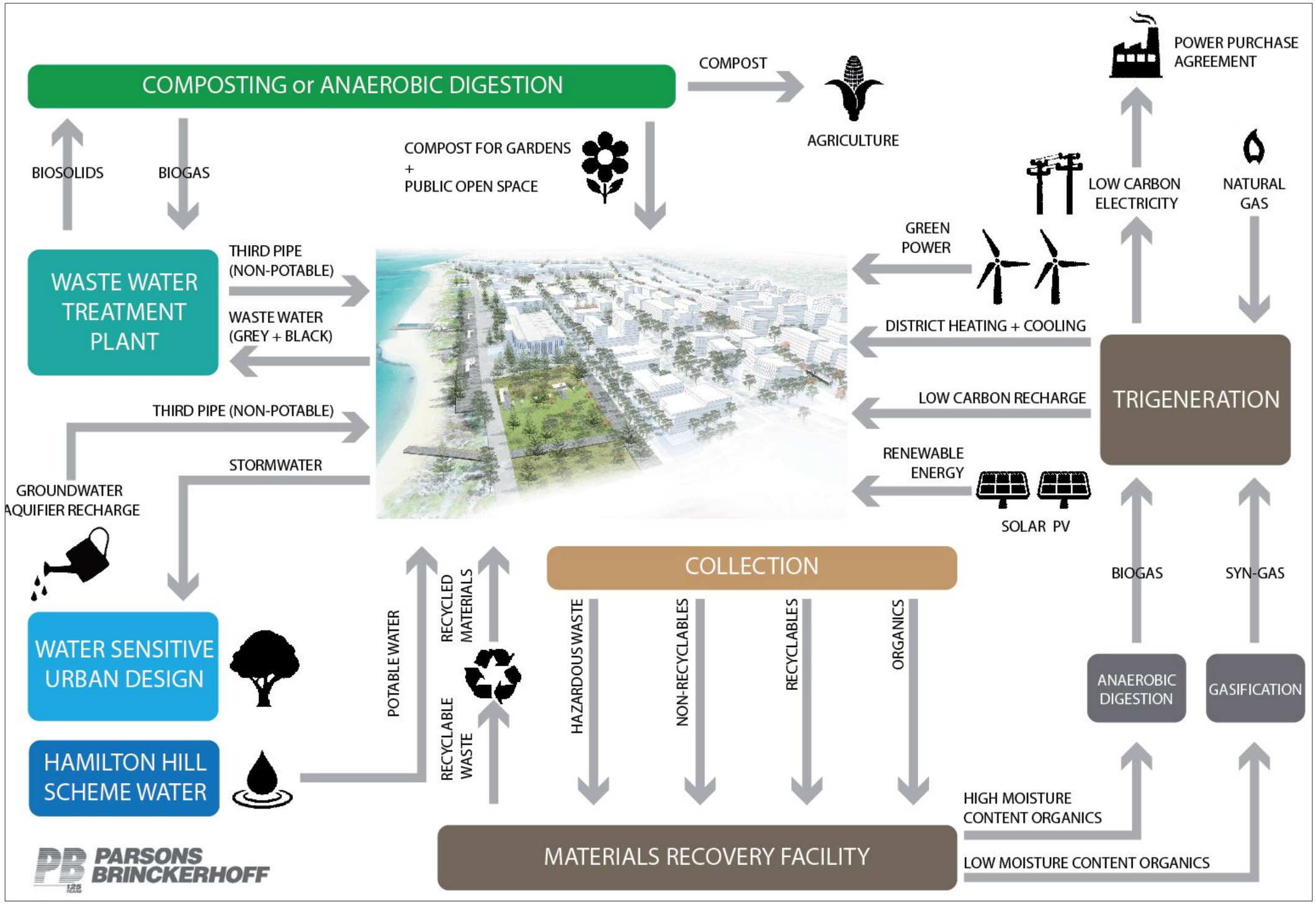

Figure 65_A distributed and integrated systems approach model